Northeastern University

Graduate Catalog
2021–2022

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General Admission and Transfer Credit

Regulations Applying to All Degree Programs

A copy of each graduate degree program as approved by the Board of Trustees and as officially amended is on file in the Office of the Provost. This record contains the goals, learning objectives, and all requirements for the program. All descriptions of the program in the university, college, and department publications must conform to this officially approved record.

Standards of admission are specific to certificate and degree programs and are found in the Graduate Catalog. (http://catalog.northeastern.edu/graduate/)

Admission Requirements

Prior to beginning a graduate program at Northeastern, students must have met one of the following criteria:

1. Received a bachelor's degree or equivalent from an accredited college or university
2. Received a master's degree or equivalent degree from an accredited college or university
3. Received a first professional or equivalent degree from an accredited college or university
4. Been accepted into an approved bachelor's-to-graduate-degree program at Northeastern University

Conditional Admission

A student who has not provided required documentation for admission by the due date for final grades for the student's first academic term will not be permitted to register for a future term.

Transfer Credit

Transfer credits from other institutions (or other programs within the university) will only be accepted at the discretion of the student's destination academic unit and the associated college with the following constraints:

- For graduate certificate programs, a maximum of 3 semester hours or 4 quarter hours of credit earned at another institution may be accepted toward the credential being pursued at Northeastern, provided the credits meet the above-listed standards.
- For master's degree programs, a maximum of 9 semester hours or 12 quarter hours of credit earned at another institution may be accepted toward the degree being pursued at Northeastern, provided the credits:
    1. Consist of work taken at the graduate level for graduate credit
    2. Carry grades of 3.000 or better
    3. Have been earned at an accredited institution
    4. Have not been used toward any baccalaureate or advanced degree or certificate at another institution
- Graduate course credits earned at Northeastern by undergraduate students enrolled in a PlusOne program will be double counted toward both the undergraduate and graduate degrees as prescribed by the graduate program in which the student is enrolled, not to exceed 16 semester hours or 12 quarter hours. Transfer credit may not be applied to graduate degrees that are completed as part of a PlusOne program.
- Students may credit-share specified courses taken while in undergraduate status for both the bachelor's and PhD degrees. A student who departs from the program before receiving PhD candidacy may opt to use those courses toward a master's degree earned. However, such credit sharing cannot be used for more than two credentials, i.e., degrees and certificates. Please see above for limits on credit sharing between credentials.
- Graduate programs may approve advanced standing credit toward its degree programs from industry-based courses deemed equivalent to, or in place of, degree requirements, not to exceed 9 semester hours or 12 quarter hours. In each case the degree program curriculum committee must approve of the course assessments or provide an assessment to evaluate learning outcomes.
- For doctoral programs, a maximum of 25 percent of the total semester hours of required coursework may be granted upon the recommendation of the admitting college's graduate committee.
- Transfer credits must have been earned within five academic years of the date of matriculation in the Northeastern program to which they are to be applied.
- Grades earned in courses to be applied as transfer credits are not counted as part of the overall grade-point average (GPA) earned at Northeastern and are posted with a grade of T to the transcript.

Uniform Credit System

One credit hour of academic credit consists of three hours of work per week throughout the term, usually one hour of class contact and two hours of outside work. When students are registered for thesis credits, directed study, or internship, the appropriate number of credit hours will be determined using the same method. Programs may vary the ratio of class time to preparation time depending on the learning outcomes and accreditation standards appropriate in their field(s).

A quarter hour is evaluated as three-quarters of a semester hour.

When students are registered for thesis credits, directed study, or internship, the appropriate number of credit hours will be determined using the same method.

Additional information on course and credit guidelines can be found here (p. 26).

Undergraduate Credit for Graduate Courses

Undergraduate students who are juniors or seniors may enroll in graduate courses for credit toward their undergraduate degrees if they meet all

prerequisites as determined by the graduate director and they receive permission from the instructor of the course and from the student's undergraduate academic advisor.

Time Limit for Course Credit

Course credits earned in the program of graduate study, or accepted by transfer, are valid for a maximum of seven years unless the relevant graduate office grants an extension.

Academic Progression

Grades submitted to satisfy, in whole or in part, the requirements for any graduate degree or certificate of advanced study must yield a cumulative GPA of 3.000 or higher. This requirement may be supplemented by additional restrictions established by the graduate program or the college's graduate office such as, but not limited to, the maximum number of individual courses with grades below 3.000 that may be obtained without being required to withdraw or a minimum GPA in each semester.

Students falling below 3.000 will be placed on academic probation. If the student remains on academic probation for two terms, they may be terminated from the graduate program.

Not more than two courses or six credit hours, whichever is greater, may be repeated to satisfy the requirements for the degree. The last grade earned in each of these repeated courses will be counted in the calculation of the cumulative GPA.

Any incomplete grades must be made up within one calendar year from the term in which the student took the class that resulted in the incomplete course grade.

Language Requirements

The committee in charge of the degree program may establish a language requirement.

Required Training

Graduate programs may require relevant training that all of the program's students must complete by deadlines communicated by the university or by the student's graduate program advisor.

General Regulations and Requirements for Graduate Certificate Programs

Certificates that Appear on the Transcript

DEFINITION

A graduate certificate program is a program of study requiring at least four graduate courses or 12 semester hours or 16 quarter hours of graduate credit. Successful completion of such a certificate program will be recorded on the student's transcript. Appropriate graduate credits taken as part of a graduate certificate program may be counted toward a graduate degree, at the discretion of the graduate degree program.

ADMISSION

All students admitted to a certificate program must satisfy the general requirements for admission as a graduate student and the requirements for the specific certificate program.

PROCEDURES FOR THE APPROVAL OF NEW CERTIFICATE PROGRAMS

New certificate programs are developed following the procedure outlined in the Guidelines for New Degree Programs found in the Office of the Provost website. (https://provost.northeastern.edu/policies/.html)

If the certificate program is identified as a component of an existing master's degree, following discussion and approval by the Graduate Council, additional approval by the Faculty Senate and Board of Trustees is not required. The provost will notify the Faculty Senate, president, and Board of Trustees of the decision. Certificate programs that are comprised substantially of new courses follow the full approval process.

PROCEDURES FOR CERTIFICATE PROGRAM REVIEW

Certificate programs will be reviewed in the context of departmental reviews. Information about these reviews can be found in the Office of the Provost website. (https://provost.northeastern.edu/policies/)

GENERAL REGULATIONS

Except as indicated herein, certificate programs shall be subject to the same regulations and procedures as Master's Degree programs.

Transcript Notation

Only approved degrees, certificates, and concentrations appear on the transcript.

General Regulations and Requirements for the Master's Degree

Admissions Requirements

All students admitted to a master's program must satisfy the general requirements for admission as a graduate student and the requirements for the specific master's program. To be eligible for admission, with the exception of PlusOne students, applicants must have a bachelor's degree from an accredited college or university.

Provisional or Special Students

Some applicants may be accepted as provisional or special students; however, international students cannot be accepted as provisional or special students. Provisional students must obtain a 3.000 grade-point average in the courses specified by the program, not to exceed more than the first 12 semester or 16 quarter hours to continue in the graduate program; they then become eligible to apply for admission as degree-seeking students.

Course Requirements

A candidate for the master's degree must satisfactorily complete an approved program conforming to the requirements of the graduate school and department or program in which the candidate is registered.

The requirements for the master's degree are a minimum of 30 semester hours beyond the bachelor's degree except in the College of Professional Studies in which 45 quarter hours of graduate work are required. Undergraduate-level coursework will not be accepted to meet the requirements for the master's degree.

Comprehensive Examination

The committee in charge of the degree program may require a final written or oral comprehensive examination(s) for partial fulfillment of degree requirements.

Thesis

If a thesis is required in partial fulfillment of degree requirements, it must show independent work based, in part, on original material and must meet the approval of the student's thesis committee. The committee in charge of the degree program is responsible for providing instructions concerning preparation of the thesis.

The student must submit the thesis to ProQuest (or a university-sanctioned successor system) for archiving in sufficient time to allow

for acceptance before the degree clearance deadline. Information on archiving a thesis is available in the Graduate Office.

General Regulations and Requirements for Professional Doctorate Degree Programs

Admissions Requirements

All students admitted to a professional doctorate degree program must satisfy the general requirements for admission as a graduate student and the requirements for the specific professional doctorate degree program. To be eligible for admission, applicants must have a bachelor's degree from an accredited college or university.

Provisional or Special Students

Some applicants may be accepted as provisional or special students; however, international students cannot be accepted as provisional or special students. Provisional students must obtain a 3.000 grade point average in the courses specified by the program, not to exceed more than the first 12 semester or 16 quarter hours to continue in the graduate program; they then become eligible to apply for admission as degree-seeking students.

Course Requirements

A candidate for the professional doctorate degree must satisfactorily complete an approved program conforming to the requirements of the graduate school and department or program in which the candidate is registered.

The requirements for the professional doctorate degree shall be determined by the program.

Undergraduate-level coursework will not be accepted to meet the requirements for the professional doctorate degree.

Comprehensive Examination

The committee in charge of the degree program may require a final written or oral comprehensive examination(s) for partial fulfillment of degree requirements.

Thesis or Dissertation in Practice

If a thesis or dissertation in practice is required in partial fulfillment of degree requirements, it must show independent work based, in part, on original material and must meet the approval of the student's thesis committee. The committee in charge of the degree program is responsible for providing instructions concerning preparation of the thesis.

The student must submit the thesis to ProQuest (or a university-sanctioned successor system) for archiving in sufficient time to allow for acceptance before the degree clearance deadline. Information on archiving a thesis is available in the Graduate Office.

General Regulations and Requirements for the Certificate of Advanced Graduate Study

The Certificate of Advanced Graduate Study (CAGS) provides specialized study above the master's degree. It is a course of study that falls between the master's and doctoral degree and culminates in a graduate certificate.

Admissions Requirements

An applicant for the CAGS must hold a master's degree in a related field from an accredited institution and must complete the admission procedure described in the material of the graduate schools. All students admitted to a CAGS program must satisfy the general requirements for admission as a graduate student and the requirements for the specific CAGS program.

Course Requirements

A candidate for the CAGS must satisfactorily complete an approved program conforming to the requirements of the graduate school and department or program in which the candidate is registered. The candidate must complete a minimum of 24 semester hours or, in the case of the College of Professional Studies, 32 quarter hours of credit beyond the master's degree.

Regulations Applying Only to Doctor of Philosophy (PhD) Programs

The formal requirements for the PhD degree are the following: completion of the coursework mandated by the individual degree program, fulfillment of the residency requirement, formal training in the Responsible Conduct of Research for students as appropriate, qualifying and/or comprehensive examination(s) or equivalent if required by the degree program, continuous registration, a final oral examination conducted by the student's PhD committee, and submission of a dissertation to the relevant graduate office and to ProQuest (or a university-sanctioned successor system) for archiving. The dissertation must be based on original and independent research.

Admissions Requirements

All students admitted to a doctor of philosophy program must satisfy the general requirements for admission as a graduate student and the requirements for the specific PhD program.

Academic Classification and Degree Candidacy

1. Doctoral student: Students in this classification have been admitted to a doctoral program.
2. Doctoral candidate: Every degree program shall have a policy defining candidacy. Students in this classification will have completed all departmental, college, and university requirements except for the dissertation. These requirements vary by program but minimally include completion of approximately 30 semester hours of acceptable graduate work beyond the bachelor's degree or possession of a previously earned master's degree that is acceptable to the department and certification by the graduate office. The requirements frequently include a comprehensive examination and/or a proposal defense.

Academic Residency Requirement

In the context of a doctoral degree program, the "residency requirement" refers to either:

1. A minimum number of credits or semesters that must be completed at the degree-granting institution
2. A minimum duration during which the degree candidate must be enrolled full-time at the degree-granting institution

After reaching candidacy, students must register for Dissertation for a minimum of two semesters in order to fulfill their formal residency requirement. Continuation status enrollment is for students who are post-candidacy, have completed all coursework and their residency requirement, and are actively engaged in completing a dissertation.

Responsible Conduct of Research

All doctoral students for whom Responsible Conduct of Research training is required must complete training according to the university's Policy on the Responsible Conduct of Research. (https://www.northeastern.edu/policies/Policy_on_Responsible_Conduct_of_Research.pdf)

Course Requirements

The program committee in charge of the degree program specifies the doctoral course requirements.

Qualifying Examination(s)

In departments that require qualifying examinations, students must be notified in writing of the nature and regulations governing these examinations and of how their performance on the examinations will affect their normal progress toward the degree. The graduate office shall be made aware of the department regulations concerning such examinations.

Annual Review of Student Progress

Units shall define milestones for achieving satisfactory academic progress and shall establish a published process by which the academic progress of every PhD student will be evaluated through an annual review. A copy of each review shall be submitted to the student and the graduate office.

PhD Dissertation Committee

No dissertation committee shall have fewer than three faculty members, two of whom shall be from Northeastern University. The chair of the dissertation committee will be a full-time tenured or tenure-track member of the faculty of Northeastern University and will hold a PhD (or other research doctorate). Exceptions to this policy will be considered and, if appropriate, approved by the provost or their designee.

The PhD committee should be appointed early enough to advise in the formulation of the student's program and in refining the research topic for the dissertation. Within the constraints of the above criteria, the PhD program faculty will determine the process by which dissertation committees are established. The final list of dissertation committee members shall be reported to the college's associate dean for graduate education.

If a student's major advisor leaves Northeastern (including transition to emeritus status), that person may continue the research direction of the dissertation or thesis. However, a co-advisor must be appointed from the academic department or program. The student will then have two advisors, one an official member of the Northeastern faculty who will be available for research and administrative matters and the ex-Northeastern advisor. If a new major advisor is appointed, the ex-Northeastern faculty member may serve as an outside member of the committee.

Comprehensive Examination(s) and/or Proposal Defenses

Degree programs may require a comprehensive examination(s) and/or an oral defense of the dissertation proposal as the final step before becoming a PhD candidate. The purpose of the comprehensive examination(s) is to test the knowledge and skills of the student in a particular area and his or her knowledge of recent research developments in the field. The administrative home unit for each PhD program shall establish the process by which comprehensive examination committees are established. Units may require an oral defense of the dissertation proposal in lieu of, or in addition to, a comprehensive examination.

Dissertation

Candidates for the degree of Doctor of Philosophy must complete a dissertation that embodies the results of extended research and makes an original contribution to the field.

Oral Defense of the Dissertation

An oral defense of the dissertation is required and must be held at least 14 calendar days before the degree conferral date. The defense shall be conducted with the committee members present either in person or via electronic means. In the case where neither the candidate nor the committee members are present in person on campus (i.e., the candidate and all committee members are connected only remotely via electronic means), there shall be a location established and technology enabled for public, in-person attendance of the defense by the university community and this accommodation made known to the university.

Submission of the Dissertation

The student must submit the dissertation to ProQuest (or a university-sanctioned successor system) in sufficient time to allow for acceptance before the commencement clearance deadline. Information on archiving a thesis with ProQuest (or a university-sanctioned successor system) is available in the program-relevant graduate office.

Time Limitation for Achieving Candidacy and Degree Completion

Degree candidacy must be achieved within two years of completion of required coursework, and the PhD degree must be completed within a maximum of five years after completion of required coursework. Under extenuating circumstances, a student may request an extension of this time frame from the graduate office.

Pursuit of an Academic Credential Outside Student's Major

A student enrolled in a PhD program may seek to pursue academic credentials (e.g., master's degree or certificate) outside of their major only if, prior to completing more than one-third of the required credits for that credential, they obtain the approval of their primary advisor, obtain the approval of their home college graduate office, and apply to and are accepted into the major offering that credential.

General Regulations and Requirements for Interdisciplinary Graduate Degrees

Northeastern University offers individually designed and approved interdisciplinary graduate programs. The individually designed program is for the student who wishes to pursue graduate studies in an area that substantially overlaps two or more units. In such cases, that student may design, in consultation with his or her faculty advisor(s), an interdisciplinary program. The program will correspond in scope and depth to Northeastern's established degree standards but need not agree exactly with the regulations of individual units. Individually designed, interdisciplinary degree programs must be approved by the appropriate graduate office(s).

There are also approved, specified interdisciplinary programs in which two or more units have jointly established a graduate program. As with individually designed programs, such approved, specified programs must correspond to Northeastern's established degree standards but may not agree exactly with the regulations of individual units.

University-approved Interdisciplinary Programs

Interdisciplinary programs are university-approved programs in areas of study that combine study in two or more units.

Each interdisciplinary graduate program shall be managed as established in the approved design of the program. All interdisciplinary programs, both master's and PhD, shall identify a committee with representation from all of the units involved to oversee the administration of the program in accordance with the guidelines established here (p. 9). All administrative details, including but not limited to, admission, probation notification, and graduation clearance, shall be carried out by the unit designated as the administrative home. Curriculum design and any subsequent modifications to a program shall be approved by the established procedures within all of the units involved.

Individually Designed Interdisciplinary Programs

In order to pursue an individually designed, interdisciplinary graduate program, a student must have been accepted into an approved graduate program that will serve as the administrative home unit for the interdisciplinary program.

Successful application for admission to an individually designed interdisciplinary program consists of a written proposal describing the areas of proposed study and research. Part of this proposal will be a list of courses to be taken; a description of the qualifying and comprehensive examination process to be used, if any; a timeline; and any other requirements of the program. This proposal must be designed and prepared in consultation with a faculty member at Northeastern University who is qualified to serve as the thesis or dissertation advisor. At least two units must participate in order for the proposal to be deemed interdisciplinary. The proposal must correspond in scope and depth to Northeastern's established degree standards. All of the units and the respective associate dean(s) for graduate education of the participating college(s) must approve the proposal. Approval of the proposal indicates that appropriate curricular and other academic norms for the specified degree are satisfied. A proposal for a PhD must define an area of study in which original and independent research can take place.

Admission of the student to the interdisciplinary program of study requires favorable recommendation by all units involved, including the administrative home unit. It also requires the commitment by a faculty member at Northeastern University to be the advisor of the student and chair of the interdisciplinary committee for the student. This faculty member may or may not be a member of the administrative home unit. The committee must be assembled within the first semester of the program and must include faculty members from all of the participating units. At least two units must be represented on the committee. This committee will be responsible for overseeing the completion of the degree requirements. It will also be responsible for the administrative elements of the program, such as the monitoring of satisfactory progress; the design and grading of the preliminary and comprehensive exams, if applicable; graduation clearance; etc. This interdisciplinary committee is also responsible for an annual review of the progress of the student and for reporting this progress to the administrative home unit on an annual basis.

Information for Entering Students

Graduate education at Northeastern integrates the highest level of scholarship across disciplinary boundaries with significant research and experiential learning opportunities in Boston and around the world. Northeastern offers hundreds of graduate programs, ranging from doctoral and full-time master's programs to part-time programs and graduate certificates, including an array of innovative PhD and master's programs designed to prepare students for emerging new fields. Students are able to take courses on campus, online, or in hybrid formats. This multidimensional learning environment offers students the knowledge and experience to excel and the flexibility to create the educational experience that best meets their needs. Our graduates are well positioned to meet the diverse demands of careers in academia, industry, and the professions.

Academic Resources

Libraries

Northeastern University Library

Website (https://library.northeastern.edu)
617.373.8778

The Northeastern University Library serves the entire Northeastern University community—in Boston, across the global campus network, and online. The Library provides collections and services supporting research and teaching across disciplines. Its collections are extensive, with a large proportion available digitally. The Library's collections include 483,683 print titles; 1,080,981 e-books; 181,059 licensed e-journals; and 133,733 streaming audio and visual titles. Access to print and electronic materials is provided through Scholar OneSearch, the Library's discovery platform. The Library's Archives and Special Collections hold historical records and publications of Northeastern University and unique materials preserving the history of Boston's social movements, public infrastructure, neighborhoods, and natural environments.

Services provided by the Library include both on-site and online research help, the latter including 24/7 live chat with a reference librarian; subject-specialist librarians who provide in-depth consultation and research support for each academic program at the university; and an interlibrary loan system for providing materials not readily available at Northeastern. The Library actively supports the unique needs of graduate students in research and publishing through services such as citation management workshops, research data support, and digital scholarship services.

The Snell Library building is open to all Northeastern University students, faculty, and staff. Spaces in the building include areas for group work and quiet individual study, with more than 30 group study rooms with whiteboards and plug-in displays for collaborative group work. Individual study rooms are also available for graduate students. In partnership with Information Technology Services, the Library supports the Digital Media Commons and InfoCommons computing areas, providing high-level media creation and editing capabilities. The Digital Media Commons also includes a 3D printing studio and professional-level audio and video recording studios.

School of Law Library

Website (https://www.northeastern.edu/law/library/)
617.373.3332

The School of Law Library, located on four floors in the Knowles Law Center, includes a comprehensive collection of U.S. legal materials in

print and in electronic format. Of particular note is the library's collection in the areas of public interest law; international human rights law; and public health, death penalty issues, and progressive lawyering. More information can be found at the School of Law Library webpage (http://www.northeastern.edu/law/library/).

Office of the Registrar

Walk-in address
271 Huntington Avenue

Mailing address
Northeastern University
ATTN: Office of the Registrar, 230-271
360 Huntington Avenue
Boston, MA 02115-5000

617.373.2300
617.373.5351 (fax)
registrar@northeastern.edu
Website (https://registrar.northeastern.edu/)

The Office of the University Registrar provides an important link between the university's academic programs and policies and the student. It administers a number of specific services, including class scheduling, registration, record functions, verification of enrollment, reporting, transcript services, and Commencement.

The registrar's office utilizes the myNortheastern web portal and the Student Hub to provide students convenient access to information and services, including class schedules and registration, most recent grades, unofficial transcripts, and transcript and enrollment verification requests. Additional information is available at the Office of the University Registrar website (https://registrar.northeastern.edu/).

Campus Resources

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Center for Advancing Teaching and Learning Through Research

215 Snell Library
617.373.3157
617.373.7779 (fax)
catlr@northeastern.edu
Website (https://learning.northeastern.edu/)

The Center for Advancing Teaching and Learning Through Research (CATLR) provides professional development for all graduate students at Northeastern in their roles as teaching assistants, instructors, and future faculty and professionals. We provide a range of opportunities for graduate students to develop effective teaching skills, including course design and communication. CATLR is committed to supporting your success at Northeastern and beyond, and we welcome you to:

- Participate in workshops and other events to learn about effective practices in teaching and course design and to adapt them for your own current or future use.
- Meet one-on-one with a CATLR consultant to discuss any aspect of teaching or preparing for the academic job market and postdoctoral careers, including developing course syllabi, teaching statements, teaching portfolios, and diversity statements.
- Invite a CATLR consultant to observe your class, recitation, lab, studio, or guest lecture and to meet with you afterward to share and discuss their observations in relation to your own goals and reflections.
- Register for the self-paced Future Faculty Program to prepare for and reflect on the various dimensions of teaching in higher education.

All of CATLR's services are provided on a formative and confidential basis.

Disability Resource Center

617.373.2675
617.373.7800 (fax)
Website (http://www.northeastern.edu/drc/)

Northeastern University and the Disability Resource Center (DRC) are committed to providing disability services that enable students who qualify under Section 504 of the Rehabilitation Act and the Americans with Disabilities Act Amendments Act (ADAAA) to participate fully in the activities of the university. To receive accommodations through the DRC, students must provide appropriate documentation that demonstrates a current substantially limiting disability. Accommodations are provided based on an evaluation of the information provided by students and their clinicians, on a case-by-case basis. These services are available for, but not limited to, students with the following diagnoses:

- Learning disabilities and/or AD(H)D
- Autism spectrum disorders
- Chronic or degenerative disorders
- Hearing loss
- Mobility impairments
- Psychiatric disorders
- Traumatic or acquired brain injury
- Vision impairments

Students should provide documentation to the DRC at their earliest convenience to allow for sufficient time for review. After the documentation has been reviewed, a disability specialist will contact the student regarding appropriate next steps. Visit the DRC website (http://www.northeastern.edu/drc/) for additional information or contact staff at 617.373.2675.

Employer Engagement and Career Design

Website (https://careers.northeastern.edu)

103 Stearns Center
617.373.2430
617.373.4231 (fax)
careers@northeastern.edu

Employer Engagement and Career Design serves a diverse and sustainable global network of learners, alumni, and employers, forming a

powerful ecosystem that nurtures lifelong career design and partnerships by enabling learners to:

- Choose a major and explore career options that fit an individual's unique attributes
- Take advantage of experiential learning opportunities
- Make career decisions that will engage students and alumni in productive and fulfilling work
- Prepare for and conduct successful job searches
- Create meaningful and effective engagement with employers
- Contribute to meeting global and societal needs

We collaborate closely with the co-op community in all colleges and campuses across the global university while offering a dynamic framework of career design as lifelong learning with distinctive advising and programs to support learners at all stages of their journey. We are committed to supporting all learners and employer partners in eliminating biases and inequitable systems that stand in the way of achieving their goals and fostering an inclusive and just society.

Graduate Student Government

Website (http://www.northeastern.edu/gsg/)
617.373.4502
GSG@northeastern.edu

The Graduate Student Government (GSG) represents graduate students at Northeastern University, serving as a liaison among the administration, faculty, staff, and students. The role of the GSG is to address the professional, financial, social, and representative needs of the graduate community as follows:

- Seeks to improve the quality of graduate student life, academic affairs, and research
- Offers access to professional development resources and networking
- Facilitates cooperation among the graduate student groups and organizations
- Distributes the graduate activity fee
- Sponsors graduate orientation programs
- Fosters interdepartmental and intercultural communication and appoints graduate representatives to serve on university committees

All graduate students and full-time College of Professional Studies (CPS) graduate students affiliated with the Boston campus are eligible to be part of the GSG Senate. Representatives from the eight graduate schools, the professional schools, and CPS assist the executive board in the affairs of this governing organization. The senate meets regularly during the fall and spring semesters, and all meetings are open to all students.

Public Safety

Northeastern University Police Department

100 Columbus Place
617.373.3333 (EMERGENCY—police, fire, medical)
617.373.3934 (TTY emergency or nonemergency)
617.373.2121 (nonemergency regular business)

Website (https://nupd.northeastern.edu/)

Public Safety Division Administrative Offices
617.373.2696

Personal Safety
617.373.2121

The Public Safety Division is committed to working with Northeastern faculty, students, staff, and neighbors to build relationships and keep our campus thriving. Our work extends far beyond Boston, as we support learners in their academic and experiential endeavors around the world. The Public Safety Division is comprised of three sections: Police Department, Emergency Management, and International Safety.

The Northeastern University Police Department (https://nupd.northeastern.edu/) (NUPD) is a full-service and accredited police agency that comprises patrol and investigative divisions providing 24-hour service. NUPD has developed robust crime-detection and prevention strategies centered on technology and campus community engagement. Our well-trained officers are ready and willing to assist all members of our community.

A personal safety escort (https://nupd.northeastern.edu/our-services/safety-escort-services/) can be provided from one on-campus location to another, any time of day, whenever personal safety is a concern. You'll need to provide your name, Northeastern ID number, and location. Safety escorts usually arrive in 10 to 15 minutes. A special, nighttime off-campus escort service, called the RedEye, runs from dusk to dawn to transport students to their residence within two miles from the center of campus. Every night from 7 p.m. until 6 a.m., the RedEye van will pick students up at the Snell Library. In order to use this escort, you must book a ride in advance using the RedEye app, or you can book a ride at the RedEye dispatch center located at the Northeast Security office in the Ruggles Substation.

SafeZone (https://nupd.northeastern.edu/safezone/) is a mobile safety app that is unique to Northeastern University. SafeZone is a smartphone app that any student or staff member can download and use for free. This app will connect you directly to the Northeastern University Police Department should you need our assistance or emergency support while you are on campus.

NUPD encourages you to not only familiarize yourself with all of the services provided by NUPD but to also utilize the services and safety-related tips provided. If you see something that does not look or feel right, NUPD encourages you to say something by contacting NUPD at 617.373.2121 or utilizing the SafeZone app.

LOST AND FOUND (HTTPS://NUPD.NORTHEASTERN.EDU/OUR-SERVICES/LOST-AND-FOUND/)

If you have lost an item on Northeastern's Boston campus, call 617.373.3913. If your item has been turned in, we will contact you by telephone or email. If you have found an item on campus, return it to our headquarters located at 100 Columbus Place. If you suspect the item has been stolen, call the Northeastern University Police at 617.373.2121 to report the theft.

UNIVERSITY EMERGENCY INFORMATION (HTTP://WWW.NORTHEASTERN.EDU/EMERGENCY/)

617.373.2000 (snow emergencies)
617.373.3333 (police, medical, or fire emergencies)

Northeastern University is committed to providing members of its community with a safe and secure place in which to live, work, and study.

The university is prepared to respond to emergencies and urgent situations that require immediate action. A trained team of police officers, EMTs, health and counseling experts, student affairs and residential life

staff, and other professionals form a coordinated group that is able to manage a wide range of potential situations.

NU ALERT, emergency broadcast communication messages, are sent to the email addresses and telephone numbers students, faculty, and staff have provided the university. For more information on NU ALERT and Emergency Planning, visit the NUPD website (https://nupd.northeastern.edu/safety/emergency-planning/).

University Health and Counseling Services

70 Forsyth Building, Suite 135
617.373.2772 (voice)
617.373.2601 (fax)
uhcs@northeastern.edu
Website (https://www.northeastern.edu/uhcs/)

University Health and Counseling Services (UHCS) provides medical and mental healthcare to current Northeastern students with telehealth and scheduled visits. In addition, Find@Northeastern (https://www.northeastern.edu/uhcs/find-at-northeastern/) provides immediate access and connection to a licensed mental health provider who can offer support 24/7.

UHCS clinicians are board-certified and licensed practitioners who provide confidential assessment and treatment of medical and mental health concerns as well as referrals to specialists in the community. Visit UHCS (https://www.northeastern.edu/uhcs/) for more information, including:

- Access to Care (https://www.northeastern.edu/uhcs/access-to-care/)
- 24/7 Mental Health Support (https://www.northeastern.edu/uhcs/find-at-northeastern/)
- Northeastern University Student Health Plan (https://www.northeastern.edu/nushp/) (NUSHP)
- University Health Report (https://www.northeastern.edu/uhcs/forms/university-health-report/) (immunization requirements)
- Medical Leave of Absence (https://www.northeastern.edu/uhcs/forms/medical-leave-of-absence/) (MLOA)
- Timely health updates

We Care

617.373.7591
wecare@northeastern.edu (we_care@northeastern.edu)

Website (http://www.northeastern.edu/wecare/)

We Care assists students who are experiencing unexpected challenges to maintain their academic progress. The staff works with students to coordinate among university offices, to offer appropriate referrals, and to help develop viable options to support their continued success at the university. We Care also provides guidance to faculty and staff in identifying Northeastern resources and policies to help students succeed.

Information for International Students

Office of Global Services

Website (http://www.northeastern.edu/ogs/)
617.373.2310
617.373.8788 (fax)

The Office of Global Services (OGS) offers a vast array of programs and services to more than 18,000 international students and scholars who represent approximately 146 nations.

OGS also works to promote meaningful interaction and intercultural understanding among citizens of all countries and their peers from the United States, providing educational and cultural enrichment opportunities for all members of Northeastern and the community at large. OGS advances the international community of Northeastern by ensuring immigration compliance while providing transformational academic services and cultural experiences for student satisfaction and successful graduation.

OGS maintains the SEVIS (Student and Exchange Visitor Information System) records of nonimmigrant students and scholars at Northeastern, as mandated by the U.S. federal government. OGS provides information and services to ensure compliance with regulations and procedures affecting those international students and scholars in specified nonimmigrant visa classifications.

OGS serves as a "home away from home" for all international students. Affiliation with OGS begins with admission to the academic program and continues throughout the student life cycle at Northeastern and beyond for alumni who apply for Optional Practical Training (OPT). OGS offers academic support services; cultural acclimation support; and events and initiatives including the cultural festival “Carnevale” in the spring, which celebrates the cultural diversity of the entire university community. For a list of OGS services and programs, visit the OGS website. (http://www.northeastern.edu/ogs/)

International students must maintain full-time status at Northeastern to be in compliance with immigration and SEVIS regulations. Also, they must not engage in any type of employment unless timely authorized by OGS. Note that timely registration for courses is especially important so that they may remain in compliance with current federal regulations. They should consult with OGS if they have questions about their individual status.

Coming to Northeastern

Preparing to study at Northeastern University is exciting, and students have many things to do in preparation. Here are some of the key items students should do to prepare.

- **Obtain F-1 or J-1 visa** from the U.S. embassy or consulate in the home country to be eligible to study in the United States. An international student may attend Northeastern in a nonimmigrant status other than F-1 or J-1 only if U.S. immigration regulations allow for study in the United States under that specific visa classification. Some international students must apply and be approved for a change of status (e.g., from B-2 to F-1) before beginning the program at Northeastern. For detailed information/instructions specific to a student's current nonimmigrant status, eligibility to participate in co-op, or other forms of experiential learning, contact OGS (http://www.northeastern.edu/ogs/).
- **Acquire Student Health Insurance:** Since September 1989, Massachusetts law (M.G.L. c.15A, § 18) has required every full-time and part-time student enrolled in a certificate, diploma, or degree-

granting program in a Massachusetts institution of higher learning to participate in a Student Health Insurance Program (SHIP) or in a health benefit plan with comparable coverage. The Student Health Program defines a part-time student as a student enrolled in at least 75 percent of the full-time curriculum (College of Professional Studies graduate students—7 credits, part-time graduate students—6 credits).

- **Complete health report:** Prior to entering Northeastern, all enrolled students must complete and submit a health report to University Health and Counseling Services (UHCS). It must be completed and returned by the stated deadline. The required record of immunity section is necessary for compliance with the Massachusetts immunization requirements for college-age students. Failure to meet the requirement will prevent future course registration. Additionally, further documentation of immunity is mandatory for students in Bouvé College of Health Sciences. Visit the UHCS webpage (http://www.northeastern.edu/uhcs/) to access the health report online.

Planning Information

New international students are expected to arrive by the program start date stated on the I-20 issued by Northeastern or on the DS-2019 issued by Northeastern or by the sponsoring agency/government.

When making travel arrangements, students should seek admission to the United States no more than 30 days prior to the report date on the I-20 or DS-2019, and students should not arrive after the program start date on the I-20 or DS-2019.

All international students will need to attend the mandatory international student orientation program and complete the international student Online Immigration Clearance. For further details on the OGS international student orientation and online immigration clearance process, and for other information pertinent to international students, check the OGS website (https://international.northeastern.edu/ogs/new-students/arrival/).

International Student Orientation and Cultural Events

OGS (https://international.northeastern.edu/ogs/) organizes a mandatory orientation for international students on an F-1 or J-1 visa. Students will receive an overview of nonimmigrant visa compliance requirements along with information and resources to support academic success, student life, campus safety, and cultural adjustment.

International students on an F-1 or J-1 visa should plan to arrive on campus no more than 30 days prior to the program start date on the I-20 or DS-2019 in order to attend the International Student Orientation and complete the mandatory Online Immigration Clearance. International orientation dates will be listed on the OGS website.

Throughout the year, OGS hosts cocurricular events that celebrate cultures and the rich diversity of the campus. These events are encouraged as a way to gain familiarity with Northeastern in a cross-cultural context while also facilitating the formation of friendships across cultures.

U.S. citizens who have been living abroad are not required to complete OGS orientation sessions but are welcome to participate in cocurricular events. For more information and to register, check the schedule of events on the OGS website. (https://international.northeastern.edu/ogs/)

SEVIS Compliance

OGS is required to comply with immigration regulations governing student status and must report information every semester as required by the Department of Homeland Security.

OGS: Your Resource for SEVIS Advice and Assistance

OGS advises students on the complexities of immigration compliance and interfaces with various U.S. government agencies. OGS maintains and updates the SEVIS system and advises students on relevant issues related to nonimmigrant student status by individual appointments or through workshops and information sessions. Check the OGS website (https://international.northeastern.edu/ogs/) for important updates and/or contact OGS with questions relating to nonimmigrant student status or any aspect of SEVIS compliance.

Information Technology Services

IT Services is the university's central group that provides technology services, solutions, and support to all Northeastern students. Visit the Connect To Tech guide (https://connect-to-tech.northeastern.edu/students/?utm_source=fy22&utm_medium=catalog&utm_campaign=connect) for key technology resources and information that are particularly helpful to students, such as Northeastern accounts, email, laptop recommendations and discounts, software, and good-to-know websites and mobile apps.

Technology Support and IT Service Desk

Tech Service Portal (https://service.northeastern.edu/tech/) (for self-service and live chat support)
617.373.HELP [4357]
help@northeastern.edu

The IT Service Desk is available 24 hours a day, 7 days a week, to assist you with your technology questions and issues—call or email anytime for support. Outside of the Boston area, i (https://services.northeastern.edu/tech/?id=kb_article&sys_id=18ace88a1bd4b0100813a643b24bcb11)nternational and toll-free calling options are available (https://services.northeastern.edu/tech/?id=kb_article&sys_id=18ace88a1bd4b0100813a643b24bcb11). Visit the Tech Service Portal (https://services.northeastern.edu/tech/) to search for how-tos and FAQs, borrow a laptop or other equipment, start a live chat, and search other resources. Occasionally, interruptions to university systems, services, and tools can happen for both expected and unexpected reasons—when they do, get updates about them through Northeastern's IT Status page (https://northeastern.statuspage.io/).

Living in Boston or Beyond

While living in Boston or beyond Boston for co-op or other experiential opportunities, Off Campus Housing and Support Services is here to provide support. For links to off-campus support services, Boston neighborhoods, off-campus apartment listings, renters' rights information, and citywide events, visit the link below.

Off Campus Housing and Support Services

617.373.8480
offcampus@northeastern.edu

Off Campus Housing and Support Services at Northeastern provides support and education related to off-campus housing, relocation services, renters' rights information, and community connection. We offer many resources, special programs, and events to help you find off-campus housing in Boston and beyond, connect with roommates, stay connected to campus, and serve as a link to your peers, alumni, and community.

If going on co-op or part of a Northeastern program beyond Boston, we offer leased housing options in popular co-op locations. We also help you understand your rights and responsibilities as a renter, understand your lease, and how to navigate landlord issues. Peer Community Ambassadors plan programs and events for you, are here to answer all of your questions, and help you meet your neighbors.

Our extensive website offers a host of resources including an apartment search database, information on neighborhoods and transportation, as well as Northeastern, City of Boston, and beyond Boston resources and services.

Off Campus Housing and Support Services publishes an e-newsletter that provides valuable tips and information on upcoming programs and events both on campus and off campus. Individuals interested in receiving our newsletter can email us at offcampus@northeastern.edu.

For more information, visit the Off Campus Housing and Support Services website (https://www.northeastern.edu/offcampus/)!

College Expenses

Tuition and Fees

Please note: Courses taken outside of the student's home college may be billed at the per-credit rate of the college offering the course.

Graduate Program	Cost per Credit Hour
College of Arts, Media and Design graduate programs	$1,718
Bouvé College of Health Sciences graduate programs (excepting specific programs listed below)	$1,685
• Applied Behavioral Analysis	$1,285
• BSN Nursing—Accelerated Program for Second-Degree Students (ABSN)	$1,186
• DNP Nursing Practice with Concentration in Nurse Anesthesia, Clinical	$4,061 (in addition to tuition)
• DPT Physical Therapy—Postbaccalaureate Entry	$19,165 (per semester, new entries effective January 2020)
• DPT Physical Therapy—Postbaccalaureate Entry	$19,625 (per semester)
• DPT Physical Therapy, Sixth Year (effective summer term 2014)	$13,395 (per semester)
• Health Informatics	$1,315
• MS Nursing—Direct Entry	$20,225 (per term)
• MS Physician Assistant Studies	$16,825 (per term)
• PharmD Pharmacy—Direct Entry	$26,108 (per term)
• PharmD Pharmacy—Direct Entry, Clinical	$15,395 (per semester)
• PharmD Pharmacy, Sixth Year (effective Summer Term 2014)	$15,395 (per semester)
D'Amore-McKim School of Business graduate programs (including online programs, excepting specific programs listed below)	$1,640
• MBA Business Administration—Full-Time	$3,000 (billed in two installments of $1,500: fall and spring of Year 1
• MS Accounting	$1,640
• MSAMBA	$69,700 (for program)
• MSF Finance	$1,640
• MS Innovation	$1,640
College of Professional Studies graduate programs (excepting specific programs listed below)	$785
• DLP Law and Policy (self-paced)	$978 (69 QH model—new students as of 7/1/19)
• Executive DLP Law and Policy (students entering prior to 07/01/19)	$2,050
• Executive DLP Law and Policy (69 QH program; new students 07/01/19)	$1,425
• EdD Education	$932
• MEd Education; MAT Teaching (excluding MEd Higher Education Administration)	$646
• MPS Analytics; MS Commerce and Economic Development	$808 (students entering before 07/01/18)
	$855 (students entering 7/1/18–6/30/19)
	$888 (students entering 7/1/19–6/30/20)
	$939 (students entering 7/1/20–6/30/21)
• MPS Analytics; MS Commerce and Economic Development; MPS Applied Machine Intelligence	$975 (students entering 07/01/21–06/30/22)
• MPS Informatics and MPS Digital Media	$785 (students entering before 07/01/18)
	$830 (students entering 7/1/18–06/30/19)

	$862 (students entering 7/1/19–6/30/20)
	$912 (students entering 7/1/20–6/30/21)
	$947 (students entering 7/1/21–6/30/22)
• MS Global Studies and International Relations; MS Regulatory Affairs; MSTC Technical Communication	$808
• MEd Higher Education Administration	$646 (students entering before 07/01/18)
	$683 (students entering 07/01/18–06/30/19)
	$709 (students entering after 07/01/19)
• Master's-level graduate courses for personal and professional enrichment (nondegree)	$785
College of Social Sciences and Humanities (excepting specific programs listed below)	$1,250
• MS Criminology and Criminal Justice	$1,011
• MS Economics	$1,391
• MPA Public Administration	$952
• MPP Public Policy	$946
• MS Security and Resilience Studies	$1,370
College of Engineering	$1,689
Khoury College of Computer Sciences (excepting specific programs listed below)	$1,626
• Data Analytics	$1,690
• Data Science	$1,690
• Cybersecurity	$1,532
College of Science graduate programs (excepting specific programs listed below)	$1,680
• Applied Mathematics	$1,696
• Bioinformatics	$1,680
• Biotechnology	$1,672
• MS Environmental Science and Policy	$1,655
• Marine Biology	$1,445
School of Law (excepting specific programs listed below)	$56,940 (per academic year)
• JD Law, Part-time option (FlexJD)	$42,703.50 (per academic year)
• LLM Law (on ground)	$56,940 (per academic year)
• LLM Law—Online	$1,400
• MLS Legal Studies—Online	$1,094
• MS Media Advocacy (interdisciplinary program with CAMD)	(Please see College of Arts, Media and Design above)
• Graduate Certificates, online	$1,094
Master's or doctoral continuation fee (flat rate)	Equivalent to the college per-credit-hour rate listed above
Dissertation (flat rate)	Equivalent to 1.5 times the college per-credit-hour rate listed above

Fees

Visit Fee Descriptions (https://studentfinance.northeastern.edu/billing-payments/tuition-and-fees/fee-descriptions/) for more details.

Item	Fee
Student Center Fee (per term, Boston campus only)	$70 full-time
	$10 part-time
College of Professional Studies Student Center Fee (per quarter, Boston campus only)	$8.25
Student Recreation Fee (per term)	$60 full-time
	$30 part-time
College of Professional Studies Student Recreation Fee (per quarter, Boston campus only)	$60
Student Activities Fee (per term, Boston campus only)	$17
Residential Student Fee (per term)	$32
Health and Counseling Fee	$225
Health Plan Fee (yearly, optional)	https://www.northeastern.edu/nushp (https://www.northeastern.edu/nushp/)
Parking (per semester, optional)	https://www.masparc.com/products (https://www.masparc.com/products/)/
International Student Fee	$350

Student Refunds

Refund Policies

Inquiries about credit balances should be directed to Student Accounts. Refund requests for credit balances are made via the "Services & Links" section on the student's myNortheastern portal (https://my.northeastern.edu/). Credit balances will be refunded to the student, unless otherwise directed by the student or the bill payer.

Note the following exception: If the credit in your account is due to a Parent PLUS Loan, Supplemental Loan, and/or payment plan payment(s), the credit balance will be refunded to the bill payer on record unless a Refund Authorization form (https://studentfinance.northeastern.edu/

forms/), stating that funds may be released directly to the student, is received from that borrower. If a credit stems from an overpayment with a credit card, the refund must be returned to the credit card that was used.

Official Withdrawal Adjustments

Students who officially withdraw, either from a course or from the university, during an academic term will receive a tuition refund based on the policy specified below. Institutional funds awarded by Northeastern University will be adjusted based on the actual charges incurred during the semester. Funds from federal Title IV programs will be returned to the government according to federal regulations. The federal government Return of Funds Policy dictates that a student's eligibility for federal financial aid is determined by the number of days enrolled during the semester. The refund will be calculated from the day the student submits an official notification of withdrawal to the Office of the University Registrar.

Tuition credits are granted through the first five weeks of a semester or first four weeks of a half semester, based on the date of the official withdrawal processed by the Office of the University Registrar. Nonattendance does not constitute official withdrawal. Credit policies vary according to the duration of the course. Typical tuition adjustments are made according to the following schedule. (The end of week three corresponds with the last day to drop a class without a W grade.)

DURING FULL SEMESTER

During weeks one through three—100% refund
During the fourth week—60% refund
During the fifth week—40% refund
After the fifth week—no refund

SUMMER HALF SEMESTERS AND COURSES OFFERED IN PART-OF-TERM FORMAT

During weeks one through two—100% refund
During the third week—50% refund
During the fourth week—25% refund
After the fourth week—no refund

Leave of Absence Tuition and Fee Adjustments

Please refer to Graduate Schools Academic Policies (p. 32).

Disability Resource Center Tuition Adjustments

Students who are registered with Northeastern University's Disability Resource Center (http://www.northeastern.edu/drc/) (DRC) and are approved for reduced course loads may be eligible to petition the center for tuition adjustments directly related to their documented disability. Further information is available from the DRC.

State, Province, and Country-Specific Refund Policies

For state, province, and country-specific refund information, visit the Student Financial Services website (https://studentfinance.northeastern.edu/policies-procedures/).

Financial Aid Assistance

Student Financial Services

617.373.5899 (Graduate)
sfs@northeastern.edu
studentfinance.northeastern.edu (https://studentfinance.northeastern.edu/)

Northeastern University is available to assist students in developing a plan for financing a Northeastern education. Through a variety of options—including federal financial aid, Northeastern's monthly payment plan, supplemental loans, and your own resources—a plan can be designed that will make your education costs affordable. Visit the Student Financial Services website (https://studentfinance.northeastern.edu/) or contact the office directly for additional information.

How to Apply

To apply for federal financial aid programs, students must submit the Free Application for Federal Student Aid (FAFSA) (https://studentaid.gov/h/apply-for-aid/fafsa/) and include Northeastern's FAFSA school code, 002199. Students are strongly encouraged to submit their FAFSA by the priority filing deadline of March 1 to ensure they are considered for all available financial aid programs.

To electronically sign your FAFSA, you will need your FSA ID. If you do not have one or have forgotten your FSA ID, visit the Federal Student Aid website (https://studentaid.ed.gov/sa/fafsa/filling-out/#get-fsaid) to obtain one before starting the FAFSA.

Federal Financial Aid Eligibility

Students in the graduate colleges must meet the following criteria to be eligible for federal financial aid:

- Be enrolled in at least 6 credits per term for federal financial aid, unless you are on a co-op, clinical rotation, or residency or are enrolled in a full-time or part-time stand-alone course
- Be a U.S. citizen or eligible noncitizen
- Be matriculated in a degree-granting program

  Please note that students enrolled in graduate certificate programs are not eligible for federal financial aid.
- Have received a high school diploma or GED
- Be registered with Selective Service (if required)
- Not be convicted of a drug-related crime in the last year
- Not be in default from previous student loans
- Maintain satisfactory academic progress

Awarding Timelines

New students are awarded on an ongoing basis throughout the spring after we have been notified that they have been accepted into their program.

Returning students are awarded throughout the summer.

For information regarding your financial aid application, log into your myNortheastern (https://my.northeastern.edu/), click on "Services & Links," and select "My Financial Aid Status."

Typical Graduate Financial Aid Award

Students who file the FAFSA will be eligible to receive up to $20,500 in a Federal Direct Unsubsidized Loan, provided that all eligibility requirements have been met. For more information about the Federal Direct Loan Program, visit the Student Financial Services website (https://studentfinance.northeastern.edu/applying-for-aid/graduate/types-of-aid/).

Graduate Assistantships and Scholarships

These positions and awards are offered directly by the individual graduate schools or academic departments. Students seeking such assistance should contact their graduate school for eligibility criteria.

To review a description of available graduate assistantships and scholarships, visit the Student Financial Services website (https://

studentfinance.northeastern.edu/applying-for-aid/graduate/types-of-aid/).

Health Professions Student Loans and Nursing Student Loans

These federal loan programs carry a 5 percent interest rate during repayment. You must demonstrate financial need and meet Northeastern's priority filing date for consideration, as funds are limited. Northeastern University is the lender, and repayment is made directly to Northeastern.

To be eligible for the Federal Nursing Student Loan, students must be enrolled at least half-time in the Bouvé College of Health Sciences. These loans carry a nine-month grace period prior to repayment following graduation, withdrawal, or a drop below half-time status. Repayment on the loan is for a period of up to 10 years with a minimum $40 monthly payment. The loan may be prepaid at any time without penalty.

To be eligible for the Health Professions Loan Program, applicants must be enrolled full-time in the School of Pharmacy in the Bouvé College of Health Sciences. Additionally, students who would like to be considered for the Health Professions Loan Program must include parent income information when completing the FAFSA. These loans carry a 12-month grace period. Repayment on the loan is for a period of up to 10 years with a minimum $40 monthly payment. The loan may be prepaid at any time without penalty.

Physician Assistant Loan

The Physician Assistant Loan is awarded to full-time students in the graduate physician assistant program who demonstrate financial need after filing the FAFSA. The interest rate is fixed at 7 percent. Northeastern University is the lender, and repayment is made directly to Northeastern. The loan amounts range from $1,000 to $3,000, depending upon the student's financial need. Repayment begins one month after the student ceases to be enrolled full-time at Northeastern University.

Federal Direct Graduate PLUS Loan

Unlike Federal Direct Unsubsidized Loans, the Federal Direct Graduate PLUS Loan requires credit approval by the direct loan servicer.

Students have up to 25 years to repay the Federal Direct Graduate PLUS Loan. The Federal Direct Graduate PLUS Loan can be consolidated with Federal Direct Unsubsidized and Perkins loans upon graduation.

Graduate PLUS loans do not have a grace period. Repayment begins after a student is no longer enrolled at least half-time. Students who drop below half-time status and then reenroll above half-time status will need to request their loans be deferred again through their assigned direct loan servicer.

Graduate students who wish to apply for a Federal Direct Graduate PLUS Loan can do so online at studentaid.gov (https://studentaid.gov/app/launchPLUS.action/?plusType=gradPlus). For assistance with financial planning or determining the amount to apply for, please reach out to Student Financial Services.

Supplemental Student Loans

There are a number of educational loan programs available to assist students in covering their expenses over and above any federal financial aid that may be awarded to them from Student Financial Services. Most private lenders have credit and income requirements that must be met before being approved for these programs. Additional information regarding private loans is available here (https://studentfinance.northeastern.edu/billing-payments/financing-options/). Student Financial Services recommends to students that, when researching the loan and lender that best meets their needs, they make sure they take into consideration the interest rate; quality of customer service; and origination, disbursement, and/or repayment fees.

General Financial Policies and Procedures

FINANCIAL AID POLICIES

Student Financial Services reserves the right to adjust a student's initial Offer of Financial Assistance based upon information brought to the office's attention subsequent to extension of the offer, including, but not limited to, increased or new institutional scholarships, outside scholarships, or revised family financial data.

APPEAL/CHANGE IN CIRCUMSTANCES

If the student feels that the aid process does not accurately reflect their situation, or if family circumstances change during the year, the student should notify Student Financial Services for further evaluation. We may request additional documentation from you that might indicate a change in financial circumstances.

CHANGE IN ENROLLMENT STATUS

Students must notify Student Financial Services about any change in planned period of enrollment, whether due to withdrawal from a class, a leave of absence, a change in co-op or academic division, or withdrawal from the university. Students should be aware that any change in enrollment status may result in a change in federal or institutional aid eligibility. It is the student's responsibility to notify Student Financial Services about any change in enrollment status and to ensure understanding of the ramifications of such changes. It is highly recommended that whenever possible, students discuss the impact of such changes with their financial aid counselor before making them.

OUTSIDE SOURCES OF AID

Students must notify Student Financial Services of any aid received from outside sources, such as scholarships. Receipt of these sources may require an adjustment to a student's financial aid award.

REAPPLICATION PROCESS

Students must reapply for financial aid each year by filing the FAFSA online. To receive priority consideration for aid, the federal processor must receive the FAFSA by March 1.

SATISFACTORY ACADEMIC PROGRESS

To continue receiving financial aid, graduate students must maintain the academic requirements for satisfactory progress set forth by their college. Refer to the Student Financial Services website (https://studentfinance.northeastern.edu/policies-procedures/satisfactory-academic-progress/) for more information about how satisfactory progress impacts financial aid eligibility.

VERIFICATION

If a student is selected for verification, Student Financial Services may be required to collect additional documents, including tax returns and other financial documents, to verify the information provided on the FAFSA. Aid cannot be disbursed until this process is completed.

RETURN OF TITLE IV FUNDS

Northeastern University is required by federal statute to recalculate federal financial aid eligibility for students who withdraw, drop out, are dismissed, or take a leave of absence prior to completing 60 percent of a term. Recalculation is based on the percentage of earned aid using the Federal Return of Title IV funds formula. Federal regulations require students to obtain at least one A, B, C, D, or S in at least one course for the term; students who receive all unsuccessful grades for a term (F, NE, W, I, U) may be considered unofficially withdrawn from the term and subject to an aid recalculation, including the possible loss of financial aid for that term.

Bill Payment

Student Financial Services

617.373.2270
617.373.8222 (fax)
studentaccounts@northeastern.edu

Full payment of tuition and other related charges is due prior to the start of the term as specified on the original bill. For questions related to the billing process, late fees, payment methods, tuition payment plan, and refunds, contact us at the phone number and email address provided above.

E-Bill

Tuition bills are generated electronically and are available via the myNortheastern portal (https://my.northeastern.edu/). Once your billing statement is available, you will be notified via email.

Bills must be paid by the due date on the initial billing statement. If a bill has not been received by the first week of the semester, contact Student Accounts. Transcripts and other academic records will not be released until all financial obligations to the university have been met.

Payment of Tuition

Full payment of tuition, residence hall fees, and other related charges are due prior to the start of each semester. Payments will be accepted for billable charges only. The university is not able to process payments for more than the balance due on the student's account.

Accepted methods of payment are:

- **Electronic check (e-check):** Payments can be made online via NUPay on the myNortheastern portal (https://my.northeastern.edu/) and are processed the same day they are received by the university.
- **International payments using Flywire:** Northeastern University has partnered with Flywire to streamline the international wire payment process to the university. This service provides students and their families a safe, cost-effective, and convenient method of making payments to Northeastern University in foreign currencies. To learn more about international payments through Flywire, visit the Student Financial Services website (https://studentfinance.northeastern.edu/billing-payments/payment-methods/).
- **Monthly payment plan:** The monthly payment plan, administered through Nelnet Campus Commerce, allows students to divide their educational costs into smaller, more manageable installments. For additional information, visit the Student Financial Services website (https://studentfinance.northeastern.edu/billing-payments/financing-options/).
- **Supplemental loans:** There are a number of educational loan programs available to assist students in financing their education. Review options at the Student Financial Services website (https://studentfinance.northeastern.edu/billing-payments/financing-options/).

For additional information regarding available payment options, visit the Student Financial Services website (https://studentfinance.northeastern.edu/billing-payments/payment-methods/).

Student Financial Responsibility Agreement

As compelled by federal law, all students who enroll in classes at Northeastern University are required to complete and accept the Student Financial Responsibility Agreement (SFRA) (https://studentfinance.northeastern.edu/billing-payments/sfra/). This agreement must be completed once per academic year and is located on the student's myNortheastern portal (https://my.northeastern.edu/). Failure to complete the SFRA will result in a hold that prevents attendance.

VA Education Benefits

In accordance with Title 38 USC 3679 (e), covered individuals utilizing Chapter 31 or Chapter 33 education benefits at Northeastern University will not have any penalty imposed on their account nor will they be required to take out additional funding due to pending or late payments from the Department of Veterans Affairs as long as the Dolce Center for the Advancement of Veterans and Servicemembers (CAVS) has a current Certificate of Eligibility (COE) or VRE Authorization on file AND a Request for VA Benefit Certification is submitted through the myNortheastern (https://my.northeastern.edu/web/guest/) portal.

COEs must be submitted before the start of the student's first term but do not need to be resubmitted unless entitlement information changes. Students are also required to complete the Request for VA Benefit Certification form through the myNortheastern (https://my.northeastern.edu/web/guest/) portal before the start of each term they wish to use VA benefits. Students may have a hold placed on the account if there is an outstanding balance after payment from the VA is received by Northeastern.

Discrepancies in Your Bill

Discrepancies in your bill should be addressed in writing via email (studentaccounts@northeastern.edu) to Student Financial Services. Include your name, NU ID, account number, dollar amount in question, date of invoice, and any other information you believe is relevant.

If there is a discrepancy in your bill, pay the undisputed part of the bill to avoid responsibility for any late fees or financial holds.

Late Fees

Late fees can be placed on accounts any time after the due date if the account remains fully or partially unpaid. The university typically waits, however, until after the conclusion of the add/drop period, for the specified semester, prior to assessment of late fees. These fees are based on the amount past due at the time of assessment and can range from $75 to $200. Late fees are assessed once per term.

If a student or payer wishes to dispute a late fee assessment, they must do so, in writing, to studentaccounts@northeastern.edu. Please be sure to include the student's name, NU ID, and reason for the dispute in the email.

In cases where students default on financial obligations, the student is liable for the outstanding balance, collection costs, and any legal fees incurred by the university during the collection process.

Tuition Paid Directly by Employers

When a third party pays tuition directly to the university, the student must provide the Office of Student Accounts with a purchase order or a written statement of intent to pay by the third party prior to the first week of classes. If there are stipulations associated with the payment agreement, such as a minimum grade level, then the student must either pay the university directly or enroll in one of the payment options.

Documents pertaining to a third-party agreement can be emailed to thirdparty@northeastern.edu, faxed to 617.373.8222, or mailed to the address below:

Student Financial Services
Northeastern University
ATTN: Third Party Billing

354 Richards Hall
360 Huntington Ave
Boston, MA 02115

Tuition Reimbursement

Many companies, embassies, and agencies directly reimburse students for their educational expenses upon successful completion of courses. In these situations, the student is responsible for paying the bill at the beginning of the semester or selecting another payment option. Tuition may not be left unpaid pending reimbursement by a third party. Check with your human resources department to see if you qualify.

If your company requires an official transcript to process the tuition reimbursement, you may request your transcript through your myNortheastern portal (https://my.northeastern.edu/). Transcripts should be requested prior to the due date on your initial billing statement. Should there be a balance due on your account after the due date, your account may be subject to holds and a transcript will not be available until the balance due is resolved.

Tuition and Fees and Default Policy

Tuition rates, all fees, rules and regulations, courses, and course content are subject to revision by the president and the Board of Trustees at any time. In cases where the student defaults on their tuition, the student shall be liable for the outstanding tuition and all reasonable associated collection costs incurred by the university, including attorneys' fees.

Northeastern University Student Health Plan (NUSHP)

General Information

Since September 1989, Massachusetts law (M.G.L. c.15A, § 18) has required every full-time and part-time student enrolled in a certificate, diploma, or degree-granting program in a Massachusetts institution of higher learning to participate in a Student Health Plan or in a health benefit plan with comparable coverage.

The Student Health Plan defines a full-time student as having full-time student status and enrolled in any amount of credits of a full-time curriculum.

The Student Health Plan defines a part-time student as having part-time student status and enrolled in at least 75 percent of credits of the full-time curriculum (CPS undergraduate students 9 credits, CPS graduate students, 6 credits).

The health fee is assessed each term on a student's account based on these definitions unless the student has previously waived the health plan fee in the current academic year.

Students on co-op or on study abroad are considered active students and will be enrolled in and billed for NUSHP each year.

Students enrolled in online programs are not eligible for NUSHP. Courses that would normally be held in the classroom and are currently being offered online or remotely due to COVID-19 are considered in-classroom courses and may make students eligible for and assessed the NUSHP fee.

Health Insurance Waiver

Eligible students are automatically enrolled in NUSHP each academic year and may waive NUSHP via myNortheastern once they have been billed for NUSHP. In addition, to be eligible to waive, comparable coverage must be effective from the beginning of the term the student meets Student Health Program requirements.

The burden of proof that the alternative insurance is adequate falls upon the student choosing to waive. By submitting the waiver form, the student will be accepting responsibility for all medical expenses incurred, and neither Northeastern University nor its Student Health Plan will be responsible for these expenses.

Northeastern University reserves the right to verify that the student's insurance meets the criteria indicated. Disciplinary action may be taken if a student knowingly waives NUSHP without comparable coverage.

Visit the NUSHP website (https://www.northeastern.edu/nushp/) for waiver deadlines.

University-Wide Academic Policies and Procedures

Academic Appeals Policies and Procedures

Northeastern University affirms that it is essential to provide an appeals mechanism to students who believe that they have been erroneously, capriciously, inappropriately, or otherwise unfairly treated.

If a student feels that they have been the victim of harassment or of discrimination prohibited by law or by university policy, and that this constitutes a substantive basis for the appeal, the appeal shall first be pursued and investigated through the Office for University Equity and Compliance (OUEC) (https://www.northeastern.edu/ouec/). In such cases, the appeal described in Step 2 below is submitted to the appropriate dean(s), and a copy provided to the OUEC. Following a resolution of the harassment/discrimination issues, any remaining academic issues will be addressed, at the request of the student, according to the academic appeals procedures described herein.

Note that these policies and procedures apply to graduate students only.

Individual college appeal procedures can be viewed within the college's section of this catalog.

Academic Appeals

It is the policy of the university that all students shall be treated fairly with respect to evaluations made of their academic performance,

standing, and progress. The university presumes that academic judgments by its faculty are fair, consistent, and objective. Students must understand that the substitution of a different academic judgment for that of the original evaluator is a serious intrusion upon academic prerogatives entrusted to the faculty and others involved in academic evaluations. Nonetheless, the university believes it is essential to provide an appeals mechanism to students who believe that they have been erroneously, capriciously, inappropriately, or otherwise unfairly treated in an academic or cooperative education determination. This includes claims of misinterpretation or inequitable application of any academic provision of the *Graduate Catalog* or *Faculty Handbook*.

Decisions concerning admission or readmission into a program, including dismissals, and matters related to co-op employment (other than grades received) cannot be appealed beyond the college level. While program dismissals cannot be appealed beyond the college level, underlying academic judgments that led to a dismissal can be appealed.

Before invoking the appeals procedures, students are always encouraged to speak informally to their instructors or academic advisers about any determination or grade about which they have questions. If students choose to pursue an appeal, the process is described in the appeals section that follows.

A student may appeal an academic determination by submitting a written statement that details the action or judgment and the basis for the appeal. All parties shall cooperate and act expeditiously in processing the appeal to completion. Appeals shall be filed in a timely manner such that they can be considered during the academic year of the student's home unit.

All appeals should be initiated and resolved in a timely manner in accordance with the detailed time limits provided in this document.

Although students are entitled to seek the advice of outside legal counsel, students may not be represented by a lawyer in the informal or formal academic appeal procedures. A student may consult with the provost or their designee at any point in this procedure for advice or assistance.

It is strongly recommended that international students consult as soon as possible with the Office of Global Services to determine the possibility of any repercussion that the timing of an appeal may have on their immigration status.

Scientific or Research Misconduct

Scientific or research misconduct is defined as fabrication, falsification, plagiarism, or other practices that seriously deviate from those that are commonly accepted within the academic and scientific community for proposing, conducting, or reporting research and does not include honest error or honest differences in interpretation or judgments of data. (Further information can be obtained from the U.S. Office of Research Integrity, Department of Health and Human Services (https://ori.hhs.gov/).) Possible incidences of misconduct are to be reported immediately to the provost or their designee, who will initiate the appropriate procedures. Findings of scientific or research misconduct cannot be appealed through the process below.

Appeal of Final Grades and Outcomes of other Academic Evaluative Processes

STEP 1. DISCUSS CONCERNS WITH INSTRUCTOR AND/OR ADMINISTRATOR

In many cases, students may choose to discuss their concerns with the faculty member who taught the course or a member of the qualifying exam committee. If after this conversation the student's concerns remain unresolved, or if the student is not comfortable discussing the issue with the instructor or other faculty member(s) involved, the student should request a meeting with the appropriate administrator (e.g., director, assistant or associate dean, chair, or group leader) to further discuss their concerns. If these initial attempts to address the issue fail to resolve the student's concerns, or the situation precludes a student from pursuing these steps, the student can initiate a formal appeal as follows. Note that this step should occur as soon as possible after the academic determination given the time frame for appeal statement submission described in Step 2.

STEP 2. PREPARE AN APPEAL STATEMENT

A student must initiate a formal appeal of an academic determination by submitting a written statement (the Statement) that specifies the details of the action or judgment that they seek to appeal. This Statement must start with a clear description of the basis for the appeal and should include: (1) basic facts about the situation leading to the appeal; (2) when the situation occurred; (3) who was involved; and (4) the resolution sought by the student. All relevant supporting materials should be attached as addenda to the Statement. Appeals should avoid unsubstantiated, defamatory or *ad hominem* accusations regarding the motivations of the faculty member or other persons involved in making the academic determination.

This statement, and supporting materials, as submitted to and reviewed by the unit (i.e., college, school, department, or group responsible for reviewing the academic determination), will serve as the basis of the appeal throughout the appeals process, including at the university level.

Graduate students shall submit the Statement and all supporting materials to the college/school administrator specified in the college/school procedures.

The Statement must be submitted no later than 28 calendar days from the day when the academic determination is made available to the student. If a student wishes to dispute a grade in their final term, this must be done within 28 calendar days of degree conferral date.

STEP 3. COLLEGE/SCHOOL-LEVEL APPEAL

A copy of this decision shall be sent to the college/school dean or their designee of the student's home college/school.

STEP 4. UNIVERSITY-LEVEL APPEAL

If the student is not satisfied with the college/school's disposition of the matter, or if the appeal is not resolved within 35 calendar days after originally submitted to the college/school pursuant to Step 3, the student may further pursue the matter by requesting in writing within 10 calendar days of the notification from the college/school in Step 3 that the university convene the Academic Appeals Resolution Committee to review the issue. Students may obtain information on this process from the provost or their designee. This committee has been designated as the final authority on these matters.

A. Academic Appeals Resolution Committee

The Academic Appeals Resolution Committee shall be a standing committee consisting of the following:

- The provost or their designee, who shall be the chair of the committee, and nonvoting member.
- Three faculty members and one alternate faculty member (with the alternate serving in instances where there is a conflict of interest or when a member has to be replaced) all from different colleges appointed by the Faculty Senate Agenda Committee. Members will serve a one-year term with no term limits.

- If the appeal had at any point involved a matter of harassment/discrimination, the committee shall include a representative of the OUEC, who shall be a nonvoting member.

B. Preliminary Matters

Upon receiving an appeal, the committee shall obtain copies of all documentation related to the appeal from Steps 1, 2, and 3, including the procedures of the relevant unit and college/school. If the Academic Appeals Resolution Committee determines, by a majority vote, that the appeal is patently without substance or merit, it may dismiss the appeal.

C. Investigation

The Academic Appeals Resolution Committee shall investigate the matter under appeal by studying the relevant documents (the Statement, supporting documents, and additional accumulated documentation), interviewing the parties (especially the student and the involved faculty member), and taking any other action it deems appropriate. A resolution shall be rendered within 35 calendar days of appeal submission. At no time shall the committee be bound by rules of evidence but shall at all times conduct itself in a manner that is not arbitrary or capricious. The Academic Appeals Resolution Committee may, but is not required to, hold a hearing prior to resolving the issues. However, in all instances, the student and the involved faculty member shall have the right to appear separately and privately before the Academic Appeals Resolution Committee. The student shall have the right to have an advocate from the university community present during his or her testimony to the Academic Appeals Resolution Committee.

D. Authority to Act

The Academic Appeals Resolution Committee has been designated as the final authority on academic matters. At the conclusion of its investigation, the Academic Appeals Resolution Committee shall resolve, by majority vote, the issue by either upholding the finding of the college/school, in which case no further appeal is available, or granting such relief to the student as the Academic Appeals Resolution Committee deems appropriate. The Academic Appeals Resolution Committee shall not render a resolution that contradicts the prior findings or actions of the OUEC.

E. Resolution

All direct parties to the appeal, including but not limited to the student, the faculty member (or others involved in academic evaluations), the dean of the involved college(s), the Faculty Senate, and the registrar, shall be promptly informed in writing of the decisions and actions taken during this academic appeals procedure.

F. Action

The dean(s) or their designee in the involved college(s) shall take whatever action is necessary to implement fully the resolution of the Academic Appeals Resolution Committee.

G. Appeal

Once adjudicated, the matter is considered closed, and no further appeal can be instituted by the student or the involved faculty member with respect to the issue(s) raised at any level of the formal appeals resolutions procedures.

Step 1: Discuss concerns with instructor or appropriate administrator	Timeframe: As soon as possible after academic determination (see note 1 below)
Step 2: Student prepares/submits appeals statement to unit or college/school	Timeframe: Within 28 calendar days of academic determination
Step 3: Unit/college/school-level appeal process	Timeframe: Decision notification within 35 calendar days of student appeal statement submission
Step 4: University-level appeal process	Timeframe: Student submits within 10 calendar days of college/school decision; resolution rendered within 35 calendar days of appeal submission

Note 1: Step 1 should occur as soon as possible after the academic determination given the time frame for appeal statement submission described in Step 2.

Academic Calendars

The graduate schools' programs are offered on a semester calendar consisting of 15 weeks. The College of Professional Studies graduate programs are offered on a quarter calendar consisting of 12 weeks.

Quarter Programs

For student records that include quarter hours, the approved semester-hour conversion rate is (quarter hours) x 0.750. For example, a 4-credit quarter course is equivalent to a 3-credit semester course.

Semester Programs

Traditional semester hours apply.

Campus Transfer and Campus Location Change

Campus Transfer

Students may request an official campus transfer from their school/college to complete their program. The program has to be approved by the school/college academically AND meet regulatory requirements (state/provincial licensure). If the student is an international student, the program has to be offered in compliance with F-1/study permit requirements at the requested new home campus location.

Campus Location Change

Students may request a campus location change to a new campus (the host campus) for a period no longer than one academic year (two consecutive semesters or three consecutive quarter terms) and no more than 50 percent of a degree program. It must be approved by the school/college academically and courses must be offered that allow the student to make normal progress in compliance with regulatory requirements. If the student is an international student, the program has to be offered in compliance with F-1/study permit requirements at the requested host campus location.

* Canadian Campus: Post-Grad Work Permit (PGWP) requires 51 percent of degree completion from within Canada.
* A new I-20 will be issued for students completing more than 50 percent of their program at the new campus.

Code of Student Conduct

The Code of Student Conduct is online at the Office of Student Conduct and Conflict Resolution (http://www.northeastern.edu/osccr/code-of-student-conduct/) website.

Cooperative Education

Website (http://www.northeastern.edu/coop/)

Cooperative education (co-op) is the cornerstone of Northeastern University's experiential learning approach, in which on-campus study is enhanced by real-world experience through full-time employment at locations all over the world. Through co-op, students alternate periods of academic courses with periods of employment in positions related to their academic or career interests. This combination provides an integrated learning experience that enhances both in-class studies and career development.

General Requirements

- Be a full-time student to participate in co-op.
- Complete all pre–co-op requirements as established by the college of the student.
- Make satisfactory progress toward degree completion, including grade-point average requirements, as defined by the university, the colleges, and the major program curricula.
- Have accurate information about the co-op placement in the university's official co-op placement system, including specific start and end dates and meeting the minimum hour and day requirements.
- Not participate in co-op in the final term unless it is specified in the curriculum requirements of the program in the catalog.
- Resolve any previous disciplinary or academic probation issues, or have the cooperative education coordinator approve a plan to resolve these issues prior to applying for co-op jobs.
- Have any self-developed co-op approved by the cooperative education coordinator before accepting the position.
- Comply with any preemployment checks required by the employer, such as drug testing, credit checks, physical examinations, security clearance, and criminal record checks.
- Participate in Title IX training, as required.
- Complete any additional requirements (https://careers.northeastern.edu/students/student-co-op/global-co-op/) if participating in a global co-op.
- Work with the cooperative education coordinator if an Unsatisfactory (U) grade has been received for a past co-op to reestablish eligibility in accordance with the policies and requirements of the college.

TRANSFER AND INTERNATIONAL STUDENTS:

- Transfer students from other universities must have met the same requirements in their major's co-op program as nontransfers and must have completed at least one semester of classes before starting co-op.
- International students must attend one academic year, or its equivalent, and obtain proper authorization from the Office of Global Services before engaging in co-op.

Academic Requirements

1. **Be full-time while on co-op. Full-time status for co-op is defined as either:**
   a. one full-time co-op job; 32-40 hours per week, or
   b. two simultaneous half-time co-op jobs; 16-31.99 hours each, or
   c. one half-time co-op job; 16-31.99 hours with graduate students taking 3 or more academic credits or undergraduate students taking 6 or more academic credits.
      i. Undergraduate students on co-op in a Summer 1 or Summer 2 term may be registered for one half-time co-op without acquiring a second job or taking an accompanying class.
2. **Meet the minimum length requirements for an academic term:**
   a. Semester full-term: minimum of 11 weeks or 55 workdays
   b. Quarter full-term: minimum of 9 weeks or 45 workdays
   c. Summer 1 or Summer 2 term: minimum of 5 weeks or 25 workdays
3. **Receive a grade of Satisfactory or Unsatisfactory for the co-op experience.**

Registration for Co-op

Students are registered for co-op based on a complete job placement in the university's official co-op placement system with accurate start and end dates and meet the minimum hour and day requirements. Registration into the co-op experience class occurs one month before the term. Students need to be placed for co-op by the end of the add period, or they should be registered for classes if still searching for a job by this deadline. All co-op placements need to be approved by a co-op coordinator and entered into an official co-op placement system by the last day to drop without a W.

Co-op Financial Planning

- No tuition is charged while a student is on co-op only (students will pay room and board if they stay in university housing).
- If a student takes a credit-bearing class while on co-op, tuition will be charged at the per-credit rate.
- Students who wish to register for more than 4 credits while on full-time co-op must complete the Petition Registration form (https://registrar.northeastern.edu/wp-content/uploads/sites/9/form-pet-reg.pdf).
- Financial aid will be distributed to match the student's tuition bill and other allowable expenses.
- Students on co-op are required to maintain the same health insurance coverage (either through a private provider or through the university program) as they would while attending classes.

Further Information

For more detailed information about co-op policies and procedures, see the *Cooperative Education Student Handbook* on the Cooperative Education website (https://www.northeastern.edu/coop/).

Course Credit Guidelines

Guidelines for Assigning Credit to Courses

The primary standard for establishing course credit at Northeastern is the semester/quarter hour, or Carnegie Unit, the standard used by the federal government. One hour of credit is awarded for a lecture/seminar class meeting 50 minutes each week during a 15-week semester or 12-week quarter and also requiring a minimum of two hours of outside preparation each week by the student. An hour of contact time in the rest of the document is based on this 50-minute session.

- 2 semester/quarter hours (100 minutes per week of instruction plus 4–6 hours homework, or equivalent)
- 3 semester/quarter hours (150 minutes per week of instruction plus 6–9 hours homework, or equivalent)
- 4 semester/quarter hours (200 minutes per week of instruction plus 8–12 hours homework, or equivalent)

The Office of the Registrar, 271 Huntington Avenue, maintains the official record for all courses. In the event of error in any publication, the academic record will reflect the correct semester/quarter hours applicable to any degree requirement.

On occasion, course titles change, while the course number remains the same. Despite such title changes, the course is still considered to be the same course. Students who have taken the course under the old title and then take the course again under the new title are considered to have repeated the course.

NOTE ABOUT HOMEWORK AND STUDENT PREPARATION FOR CLASS

The credit hour assumes a set proportion of two hours of student preparation or homework for every hour spent in class. Northeastern wishes to emphasize that the federal government has established this as the minimum amount of work expected, and assigning more work does not in itself justify an increase in the credit value of the course. We also wish to note that there is great variation in the amount of time each student will need to devote to each course or to a specific form of study (e.g., reading, writing, completing problem sets), and, therefore, it is not possible to enforce any exact accounting of student work outside of class.

CREDIT ASSIGNMENT PROCESS

Northeastern University uses the Carnegie Unit to determine class meeting time requirements. The actual amount of academic work that goes into a single credit hour is calculated as follows:

- One lecture (taught) or seminar (discussion) credit hour represents one hour per week (50 minutes) of scheduled class/seminar time and two hours of student preparation time.
- One laboratory or studio credit hour represents one hour per week of lecture or discussion time plus one to two hours per week of scheduled supervised or independent work, or a total of three hours in the lab or studio.

DEFINED INSTRUCTIONAL METHODS

- Traditional: meets fully on ground in a physical location with instructor present
- Hybrid: meets majority on ground in a physical location with instructor present with some online instructional component
- Live cast: meets fully on ground in a physical location with the instructor in a different location teaching synchronously and supported by an instructional assistant in the physical location
- Online: meets fully online

FULL-TIME AND HALF-TIME EXPERIENCES

Academic experiences integral to curriculum and requiring registration (but not credit bearing) have the following required hours of participation:

- Full-time experiences: 32–40 hours per week in a semester for a minimum of 11 weeks or 55 days, or in a quarter for 9 weeks or 45 days
- Half-time experiences: 16–31.99 hours per week in a semester for a minimum of 11 weeks or 55 days, or in a quarter for 9 weeks or 45 days (to achieve full-time status, graduate students must take 3 or more academic credits and undergraduate students must take 4 or more academic credits)
- Summer 1 or Summer 2 semester: minimum of 5 weeks or 25 workdays
- Summer quarter: 6 weeks or 30 workdays

International students must confer with the Office of Global Services to determine CPT requirements as appropriate.

Family Educational Rights and Privacy Act (FERPA)

FERPA for Students—General Information

FERPA is a federal law that applies to educational institutions. Under FERPA, schools must allow students who are 18 years or over or attending a postsecondary institution:

- Access to their education records
- An opportunity to seek to have the records amended (see the *Student Handbook* for this procedure)
- Some control over the disclosure of information from the records

FERPA General Guidance for Parental Disclosure

When a student turns 18 years of age or attends a postsecondary institution, the student, and not the parent, may access, seek to amend, and consent to disclosures of his or her education records.

If you are an undergraduate day student and you choose not to share information with your parents, Northeastern will, if asked, indicate that you have restricted access to your records.

Release of Directory Information

The primary purpose of directory information is to allow Northeastern University to confirm attendance for employers, health insurance companies, and loan agencies. Northeastern may disclose appropriately designated "directory information" without written consent, unless you have advised the university to the contrary in accordance with the procedures below. If you choose not to release directory information, all communications with all third parties and agencies will need to be done through your written request to the university or in person.

As of June 30, 2016, Northeastern directory information includes:

- Student name
- Home address (city, state, country only)
- Major field of study
- College
- Class year
- Enrollment status (e.g., undergraduate or graduate, full-time or part-time)
- Dates of attendance
- Degrees, honors, and awards received
- Most recent educational agency or institution attended
- Sports activity participation, showing weight/height of members of athletic teams
- Participation in officially recognized activities

If Northeastern currently has permission to release data and you do not want the university to disclose directory information without your prior written consent, you must notify the university by coming to the Office of the Registrar, 271 Huntington Avenue.

Notification of Rights under FERPA

The Family Educational Rights and Privacy Act (FERPA) affords students certain rights with respect to their education records. These rights are:

1. The right to inspect and review the student's education records within 45 days of the day the university receives a request for access. Students should submit to the registrar, dean, or head of the academic department (or appropriate official) written requests that identify the record(s) they wish to inspect. The university official will make arrangements for access and notify the student of the time

and place where the records may be inspected. If the records are not maintained by the university official to whom the request was submitted, that official shall advise the student of the correct official to whom the request should be addressed.

2. The right to request the amendment of the student's education record that the student believes is inaccurate or misleading. Students may ask the university to amend a record that they believe is inaccurate or misleading. They should write the university official responsible for the record, clearly identify the part of the record they want changed, and specify why it is inaccurate or misleading. If the university decides not to amend the record as requested by the student, the university will notify the student of the decision and advise the student of his or her right to a hearing regarding the request for amendment. Additional information regarding the hearing procedures will be provided to the student when notified of the right to a hearing.
3. The right to consent to disclosures of personally identifiable information contained in the student's education records, except to the extent that FERPA authorizes disclosure without consent. One exception, which permits disclosure without consent, is disclosure to school officials with legitimate educational interest. A school official is defined as a person employed by the university in an administrative, supervisory, academic, or support staff position (including law enforcement unit and health staff); a person or company with whom the university has contracted (such as an attorney, auditor, or collection agent); a person serving on the Board of Trustees; or a person assisting another school official in performing his or her tasks. A school official has a legitimate educational interest if the official needs to review an education record in order to fulfill his or her professional responsibility.
4. The right to file a complaint with the U.S. Department of Education concerning alleged failures by the university to comply with the requirements of FERPA. At Northeastern, the Office of the University Registrar, 271 Huntington Avenue, administers FERPA.

Additional Information

Additional information can be obtained at the U.S. Department of Education's website (http://www.ed.gov/policy/gen/guid/fpco/ferpa/) or by writing to:

Family Policy Compliance Office
U.S. Department of Education
400 Maryland Avenue, SW
Washington, D.C. 20202-5920

Final Examinations and Related Policies on Other Exams

All final examinations, term papers, or projects must be returned to the student or be retained by the department for a period of one year.

General Regulations

Review the general regulations that follow as well as all other regulations or limitations included throughout this catalog. Your success at Northeastern depends, in part, on understanding your rights and fulfilling your responsibilities.

Legal Rights and Responsibilities

GRIEVANCE PROCEDURE FOR DISABLED STUDENTS

It is the policy of Northeastern University to comply with all laws governing access by and discrimination against disabled students. Accordingly, any student who believes that there has been a violation of these laws is encouraged to initiate a discussion with the Office for University Equity and Compliance (https://www.northeastern.edu/ouec/about/).

GRIEVANCE PROCEDURE—SEXUAL HARASSMENT

No employee, agent, supervisory personnel, or faculty member shall exercise his or her responsibilities or authority in such manner as to make submission to "sexual advances, requests for sexual favors, or other verbal or physical conduct of a sexual nature" as an explicit or implicit term or condition of evaluation, employment, admission, advancement, or reward within the university. Neither shall any employee, agent, supervisory personnel, or faculty member make submission to or rejection of such conduct the basis for employment or academic decisions affecting any employee or student. Neither shall any employee, agent, supervisory personnel, or faculty member conduct himself or herself with respect to verbal or physical behavior of a sexual nature where such conduct has the purpose or effect of unreasonably interfering with an individual's work or academic performance or creating an intimidating, hostile, or offensive work or classroom environment.

Though sexual harassment will not be tolerated, the university recognizes that it is difficult to regulate emotional relationships between consenting adults. However, a consensual relationship may be suspect in instances in which one of the individuals has authority over the other. Therefore, no faculty or employee involved romantically or sexually with a student may teach or supervise that person either individually or as part of a group in any activity connected to the university.

Any student, teaching assistant, employee, or faculty member who feels that he or she has been the victim of sexual harassment may bring the matter to the attention of the director of the Office for University Equity and Compliance. Copies of the sexual harassment grievance procedure can be obtained from the Office for University Equity and Compliance (https://www.northeastern.edu/ouec/).

HAZING—CHAPTER 269 OF THE MASSACHUSETTS GENERAL LAWS

Section 17. Whoever is a principal organizer or participant in the crime of hazing, as defined herein, shall be punished by a fine of not more than three thousand dollars or by imprisonment in a house of correction for not more than one year, or both such fine and imprisonment. The term hazing as used in this section and in sections eighteen and nineteen, shall mean any conduct or method of initiation into any student organization, whether on public or private property, which willfully or recklessly endangers the physical or mental health of any student or other person. Such conduct shall include whipping; beating; branding; forced calisthenics; exposure to weather; forced consumption of any food, liquor, beverage, drug, or other substance; or any other brutal treatment or forced physical activity which is likely to adversely affect the physical health or safety of any such student or other person, or which subjects such student or other person to extreme mental stress, including extended deprivation of sleep or rest or extended isolation. Notwithstanding any other provisions of this section to the contrary, consent shall not be available as a defense to any prosecution under this action.

Section 18. Whoever knows that another person is the victim of hazing as defined in section seventeen and is at the scene of such crime shall, to the extent that such person can do so without danger or peril to himself or others, report such crime to an appropriate law enforcement official as soon as reasonably practicable. Whoever fails to report such crime shall be punished by a fine of not more than one thousand dollars.

Section 19. Each institution of secondary education and each public and private institution of postsecondary education shall

issue to every student group, student team, or student organization that is part of such institution or is recognized by the institution or permitted by the institution to use its name and facilities or is known by the institution to exist as an unaffiliated student group, student team, or student organization, a copy of this section and sections seventeen and eighteen; provided, however, that an institution's compliance with the section's requirements that an institution issue copies of this section and sections seventeen and eighteen to unaffiliated student groups, teams, or organizations shall not constitute evidence of the institution's recognition or endorsement of said unaffiliated student groups, teams, or organizations.

Each such group, team, or organization shall distribute a copy of this section and sections seventeen and eighteen to each of its members, plebes, pledges, or applicants for membership. It shall be the duty of each such group, team, or organization, acting through its designated officer, to deliver annually to the institution an attested acknowledgement stating that such group, team, or organization has received a copy of this section and said sections seventeen and eighteen, that each of its members, plebes, pledges, or applicants has received a copy of sections seventeen and eighteen, and that such group, team, or organization understands and agrees to comply with the provisions of this section and sections seventeen and eighteen. Each institution of secondary education and each public or private institution of postsecondary education shall, at least annually, before or at the start of enrollment, deliver to each person who enrolls as a full-time student in such institution a copy of this section and sections seventeen and eighteen.

Each institution of secondary education and each public or private institution of postsecondary education shall file, at least annually, a report with the regents of higher education and, in the case of secondary institutions, the board of education, certifying that such institution has complied with its responsibility to inform student groups, teams, or organizations and to notify each full-time student enrolled by it of the provisions of this section and sections seventeen and eighteen and also certifying that said institution has adopted a disciplinary policy with regard to the organizers and participants of hazing and that such policy has been set forth with appropriate emphasis in the student handbook or similar means of communicating the institution's policies to its students. The board of regents and, in the case of secondary institutions, the board of education shall promulgate regulations governing the content and frequency of such reports and shall forthwith report to the attorney general any such institution that fails to make such report.

STUDENT RIGHT-TO-KNOW AND CAMPUS SECURITY ACT

In compliance with the Student Right-to-Know and Campus Security Act, information regarding graduation rates may be obtained in the Office of the Registrar, 271 Huntington Avenue, and in the Department of Athletics, 219 Cabot Physical Education Center; information regarding safety and security may be obtained in the Office of Admissions and the Public Safety Division, 100 Columbus Place. It is Northeastern University's policy to disclose to an alleged victim of any crime of violence the results of any disciplinary proceeding against the alleged perpetrator of such crime. Further information is available in the Office of Student Conduct and Conflict Resolution (http://www.northeastern.edu/osccr/).

USE OF ALCOHOL AND DRUGS

The unlawful manufacture, distribution, dispensation, possession, or use of a controlled substance is prohibited in or on any Northeastern property. Any university employee or student determined to have violated this policy may be subject to disciplinary action up to and including dismissal. The use of alcohol while on Northeastern property is prohibited except where specifically authorized by the university. No employee may report to work while under the influence of alcohol or illegal drugs. Violation of these regulations may be reason to require evaluation/treatment for substance abuse in coordination with the University Center for Counseling and Student Development and/or for disciplinary action up to and including dismissal. Northeastern University works to provide a drug-free workplace for all university employees and students. The Center for Counseling and Student Development provides resources for treatment and referral for students and employees with substance abuse problems. Educational programs for students, employees, and managers are presented through Human Resources Management, the Office of Housing and Residential Life, the Office of Prevention and Education at Northeastern, and University Health and Counseling Services and cover the dangers of alcohol and drug abuse, the availability of assistance for counseling and rehabilitation, and penalties for violating university policies. To comply with federal law, the university requires that employees directly engaged in performance of a grant or contract must notify their employers of any criminal drug statute conviction for a violation occurring in the workplace no later than five days after the conviction. The university must notify any federal contracting agency within ten days of having received notice that an employee engaged in the performance of such contract has had a criminal drug statute conviction for a violation occurring in the workplace. The university will take appropriate action up to and including dismissal and/or require participation in an approved abuse assistance or rehabilitation program.

USE OF WEAPONS

The use or possession on campus of firearms, explosive agents of any kind, as well as chemicals, mace, and tear gas, is specifically forbidden by the Code of Student Conduct. Violation of this university policy is cause for disciplinary action up to and including expulsion. In addition, it is worth noting that Massachusetts law states: "Whoever, not being a law enforcement officer and notwithstanding any license obtained by him under the provisions of chapter one hundred and forty, carries on his person a firearm as hereinafter defined, loaded or unloaded, in any building or on the grounds of any college or university without the written authorization of the board or officer in charge of said college or university shall be punished by a fine of not more than one thousand dollars or by imprisonment for not more than one year or both. For the purpose of this paragraph, 'firearm' shall mean any pistol, revolver, rifle, or smoothbore arm from which a shot, bullet, or pellet can be discharged by whatever means."

Massachusetts general law prohibits the possession of nunchaku or karate sticks; switchblades; knives; starter's pistols; ammunition; leather armbands or other clothing that has metallic spikes, points, or studs; or other dangerous weapons or articles. A student who possesses any articles for sporting purposes (for example, bow and arrows) should check with the University Police Department or the Department of Residential Life to determine whether such articles are among those prohibited by statute or university regulation. Northeastern University also prohibits the possession of knives other than food utensils.

Policies and Procedures

ACADEMIC INTEGRITY POLICY

The university's complete Academic Integrity Policy (http://www.northeastern.edu/osccr/academic-integrity-policy/) is available through the Office of Student Conduct and Conflict Resolution.

APPROPRIATE USE OF COMPUTER AND NETWORK RESOURCES POLICY

The university's Appropriate Use of Computer and Network Resources Policy (https://cpb-us-w2.wpmucdn.com/sites.northeastern.edu/dist/b/620/files/2020/09/

Policy_on_Appropriate_Use_of_Computer_and_Network_Resources.pdf) is available from the Office of Information Security (https://security.its.northeastern.edu/).

BEHAVIOR ON CO-OP, ON EXTERNSHIPS, AND IN THE NEIGHBORHOOD

As an urban institution, Northeastern University is a part of the vibrant community and business life of the surrounding neighborhoods. Maintaining amicable and considerate relations between the university and local residents and businesses is essential to the continued cooperation of the university and its neighbors in civic projects and issues and to the furtherance of the university's broader mission to contribute to the general good of society. The university endeavors to foster conditions under which such beneficial relations exist. Consequently, the university must consider conduct on the part of members of the university community, whether on or off campus and whether isolated or continuing in nature, that is disruptive of these relations; that impairs, interferes with, or obstructs the lawful missions, processes, and functions of the university; or that is found by the university to be abhorrent or offensive to generally accepted standards of social behavior, as inimical to the university's interests.

The university's Code of Student Conduct governs student behavior on co-op, externships, and in the community surrounding the university. In addition, misbehavior in these settings may violate the law, policies of the co-op employer, or rules of the externship sponsor.

BICYCLES

Wherever possible, students should use the bike racks available at various locations on campus. Bicycles should not be chained to fences, doors, trees, or other objects, and under no circumstances may bicycles be brought into any university building. The fire code dictates that all entrances, exits, corridors, and stairwells must be free and clear at all times. Bicycles found in violation of this code will be removed from the area.

CARD PLAYING AND GAMBLING

The university does not permit card playing of any kind in classrooms unless it is a regularly scheduled activity of an organization recognized officially by the Office of Student Activities. Social card games are permitted in the residence halls and in the Curry Student Center. Students may not gamble, play pyramid games, or sell lottery tickets. Casino or other game events are permitted in designated areas that are approved by city and state laws, as part of properly scheduled events, and in strict accordance with regulations issued by the Office of the Vice President for Student Affairs.

COPYRIGHTABLE MATERIALS

It is the general policy of the university that student papers or projects submitted in partial fulfillment of course requirements remain the property of the student authors.

This policy does not apply to:

1. "Work for hire" as defined by intellectual property laws
2. Work derived wholly or in part from other patented or copyrighted material
3. Work done as part of external grants or contracts in which the contracting documents or regulations define ownership
4. Work in which the university or its agents or employees contribute substantial time or resources
5. Work considered a thesis or dissertation

The university owns the copyright to any work created or developed by one or more students with the significant use of funds, space, facilities, equipment, materials, or other university resources. The university will not normally construe the payment of salary from unrestricted funds or the provision of office and library facilities as constituting significant use of funds, space, facilities, equipment, materials, or other resources of or administered by the university. Use of laboratory and/or computer facilities or assistance from one or more faculty or staff members to a student author specifically pertaining to the work constitutes significant use of university resources. In all cases, the provost or his or her designee shall make a good-faith determination concerning significant use, which shall be final and binding on all parties.

In the case of a thesis generated by research performed in whole or in part by a student in the course of or pursuant to an agreement for sponsored research or other written agreement, including an agreement between the author(s) and the university, or utilizing equipment or facilities provided to the university under conditions that impose copyright restrictions, ownership or control shall be determined in accordance with such agreement or restrictions. In the absence of such agreement or restrictions, copyright ownership in such a thesis shall reside in the student. However, the student, as a condition of a degree award, must grant the university the royalty-free right to reproduce and publicly distribute copies of the thesis for limited and noncommercial purposes.

Where necessary to secure to the university an ownership of copyright, students shall assign such rights of copyright, or grant the specified rights of reproduction and distribution, to the university. The university reserves the right to employ, at its discretion, the materials or portions of any work created or developed in the course of an author's relationship with the university, or otherwise covered by the University Patent and Copyright Policy, for promotional, professional, or noncommercial purposes on a royalty-free basis. Certain courses taught at Northeastern University involve students in individual or group assignments or projects involving the creation of materials, objects, or techniques that may be patentable or copyrightable. These courses generally require extraordinary levels of faculty organization and participation and/or substantial university resources.

1. Individual teachers or academic units may require that originals or copies of such papers or projects be retained either temporarily or permanently by the individual teacher or by the unit.
2. A thesis is a student work representing significant original or independent research and for which the student receives a substantial amount of credit toward a degree or certificate. Where there is a question concerning whether or not a student's work is a thesis, the provost or his or her designee shall make a good-faith determination concerning same, which shall be final and binding on all parties.
3. Copies of the university patent and copyright policies are available from the Division of Research Development, 405 Lake Hall, 617.373.4587.

In accordance with university patent and copyright policies, in such courses the university is the owner of all rights in technology, computer programs, or other creative work that may be developed by the undergraduate or graduate student as part of the student's work in those courses. It is the university's intention, where applicable, to disclose and authorize the use of such technology, programs, or work to nonprofit organizations and to government agencies without a fee. The university may also have the opportunity to license such materials to a commercial enterprise, and in this event, it is the university's intention to share any revenue from such a license with student contributors in an amount determined in accordance with the then-existing university policy or plan. Students are informed early in the semester if the course in which they are enrolled falls within this category and will be asked to sign a letter of

agreement. Should the student decline to sign an agreement, he or she will be assigned to another course section—one in which such agreement is not required—or will be given alternative activities not involving such assignments or projects.

COPYRIGHTS AND PATENTS

Any student who makes, as sole or joint inventor, an invention that involved significant use of university resources, including funds, space, facilities, equipment, or materials, or that is subject to terms of a sponsored research or other agreement between the university and another party, shall assign this invention and all associated applications and patents to the university or its designee unless the invention has been released to the inventor in accordance with the applicable provisions of the university patent policy. Any student, whether before or after terminating his or her association with the university, shall do whatever is necessary to enable the university or its designee to take out patents in any and all countries on such invention. The cost and expense of making such assignments and procuring such patents shall be borne by the university or its designee. When an invention is made by a student not involving significant use of funds, space, facilities, equipment, materials, or other resources of or administered by the university, the university will waive its rights, and the invention will be the exclusive property of the student, provided the student's rights in the invention are not altered by the terms of any financial aid received, including external sponsorship, scholarships, fellowships, traineeships, thesis expenses, or other assistance, whether or not administered by the university and provided the invention is not subject to third-party rights.

DEMONSTRATIONS

The university supports as fundamental to the democratic process the rights of all members of the university community to express their views and to protest actions or opinions with which there is disagreement. A university is where individuals express diverse ideas and viewpoints in an atmosphere free of any physical force. The university insists that all demonstrations be peaceful and orderly and abide by university regulations.

- Demonstrators must not block corridors or entrances or use loud noise to disrupt a conference, meeting, or assembly.
- Demonstrations may not be conducted in faculty or administrative offices, classrooms, libraries, or study areas.
- Moving picket lines in university corridors are prohibited. (Protests may be registered by individuals or groups standing in a single line against a corridor wall, but corridors must be kept open at all times for the free passage of other members of the community.)

Students, faculty, or other members of the university community who violate these regulations will be subject to disciplinary action; violators also jeopardize their right to remain in the university community.

DEPARTMENTAL JURISDICTION

Certain departments of the university shall have the power to set down rules and regulations governing the operation of the departments' respective areas of responsibility. Such rules and regulations shall be in accord with the "General Statement of Student Rights and Responsibilities" as well as with the policies pertaining to student conduct as defined in this document.

DISMISSAL FROM CLASS

Students dismissed from classes for insubordination or other disciplinary reasons may not return without the approval of the college and the senior vice chancellor for student affairs.

IDENTIFICATION CARDS

All students must have in their possession at all times the officially approved and properly validated photo identification card. It will be necessary to show this card as a means of identification when using the library and campus recreational facilities, at athletic contests, at student elections, at University Health and Counseling Services, at Student Accounts, at the Office of the Registrar, to campus police, and elsewhere around the university. All members of the community should be prepared and willing to identify themselves and their guests upon request by authorized personnel. An official photo identification card will be issued to new students during their initial orientation and registration periods. Replacements for lost cards can be obtained at the Office of the Registrar, 271 Huntington Avenue.

JURY DUTY

Northeastern expects students to fulfill their civic duties; the university cannot interfere in this process. Students who miss classes because of this obligation must notify their professors in writing, explaining which classes will be missed on which days. The professors will work with students to make up missed assignments or exams. Upon completion of their jury duty, students must bring a copy of the documentation of their service to the appropriate professors. Students on co-op are expected to inform their supervisors if called to jury duty.

MEDIA AND PUBLIC APPEARANCES

In all personal communications to newspapers or other media, as well as personal public appearances in which students identify themselves as members of the Northeastern University community, it should be made clear that the opinions presented are a student's own and not necessarily those of the university. Students who appear on public programs as representatives of Northeastern University must be particularly careful to avoid language or presentations that could be considered in bad taste or offensive.

PETS

Pets are prohibited in all university buildings out of consideration for the general community and to maintain a clean and healthy environment. Exceptions are made for guide dogs and other guide animals.

PUBLIC ACCESS

Access by the general public to attend special programs or functions is limited to those events approved for such attendance. The facilities of the university were designed for the use of members of this academic community. When appropriate, access may be permitted for events and programs when it is apparent that the students, faculty, staff, and alumni of the university and their guests will not fill the facility reserved for such use. In such cases, special provisions must be made to ensure that members of this academic community have priority to attend and are not precluded from attendance by the general public. Certain facilities, such as residence halls, classrooms, and laboratories, are designed for and are to be used by residence hall residents only, or in the case of classrooms and laboratories, by members of this academic community. In all cases, the essential educational purpose of the university cannot be interrupted or disturbed by the access of the general public. Officials of the university may restrict or prevent access by the public if such access disturbs or has the potential to disturb classes or other functions of Northeastern University. Occasionally, access to an area such as the Krentzman Quad will be granted to distribute free literature or provide a public forum for speakers. Such use requires the prior approval of the director of student activities and will be granted only during the Wednesday and Thursday activity periods. The use of facilities such as residence halls or cafeterias for distribution of literature or for speakers is prohibited.

SAFETY GLASSES

Safety glasses must be worn in all chemistry laboratories and other facilities as required.

SALES AND SOLICITATIONS

Northeastern University is not a marketplace. Sales of material or solicitations, such as newspapers and other printed matter, insurance, foodstuffs, and all other articles are prohibited without the express written permission of designated officials of the university. Solicitations of any kind are also prohibited without the express written permission of designated officials. Exceptions to this policy are made for recognized student organizations and residence hall residents. Residence hall residents should request permission to sell within their housing unit from the director of residential life; recognized student organizations should request permission for sales from the director of student activities; all others should apply to the business manager of the university. Such permission, when granted, is for designated areas within the university and is subject to the restrictions imposed by the approving officials. General solicitation, especially in such areas as classrooms, lounges, and cafeterias, is not permitted.

SMOKING

All locations, campuses, buildings, and outdoor areas owned and/or operated by the university are smoke-free and tobacco-free (https://www.northeastern.edu/policies/pdfs/Policy_on_Smoke-Free_Campus_rsa1-1.pdf). The sale of cigarettes and other tobacco products is prohibited on campus. Smoking cessation information and programs are available. For further information, contact the Office of Human Resources Management or University Health and Counseling Services.

TAPE RECORDERS

Students may not use tape recorders in the classroom without the instructor's consent. Students with disabilities who need a tape recorder in the classroom may make arrangements through the Disability Resource Center (https://drc.sites.northeastern.edu/).

TEXTBOOKS

Students should purchase or have in their possession the assigned textbooks, problem books, manuals, and other supplies that may be necessary in a classroom or laboratory.

Graduate Schools Academic Policies

Note that this information applies to both undergraduate and graduate students. Not all of the policies and procedures apply to both types of students. *Note:* International students must consult with Office of Global Services (OGS) (http://www.northeastern.edu/ogs/) advisors concerning any of the following items in order to maintain compliance with Student and Exchange Visitor Information System (SEVIS) regulations and institutional policy. It is best to set up an appointment to discuss individual cases and learn about appropriate procedures to follow.

Attendance Requirements

The university expects students to meet attendance requirements in all courses to qualify for credit. Attendance requirements vary; it is the student's responsibility to ascertain what each instructor requires.

Failure to meet attendance requirements may force a student to drop the course, as recommended by the instructor and the college.

Permission to make up work may be granted by instructors for reasonable cause. Requests must be made immediately upon a student's return to class.

Absence Because of Student Activities

If students must miss classes to participate in athletic contests or other forms of scheduled intercollegiate activity, they are entitled to makeup privileges. Faculty members may require a written statement from the administrator in charge of the activity.

Absence Because of Illness

A student who is absent from school for an extended period of time must inform his or her college by email from an official university email account or by telephone.

Absence Because of Religious Beliefs

The university maintains the following guidelines regarding student absences because of religious beliefs:

Any student who is unable, because of his/her religious beliefs, to attend classes or to participate in any examination, study, or work requirement shall be provided with an opportunity to make up such examination, study, or work requirement that he/she may have missed because of such absence on any particular day; provided, however, that such makeup examination or work shall not create an unreasonable burden upon such school. No fees of any kind shall be charged by the institution for making available to the said student such opportunity. No adverse or prejudicial effects shall result to any student because of availing himself/herself of the provisions of this section. (Massachusetts General Laws, Chapter 151C, Section 2B, 1985)

Absence Because of Jury Duty

Members of the university community are expected to fulfill their obligations to serve on a jury if called upon.

A student selected for jury duty should inform his or her instructors and/or activity advisors. They will provide a reasonable substitute or compensatory opportunities for any required work missed. Absence will not be penalized in any way.

Leaves of Absence

Students may request to take the following types of leaves of absence:

- Personal or Academic
- Medical or Emergency
- Military Deployment or Missionary Service

Students in Pre-Matriculation and Pathway programs (including N.U.in, Foundation Year, NU Immerse, NU Bound) do not fall under the leave of absence policy below. Students in these programs with emergent, medical, or personal circumstances that require a conversation about their ability to continue with their program of study should reach out to We Care *(*https://studentlife.northeastern.edu/we-care/#_ga=2260687946268200191621858812-1715269518161332562*8) for further guidance.*

General Leave of Absence Policy

Students who wish to take a leave of absence should complete a request through the Student Hub web portal (or via University Health and Counseling Services (UHCS (https://www.northeastern.edu/uhcs/forms/medical-leave-of-absence/)) for a medical leave of absence, as described below) before the last day to drop without a W in a term. Please consult the Academic Calendar (https://registrar.northeastern.edu/group/calendar/#_ga=2223181403151090330616212601 60-1715269518161332562*8*) for the last day to drop without a W in the term.

Students can request a leave until the last day to drop with a W in a term but should review the financial implications of withdrawing from courses on the Student Financial Services website (https://studentfinance.northeastern.edu/policies-procedures/withdrawalleave-of-absence/).

Students can take up to one year of leave.

Any leave of absence type, if approved, is subject to the following conditions:

- International students must make an appointment with the Office of Global Services (OGS) (https://international.northeastern.edu/ogs/) to discuss leave of absence procedures in accordance with federal regulations.
- Students who do not return at the end of the leave will be withdrawn and must contact their college for reentry prior to the term start.
- Students must return to classes, not to co-op.
- Students must be currently enrolled in academic classes or co-op. If a student is withdrawn for personal reasons, the withdrawal can be reversed and a request for a leave of absence can only be processed if it is before the last day to drop without a W in a term. If the student has been administratively withdrawn, a request for leave of absence cannot be considered until the withdrawal is resolved.
- Students who receive financial aid should meet with a financial aid counselor before going on a leave. Please see Return of Title IV Aid (http://catalog.northeastern.edu/undergraduate/expenses/financial-aid/) for the possible financial aid impact of a leave of absence.
- Students in university housing should refer to the Office of Housing and Residential Life for policy information.
- A student's enrollment status cannot include more than one academic year of consecutive nonclass enrollments. Students on leave for more than one year will be withdrawn from the university.
- If a student has taken multiple leaves equating to one year, the next leave request will be processed as a withdrawal.
- Students are not allowed to take classes for credit toward their degree at Northeastern while on a leave of absence.

Students on a leave of absence are considered active students and are able to register for classes in an upcoming term in a leave status. If a student is unable to register because they are inactive, the student should contact their college for reentry at the time of registration for the return term. Students are expected to register for classes upon returning from a leave of absence.

LEAVE OF ABSENCE FOR INTERNATIONAL STUDENTS

International students must discuss maintenance of U.S. immigration status with an advisor at OGS before requesting any type of leave of absence.

PERSONAL OR ACADEMIC LEAVE OF ABSENCE

Personal leaves of absence are general leaves of absence that do not meet the criteria of more specific leaves outlined in the catalog. Academic leaves are applied to a student record in the rare cases when a student has fulfilled the last remaining requirements abroad, but final grades have been yet to be received at Northeastern; or are taking a leave of absence from Northeastern to pursue other academic work. A student interested in requesting a personal or academic leave of absence should speak with an academic advisor.

MEDICAL OR EMERGENCY LEAVE OF ABSENCE

Medical leave is an option available to those Northeastern students who develop a major medical condition that precludes class attendance, completion of requirements, and/or participation in co-op. Medical leave requests must be initiated at UHCS (https://www.northeastern.edu/uhcs/forms/medical-leave-of-absence/). Students can request from their college an exception to take classes elsewhere while on a medical leave of absence based on extenuating circumstances.

Emergency leaves may be granted when a student cannot continue attending class after the start of the term due to life-changing situations beyond the student's control. Students interested in requesting emergency leave are encouraged to contact We Care (https://studentlife.northeastern.edu/wecare/). Students can request an Emergency Leave of Absence via the Student Hub.

Please consult Refunds for Withdrawal from the University—General Information (http://catalog.northeastern.edu/undergraduate/expenses/bill-payment/) concerning tuition charged for the term in which the leave has been granted. The student may appeal for consideration of their financial circumstances; appeal information can be found at Student Financial Services (https://studentfinance.northeastern.edu/policies-procedures/withdrawalleave-of-absence/). If the appeal is approved, housing and other fees will not be included in the appeal decision; please refer to the Residence Hall and Dining License Agreement (https://www.northeastern.edu/housing/license-agreement/). Outstanding balances (including unpaid balances) for the academic term in which the leave is taken are still due the university.

Financial aid recipients must contact their financial aid counselor to understand the effects on aid received.

If the leave extends more than six months, students who have taken loans for education expenses may be required to start repayment of those loans.

Students enrolled in the Northeastern University Student Health Plan (NUSHP) will remain enrolled in the plan for the plan year, ending August 31.

LEAVE OF ABSENCE DUE TO MILITARY DEPLOYMENT OR MISSIONARY SERVICE

When a student is called to active duty or missionary service, they must request the leave by filling out the proper request form through the Student Hub. Proof of official deployment or call to service paperwork will be required as an attachment when filling out the leave of absence request.

When a student is called during the term, the university will:

- Excuse tuition for that term. Any payment made will be credited to the student's account.
- Post a leave of absence for the term to hold a place for the student when he or she returns.

If a student is called near the end of the term, the student and faculty members may determine that incomplete (I) grades are more appropriate. In this case, tuition will not be waived.

When a student returns to the university after completion, he or she will notify the college academic student services office if the leave was longer than one year; that office will in turn notify the Registrar's Office. The college academic student services office will assist the student with reentry and registration. If the leave was less than one year, the student should register for classes for the upcoming term prior to returning to campus.

International students who must take a leave of absence to engage in military service in their home country must also complete a form for leave of absence with OGS.

RETURNING FROM A LEAVE OF ABSENCE

Students on a leave of absence are considered active students and are able to register for classes in an upcoming term in a leave status. If a student is unable to register because they are inactive, they should contact their college for reentry at the time of registration for the return term. Students are expected to register for classes upon returning from a leave of absence.

Students who are withdrawn and are applying for Commencement may be reentered on a leave of absence, pending the college's approval, prior to the term in which they will graduate. International students returning from a leave of absence should contact OGS regarding the Student and Exchange Visitor Information System (SEVIS) procedures three to four months prior to anticipated return date.

Students who wish to reenter the university following a medical leave must contact UHCS. Reentry from a medical leave requires receipt of all documentation delivered to UHCS on or around one month prior to the planned reentry to classes. Once all documentation is received by UHCS, it will be reviewed and the student will be notified of the decision. Students must be enrolled in Northeastern University classes for the term in which they wish to return from their medical leave of absence. More specific information about the reentry process can be found at the UHCS website (https://www.northeastern.edu/uhcs/forms/medical-leave-of-absence/).

University Withdrawal

Students seeking to withdraw from the university for any reason should meet with their academic advisor before completing the university withdrawal form online. Students should review the financial implications of withdrawing from all classes on the Student Financial Services website.

Students may be withdrawn from the university for financial, disciplinary, or academic reasons. Students looking to withdraw for medical reasons, should reach out to UHCS (mloa@northeastern.edu) to review medical leave of absence.

Graduation Requirements

To be eligible to receive degrees, students must meet all academic requirements. They must also clear all financial and disciplinary deficiencies.

In addition, each program of study has specific academic requirements. These are specified for each program under the various schools and colleges in this catalog.

Prior to completion of their program, students are expected to complete a graduation degree audit at their college's academic student services office.

All eligible degree candidates must complete the graduation application by the applicable deadline. Before you apply to graduate through the Student Hub, we recommend you take the time to review your current program information, i.e., degree, major, and concentration.

Student Bill of Academic Rights and Responsibilities

This bill was drafted by the Student Senate, the Vice President for Student Affairs, and members of the Faculty Senate. It was passed in the spring of 1992. It was then updated by the Student Body President, Vice President for Academic Affairs, and passed by the Student Senate in the Fall of 2017 and Faculty Senate in the Spring of 2018 for adoption in the Undergraduate Student Handbook *(*http://www.northeastern.edu/osccr/code-of-student-conduct/*) for the 2018–2019 academic year.*

We, the students of Northeastern University, believe that a quality education is the paramount goal of all students. In order to fulfill this goal, the university recognizes certain rights and responsibilities, which follow below.[1] Northeastern University students recognize and accept that redress of complaints arising from these rights is limited to the procedures specified in "Student Academic Appeals Procedures".[2]

Course-Related Rights

Article 1

Students have the right to instructors who attend classes on time.

Article 2

Students have the right to receive grades and feedback in a timely manner, particularly in the case of sequentially related assignments. At least one summative assessment should be given and returned a week prior to the end of the withdrawal period. Students also have the right to view work they submit to satisfy course requirements after it is graded and receive their instructor's rationale for grades received on said work.

Article 3

Students have the right to adequate access to instructors. This includes instructors replying to communications from students in a timely manner, suggested to be within two business days, with the exception of during university recesses, as well as maintaining consistent office hours for in-person courses, occurring at the same time at least once a week. Instructors may change office hours by notifying students in a timely manner, suggested to be within two business days, baring extenuating circumstances.

Article 4

Students have the right to receive a course outline, which includes a fair and explicit grading policy, at the beginning of each course. Changes to the course outline that result in a deadline, assignment, major exam, or similar course event being introduced to or moved earlier in the schedule shall be communicated to students in a timely manner, suggested to be at least 10 business days prior to the new deadline.

Article 5

Students have the right to instructors who communicate the material pertaining to the course effectively in the English language except in the case of foreign language instruction.

Article 6

Students have the right to participate in and have access to Student Government Association teacher/course evaluations.

Article 7

Students have the right to have a list of all course materials that must be purchased. Possible substitutions for said course materials, (i.e., acceptable previous editions of textbooks, digital versions, library owned resources, etc.) should be made available to students at least a week prior to the start of the academic term.

Article 8

Students have the right to alternative grading arrangements if they are unable to attend a graded activity that takes place outside the scheduled class time.

Rights to University Academic Services

Article 9

Students have the right to adequate access to effective academic services, including academic and co-op advising, as described in the student handbook and other university publications, provided by the university.

Article 10

Students have the right[3] to an environment conducive to learning and to faculty who respect students' academic freedom[4] in the classroom. When exercising academic freedom, students are expected to comply with all applicable university ethics, anti-harassment, and nondiscrimination policies.

Article 11

Students have the right to access university health resources provided by University Health and Counseling Services (https://www.northeastern.edu/uhcs/) (UHCS), and in accordance to Massachusetts State Law, to have access to a medical plan that they can purchase (Northeastern University Student Health Plan (http://www.northeastern.edu/nushp/)).

Article 12

Students have the right to access university resources provided by the university's Disability Resource Center in accordance with the Policy on Equal Opportunity (http://www.northeastern.edu/policies/pdfs/Policy_on_Equal_Opportunity.pdf). Students have the right to pursue informal and formal grievances through the procedures (http://www.northeastern.edu/drc/getting-started-with-the-drc/grievance-procedure/) outlined by the Disability Resource Center.

Scheduling Rights

Article 13

Students have the right to final exam schedules in accordance with established university policy, including non-conflicting final exam schedules.

Article 14

Students have the right to attend any course session held prior to the end of the add/drop period so long as permission from the instructor is obtained in advance and all duly registered students have proper access to seating and other course resources.

Article 15

Students will not be penalized for excused absences, with the understanding that students may need to make up for the academic commitment from which they were excused. Reasons for an excused absence include religious, medical issues, jury duty, bereavement, and military service. See the course catalog (http://catalog.northeastern.edu/undergraduate/academic-policies-procedures/attendance-requirements/) and other applicable policies (http://gonu.com/sports/2013/7/15/SASS_0715134535.aspx?path=sass) for the full attendance and excusal policy.

General Academic Rights

Article 16

Students have the right to be informed, in a timely fashion, of proposed action to be taken against them.

Article 17

Students have the right to the redress of academic grievances through the processes provided by the university.

Article 18

Students have the right to university support and resources, such as the Office of Global Services (https://www.northeastern.edu/ogs/), with regard to their visa status.

Article 19

In accordance with the Northeastern University's Nondiscrimination Policy (https://www.northeastern.edu/policies/pdfs/Policy_on_Equal_Opportunity.pdf), students have the right to a learning environment free of discrimination or harassment, including as provided for in Northeastern University's Title IX Policy (http://www.northeastern.edu/titleix/title-ix-policy-2/).

Article 20

Northeastern University's policy on student produced intellectual property can be found on page 54 under *Copyrightable Materials* of the *Undergraduate Student Handbook*.

Article 21

Students have the right of access to their academic and financial aid records and maintenance of the privacy of these records, as provided by the Family Educational Rights and Privacy Act.

Student Responsibilities

Article 1

Contribute to a climate of open inquiry and honesty in all aspects of the university's academic life. This includes reviewing, and becoming familiar with, the Academic Integrity Policy on the OSCCR website.

Article 2

Commit sufficient time and effort for study and for use of library, studio, laboratory, and computational facilities, as appropriate for each course.

Article 3

Contribute to the classroom/laboratory/studio learning environment through discussion and active participation.

Article 4

Acquire the necessary prerequisites for full participation in each academic course.

Article 5

Attend scheduled classes regularly and on time, and arrive to class prepared, having completed all the readings and other assignments.

Article 6

Seek out faculty and teaching assistants outside of class time, to obtain help with problems encountered in a given course.

Article 7

Respect the academic freedom[4] of each faculty member and student.

Article 8

Assist the university in its various self-evaluations (e.g., TRACE, surveys) by responding honestly and conscientiously.

Article 9

Maintain effective communication with the university by providing permanent and local address information to the university through a system designated by the university, and by reading university email on a frequent and consistent basis.

Article 10

Act as positive representatives and genuine ambassadors of the university when studying and working in domestic and international settings associated with Northeastern University.

Article 11

Complete an entry (including itinerary, accommodation information, and contact information) using 'My Travel Plans,' located on the Services and Links tab in the myNortheastern Student Portal, or other system as required by the university, prior to all university-sponsored travel outside of Massachusetts, including but not limited to: Study Abroad, Dialogues of Civilization, Foreign Exchange Programs like BSIB, Alternative Spring Break, Engineers without Borders, Co-op Placements outside of Massachusetts, etc.

Article 12

Complete all required activities prior to attending classes for their entrance date (including alcohol education, violence prevention programming, required reading, etc.).

Article 13

Have in their possession at all times the officially approved and properly validated photo identification card.

Students who fail to comply with these responsibilities could lose certain student privileges as well as face possible disciplinary sanctions under the Code of Student Conduct.

[1] The student rights, through their representatives in the Student Government Association (SGA), described in these sections arise from faculty and staff employment responsibilities and obligations to the university. Northeastern University students recognize and accept that it is the sole prerogative of the university to enforce these obligations and responsibilities and to determine whether and to what extent they are being carried out or violated in specific instances. Northeastern University students recognize and accept that their ability to effect redress of complaints arising from these rights is limited to the procedures specified in the current *Undergraduate Student Handbook*.

[2] The articles shall be interpreted by the Office of the Provost in conjunction with the Office of the Vice President for Student Affairs, and shall be monitored by the Student Government Association. Further, should any student discover that they have been subject to any violation of the principles stated herein, the student should follow the appropriate complaint resolution procedure in the Undergraduate Student Handbook *(*http://www.northeastern.edu/osccr/code-of-student-conduct/*).* The Student Government Association, if requested by the student, will monitor the progress of any student academic grievances.

[3] Because the university operates on a twelve-month calendar in an urban environment, many construction, remodeling, renovation, and repair projects must take place while the university is in session, and other potential distractions from the learning process arise from the surrounding urban environment on which it is dependent but over which it exerts little or no control. Thus, though the university is committed to maintaining an appropriate learning environment for its students, Northeastern University students recognize and accept, as part of their relationship with the university, that the conditions described above may cause occasional disturbances to that environment.

[4] For more on academic freedom, please refer to the AAUP's definition (https://www.aaup.org/report/1940-statement-principles-academic-freedom-and-tenure/).

Student Records, Transcripts, and Related Policies

Grade Table

Grades are officially recorded by letters, evaluated as follows:

Letter Grade	Numerical Equivalent	Explanation
A	4.000	Outstanding achievement
A–	3.667	
B+	3.333	
B	3.000	Good achievement
B–	2.667	
C+	2.333	
C	2.000	Satisfactory achievement
C–	1.667	
D+	1.333	Undergraduate only
D	1.000	Undergraduate only/ Poor achievement
D–	0.667	Undergraduate only
F	0.000	Failure
I		Incomplete
IP		In progress
CR		Credit (School of Law only)
HH		High Honor (School of Law only)
H		Honor (School of Law only)
P		Pass (School of Law only)
NE		Not enrolled

NG	Grade not reported by faculty
S	Satisfactory (pass/fail basis; counts toward total degree requirements)
U	Unsatisfactory (pass/fail basis)
X	Incomplete (pass/fail basis)
L	Audit (no credit given)
T	Transfer
W	Course withdrawal

An I, IP, or X grade shows that the student has not completed the course requirements.

The IP grade is intended for courses that extend over several terms. The time restrictions on the incomplete grade do not apply to the IP grade. While the IP grade is left unchanged, it is not included in computing the grade-point average. If the IP grade is never changed, the course does not count toward graduation requirements.

Course Comments

The following notations may also appear on the student's transcript:

E	Course excluded from GPA
HON	Honors-level course
I	Course included in GPA

Northeastern University Course Numbering

0001–0999	**Orientation and basic**
	No degree credit

UNDERGRADUATE

1000–1999	**Introductory level (first year)**
	Survey, foundation, and introductory courses, normally with no prerequisites and designed primarily for students with no prior background
2000–2999	**Intermediate level (sophomore/junior year)**
	Normally designed for sophomores and above but in some cases open to freshman majors in the department
3000–3999	**Upper-intermediate level (junior year)**
	Designed primarily as courses for juniors; prerequisites are normally required, and these courses are prerequisites for advanced courses
4000–4999	**Advanced level (senior year)**
	Designed primarily for juniors and seniors; also includes specialized courses such as research, capstone, and thesis

GRADUATE

5000–5999	**First-level graduate**
	Courses primarily for graduate students and qualified undergraduate students with permission
6000–6999	**Second-level graduate**
	Generally for master's and clinical doctorate only
7000–7999	**Third-level graduate**
	Master's- and doctoral-level courses; includes master's thesis
8000–8999	**Clinical/research/readings**
	Includes comprehensive exam preparation
9000–9999	**Doctoral research and dissertation**

Clearing an Incomplete or Changing Other Grades

The period for clearing an incomplete grade or for changing a grade other than an incomplete or failure (F or U) is restricted to one calendar year from the date it is first recorded on the student's permanent record. An incomplete grade may be reported by the instructor when a student has failed to complete a major component of a required course, such as homework, a quiz or final examination, a term paper, or a laboratory project. Students may make up an incomplete grade by satisfying the requirements of the instructor or, if the instructor is absent, the chair of the department. Be aware that instructors' policies on the granting of incomplete grades may vary and that the final decision on an incomplete grade is up to the instructor.

To request an incomplete grade, the student must obtain and complete in consultation with the instructor an Incomplete-Grade Contract (https://registrar.northeastern.edu/article/incomplete-grade-contract/) on which the precise agreement for clearing an incomplete grade is specified and which is signed by the student and the instructor. Copies of the form are kept by the student, the instructor, and the Office of the Dean of the college in which the course is offered. Any exception to this policy on change of grades must be recommended by the Academic Standing Committee (ASC) of the college in which the course was offered and must be forwarded in writing by the ASC to the registrar for implementation. (Finishing the agreed-upon coursework must be completed within one calendar year from the end of the term in which the course was offered.)

University policy states that any grade outstanding for 12 or more months cannot be changed. Any exception to this policy on change of grades must be recommended by the ASC of the college in which the course was offered and must be forwarded in writing by the dean to the Office of the Registrar for implementation.

Repeating Courses

When the appropriate course is available, students may repeat a course to earn a better grade. In all cases, the most recent grade earned in a course is the one used in calculating the overall grade-point average; however, previous grades remain on the transcript followed by the word "Repeat." Consult your academic advisor before repeating a course. Students are required to pay normal tuition for all repeated coursework.

Substituting Courses

In some cases, it may not be possible to repeat a course if a student wishes to do so. In unusual circumstances, students may petition to substitute one course for another they have already taken, as long as the subject matter of both courses is substantially alike. With the approval

of the student's academic advisor and the agreement of the department that offered the first course taken, a grade received in the new course will be labeled "Substitute" on the transcript and will be treated in the grade-point-average calculation as a "repeat" grade, as described above. The original grade will remain on the student's Northeastern transcript. Students should consult with their academic advisor before enrolling in any proposed substitute course. Students are required to pay normal tuition charges for all substitute coursework.

Clearing an Academic Deficiency

An academic deficiency occurs when a student fails to complete a course with a satisfactory grade. The deficiency may occur because the student has failed the course or because the student has passed the course but with a grade that does not meet the minimum required by the student's program.

Students who have academic deficiencies may be required to clear them before progressing within the curriculum, especially if a given course is a prerequisite for future coursework. Deficiencies may affect the student's expected year of graduation.

With the approval of the appropriate program faculty and/or academic advisor, students can clear deficiencies in the following ways:

1. Repeat the same course at one of Northeastern's colleges, which will result in a "repeat" grade (see "Repeating Courses" policy above).
2. Substitute a comparable course at one of Northeastern's colleges, which will result in a "repeat" grade (see "Substituting Courses" policy above).
3. Under special circumstances, if the course is not currently offered at Northeastern University, a student may be advised to take a preapproved course at another institution outside Northeastern University. The original grade will remain on the student's Northeastern transcript and will still be used in the calculation of the grade-point average.

Appeal of Final Grades

Under certain circumstances, students have the right to appeal final grades given by either academic faculty or cooperative education coordinators. Criteria and procedures for such appeals are available as follows:

- For undergraduate day students: the *Undergraduate Student Handbook* (available at this site (http://www.northeastern.edu/osccr/code-of-student-conduct/))
- For College of Professional Studies undergraduate students: the Student Academic Appeals Procedures page (http://catalog.northeastern.edu/professional-studies/academic-policies-procedures/student-appeals/) within the CPS Undergraduate section of this catalog
- For graduate students: the Academic Appeals Policies and Procedures page (p. 23) within the graduate section of this catalog.

Grade-Point Average (GPA)

Numerical equivalents for scholastic averages are weighted according to the number of hours the course carries. For example, suppose a student receives a grade of B in a course carrying 4 semester hours and a grade of A in a course carrying 1 semester hour. The weightings for these example courses are as follows:

Grade	Numerical Equivalent	Semester Hours	Weight
B	3.000	4	12
A	4.000	1	4
Totals:		5	16

The GPA for both courses would then be the total weight (16) divided by the total semester hours (5), or 3.200. Grades of I, IP, S, U, and X are not included in the calculation of the GPA. See Grade Table (p. 36) for a complete list of grades and numerical equivalents.

Grade Reports

Grades are available to students approximately three days after the end of each term via the myNortheastern web portal (https://my.northeastern.edu/). A missing grade means that none was received from the instructor. Grades received late from faculty are processed as they are received.

Transcripts

Currently enrolled students may obtain unofficial transcripts from the myNortheastern web portal (https://my.northeastern.edu/) and may also order official transcripts through myNortheastern. For further information on transcript requests, visit the transcript request webpage (http://www.northeastern.edu/registrar/trans_request.html). All questions concerning transcript requests should be directed to 617.373.2300,

TTY 617.373.5360

Full-Time Status

Note: Full-time status may be defined differently for federal loan purposes.

A graduate student is considered a full-time student if enrolled in a minimum of 8 semester/quarter hours of credit for the semester with the following considerations:

- Students who hold stipended graduate assistantships will be considered full-time if enrolled for a minimum of 6 semester hours of credit.
- Students for whom English is a second language, at the discretion of their departments, will be considered full-time if they are enrolled in a minimum of 8 semester hours or three courses, whichever is less.
- Students holding Dean's scholarships, Diversity fellowships, Double Husky awards, or being supported by Graduate Student Scholarships (GSSs) will be considered full-time if they are enrolled in a minimum of 8 semester hours.
- Students enrolled in Dissertation or Continuation are considered full-time.
- International students enrolled in graduate programs at Northeastern University must consult with the Office of Global Services (OGS) (http://www.northeastern.edu/ogs/) on all matters regarding the maintenance of full-time status.

Overload Conditions for Graduate Assistants

Graduate assistants are expected to devote full-time effort to their studies and the duties of their award.

They are not permitted to hold any other job during the term of their assistantship; however, they may be offered limited extra work on campus. Graduate assistants who are not on F-1 or J-1 visas can be offered overload work that does not exceed an average of 6 hours a week or 90 hours a semester, for a total of 270 hours a year (or three semesters). As part of this work, graduate assistants may be hired

to teach one 3-semester-hour course as an overload during the year (180 hours). The hours worked during the weeks between semesters are included in this total.

The Office of Global Services (https://international.northeastern.edu/ogs/) issues and verifies on-campus work authorization to eligible students in nonimmigrant visa classifications. Due to federal regulations, international graduate assistants cannot be offered overload work. All international students must acquire the appropriate work authorization from the OGS prior to engaging each and every time in any form of employment.

Dropping Courses

Not attending class does not constitute withdrawal. Students receiving a grade of W or NE in any course are responsible for the costs associated with that course. Students must drop courses using processes described below.

IN FALL AND SPRING SEMESTERS

- Through the third week of the semester, students may withdraw without any grade being posted to the transcript. Courses may be dropped via the myNortheastern web portal (https://my.northeastern.edu/).
- Between the fourth week and the last day of classes, course withdrawals are indicated by a W on the student's record. Courses may be dropped via the myNortheastern web portal. (https://my.northeastern.edu/) No financial adjustment is made for courses receiving a W grade.
- After the last day of classes, no withdrawals are accepted for any reason. A letter grade for the course will be posted on the transcript.
- Dropping below full-time enrollment may affect financial aid, health insurance eligibility, and the maintenance of proper nonimmigrant visa status.

IN SUMMER HALF SEMESTERS

- Through the second week of the half semester, students may withdraw without any grade being posted to the transcript. Courses may be dropped via the myNortheastern web portal (https://my.northeastern.edu/).
- Between the third week and the last day of classes, course withdrawals are indicated by a W on the student's record. Courses may be dropped via the myNortheastern web portal (https://my.northeastern.edu/). No financial adjustment is made for courses receiving a W grade.
- After the last day of classes, no withdrawals are accepted for any reason. A letter grade for the course will be posted on the transcript.
- Dropping below full-time enrollment may affect financial aid.

Pass/Fail System

The individual schools and colleges determine whether a course will be graded on a pass/fail basis.

Audit Policy

Full-time graduate students may, with permission, audit one class per term with no additional charge. Students are permitted to petition from the end of the course-add period to the end of the third week of classes. Permission is based on the availability of a seat in the class and is at the discretion of the instructor and college.

Students must obtain advisor approval and meet the prerequisites and any other required approvals for the class. Instructor permission as well as approval by the associate dean of the college offering the course is required. The coursework required is at the discretion of the instructor.

Once a student opts to audit a course, the audit status of the course cannot be changed. A signed Petition to Audit must be presented to the Office of the Registrar during the designated audit-add period. Excluded courses are co-op, labs, language courses, any off-campus course, any online course, and any course required for the major or degree. Audits carry no academic credit.

Minimum Cumulative GPA

Grades submitted to satisfy, in whole or in part, the requirements for any graduate degree or certificate of advanced study must yield a cumulative GPA of 3.000 or higher. This requirement may be supplemented by additional restrictions established by the graduate program or the college's graduate office such as, but not limited to, the maximum number of individual courses with grades below 3.000 that may be obtained without being required to withdraw or a minimum GPA in each semester.

Students falling below 3.000 are placed on academic probation. If the student remains on academic probation for two semesters, he or she may be terminated from the graduate program.

Not more than two courses or 6 semester hours of credit, whichever is greater, may be repeated to satisfy the requirements for the degree. The last grade earned in each of these repeated courses is counted in the calculation of the cumulative GPA.

Any incomplete grades must be made up within one calendar year from the semester in which the student took the class that resulted in the incomplete course grade.

More information regarding course grading and academic disputes may be found at "Academic Appeals" under "Appeals Policies and Procedures."

Maintenance of Student Records

The university registrar is responsible for ensuring appropriate maintenance and safekeeping of student records. The transcript, which is stored electronically and maintained indefinitely, is the holistic record of student attendance and degree progress. In the event that the university discontinues operations, the archive of student records would be maintained by:

Massachusetts Department of Higher Education
One Ashburton Place
Room 1401
Boston, MA 02108

Course Cancellations

Northeastern University reserves the right to cancel any course if minimum enrollments, appropriate faculty, or academic facilities do not meet standards.

Student Right-to-Know Act

For information about the Student Right-to-Know Act, visit the Office of the University Registrar's website. (https://registrar.northeastern.edu/article/student-right-to-know-act/)

University-Sponsored Travel

University Travel

Northeastern University is committed to the health, safety, and security of its students and all other members of the university community. As a global institution, our university members undertake university travel

around the world in pursuit of teaching, research, consulting, service, cocurricular activities, and work intended to advance learning and the interests of the university. The university supports standards and expectations associated with travel that are designed to reduce personal and university risk.

To enhance the health and safety of our students, you are required to comply with the university travel policies when undertaking university travel.

In order to provide assistance and support to you while traveling abroad, the university maintains a travel registry. In advance of planned university travel, students are required to enter their travel plans along with other requested information into the travel registry. To access the registry, go to the myNortheastern web portal (http://myneu.neu.edu/), "Services and Links," and navigate to My Travel Plans to register your travel.

Students are responsible for familiarizing themselves with the university travel policies and are encouraged to visit the university's travel support website for guidance. If you have questions related to travel or travel support, please email mytravelplans@northeastern.edu. If you need assistance during university travel, please call the university's 24-hour travel assistant line at +1.857.214.5332.

PhD Programs

Overview

Northeastern offers the following PhD programs. The Experiential PhD (p. 41) page has additional information on doctoral programs that connect Northeastern to industry, government, and nonprofit partners.

B

- Bioengineering, PhD (p. 146)
- Biology, PhD (p. 430)
- Biomedical Sciences, PhD (p. 307)

C

- Chemical Engineering, PhD (p. 152)
- Chemistry, PhD (p. 435)
- Civil and Environmental Engineering, PhD (p. 158)
- Computer Engineering, PhD (p. 172)
- Computer Science, PhD (p. 114)
- Counseling Psychology, PhD (p. 277)
- Criminology and Justice Policy, PhD (p. 480)
- Cybersecurity, PhD (p. 125)

E

- Economics, PhD (p. 483)
- Electrical Engineering, PhD (p. 176)
- English, PhD (p. 487)

H

- History, PhD (p. 490)
- Human Movement and Rehabilitation Sciences, PhD (p. 270)

I

- Industrial Engineering, PhD (p. 204)
- Interdisciplinary Design and Media, PhD (p. 58)
- Interdisciplinary Engineering, PhD (p. 247)

M

- Marine and Environmental Sciences, PhD (p. 444)
- Mathematics, PhD (p. 450)
- Mechanical Engineering, PhD (p. 207)
- Medicinal Chemistry and Drug Discovery, PhD (p. 314)

N

- Network Science, PhD (p. 135)
- Nursing, PhD (p. 293)

P

- Personal Health Informatics, PhD (p. 132)
- Pharmaceutics and Drug Delivery, PhD (p. 321)
- Pharmacology, PhD (p. 325)
- Physics, PhD (p. 457)
- Political Science, PhD (p. 493)
- Population Health, PhD (p. 286)
- Psychology, PhD (p. 464)
- Public Policy, PhD (p. 500)

S

- School Psychology, PhD (p. 278)
- Sociology, PhD (p. 518)

PhD Network

The Northeastern PhD Network is designed to build distinctive Experiential PhD (p. 41) opportunities and community among PhD students, providing students with support and resources university-wide to enhance their educational experience and career exploration.

At Northeastern, every PhD student has opportunities to acquire experience beyond traditional dissertation research. Exposure to and integration with our many industry and academic partners—through internships, fieldwork, and other collaborations—and in authentic settings—from laboratories, startup companies, and nonprofit institutions—lead to research with greater impact and broader career opportunities, both within and beyond academia. The PhD Network works with internal and external partners to grow and facilitate opportunities for PhD students.

Shared values unite PhD-centered activities at Northeastern:

- **Excellence with purpose:** All PhD programs combine academic rigor with societal impact, preparing critical thinkers to tackle the world's most challenging problems.
- **Innovative thinking:** Our education programs, mentoring activities, and research scholarship develop novel content and pathfinding approaches.
- **Crossing boundaries:** PhD students transcend disciplinary and international boundaries during their innovative educational journey.
- **Integrative education:** The integration of scholarship and research training with collaborative fieldwork and professional development provides a uniquely experiential education.
- **Inclusive diversity:** Students and faculty from diverse cultures and backgrounds drive excellence by bringing a wide range of perspectives to our distinctive programs.

Explore the PhD Network website (https://phd.northeastern.edu/network/resources/) to learn more about:

- Resources that support PhD students' educational, professional, and personal lives

- Events created especially for PhD students, both at Northeastern and through our partners
- Funding in support of fellowships, internships, and conference attendance

Experiential PhD

Overview

The future of research will be collaborative. Researchers across academic institutions, industry, government, and other organizations will team up to solve complex real-world problems. Researchers will require technical proficiency as well as the ability to work with others, form teams, manage projects and more—skills that go beyond the classroom. At Northeastern, every PhD student and postdoctoral research associate has opportunities to acquire experiences beyond traditional research. Exposure to and integration with our many partners through unique programs in authentic settings from laboratories to startup companies to nonprofit institutions leads to greater impact and broader career opportunities, both within and beyond academia.

Northeastern's Experiential PhD programs offer such opportunities for current Northeastern PhD students and postdoctoral research associates and for full-time master's-level employees at companies, laboratories, and organizations who want to pursue a doctoral degree at Northeastern. The former occurs through the LEADERs program (p. 41), while the latter occurs through the Industry PhD program (p. 42). Traditional internships and sponsored research agreements are available to Northeastern students.

The LEADERs program is designed to enable researchers to develop professionals skills through authentic career exploration opportunities at organizations in industry, government, and the nonprofit sector. Beyond the comfort zone of their own university research group, PhD students and postdoctoral research associates encounter new experiences that help shape their research perspective. They also bring fresh ideas and talent to their host organizations. Northeastern is one of the only universities in the world to offer students in all of its research-based doctoral-degree programs the option to learn and pursue research outside of their primary research group. These real-world placements are highly flexible and customizable, tailored to meet the needs of both Northeastern's PhD students and postdoctoral research associates and our institutional partners.

The Industry PhD is a first-of-its kind research-based doctoral program for full-time master's-level employees. Designed with input from external partners, employees pursue a research-based doctoral degree while maintaining their job and conducting research at the employer site. This enables employees to acquire new skills that will help them to advance in their careers and provides the organization with an opportunity to invest in their future leaders. By working closely with Northeastern faculty, employees will explore their research from a broader scientific perspective, enabling them to appreciate the research foundation of their day-to-day work and to pursue new areas of research for the company.

Experiential PhD programs offer robust benefits to both students and institutional partners. Students solve complex problems as part of their education and chart careers as future innovators. Our institutional partners receive many benefits as well, including:

- A deeper engagement in rapidly evolving fields of research
- Access to university facilities and senior faculty expertise
- Opportunities for senior leadership to mentor and copublish with students and to serve on their dissertation committees
- A chance to recruit emerging talent
- Opportunities to partner with Northeastern, an entrepreneurial research university known for its innovative collaborations with academia, government, and industry

Experiential PhD Leadership, Graduate Certificate

At Northeastern, PhD students enjoy a uniquely broad range of immersive opportunities to expand critical inquiry, learn, perform original research, and chart a path to professional success. Experiential PhD opportunities enable PhD students to step outside the comfort zone of their campus research group where students can pursue challenging, creative, customized assignments within industry, government, or the nonprofit sector that inform and enhance their pursuit of a research doctorate.

This Graduate Certificate in Experiential PhD Leadership aims to:

• **Challenge students to address complex problems** through experience within the context of real-world needs and challenges faced by industry, government, or nonprofit-sector organizations, broadening students' view of stakeholders and impact, shaping the very questions they raise and answer.

• **Equip students for a lifetime with the cultural agility, creativity, and professional skills**—public speaking and communications, meeting goals and expectations (e.g., project management for personal and professional purposes), teamwork, leadership, peer influence, leading from the middle—that they will need to translate their findings into impactful solutions.

• **Enrich every student's research group and, ultimately, fields of expertise** by fostering a collaborative, entrepreneurial, innovative approach to knowledge creation that expands their network far beyond academia to include intellectual and professional mentors and collaborators.

This graduate certificate designed for PhD students across all of Northeastern's research-based PhD programs provides students embarking on an experiential PhD with the preparation, project delivery, and guidance for contextual integration within the context of leadership development. All students pursuing this leadership certificate will be mentored by their sponsor supervisor and dissertation adviser(s).

Complete all courses and requirements listed below unless otherwise indicated.

A grade of B or higher is required in each course.

Requirements

Code	Title	Hours
PHDL 7600	Leading Self and Others	4
PHDL 7660	Experiential PhD Challenge Project 1	4
PHDL 7662	Experiential PhD Challenge Project 2	4
PHDL 7666	Contextual Integration	0

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

Industry PhD

The Industry PhD is a first-of-its kind research-based doctoral program designed with input from external partners to provide a pathway for full-time master's-level employees. Designed with input from external partners, employees pursue a research-based doctoral degree while maintaining their job and conducting research at the employer site. This enables employees to acquire new skills that will help them to advance in their careers and provides the organization with an opportunity to invest in their future leaders. By working closely with Northeastern faculty, employees will explore their research from a broader scientific perspective, enabling them to appreciate the research foundation of their day-to-day work and to pursue new areas of research for the company.

Experiential PhD programs offer robust benefits to both students and institutional partners. Students solve complex problems as part of their education and chart careers as future innovators. Our institutional partners receive many benefits as well, including:

- A deeper engagement in rapidly evolving fields of research
- Access to university facilities and senior faculty expertise
- Opportunities for senior leadership to mentor and copublish with students and to serve on their dissertation committees
- A chance to recruit emerging talent
- Opportunities to partner with Northeastern, an entrepreneurial research university known for its innovative collaborations with academia, government, and industry

The Industry PhD is applicable to any of our 35 doctoral programs. Applicants should follow the requirements of the program to which they are applying. In addition, the following Industry PhD terms (https://phd.northeastern.edu/industry-and-experiential-phd-program/) apply.

College of Arts, Media and Design

Website (https://camd.northeastern.edu/)

Elizabeth Hudson, PhD, Dean

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gradcamd@northeastern.edu

The College of Arts, Media and Design (CAMD) offers graduate programs that build on existing knowledge and establish innovative areas of inquiry and practice. We work with students to frame, research, and answer transformative questions. Together, we challenge, engage, and shape global cultures and marketplaces.

Our Mission

We create a distinctive experiential education by leveraging emergent practices and scholarship in the arts, media, and design. Our unique combination of disciplines empowers innovative thinking and making. Our students become informed citizens and creative leaders with an entrepreneurial spirit.

Graduate Studies in the College of Arts, Media and Design

Welcome to graduate studies at CAMD. We deliver an outstanding graduate education in traditional areas while exploring new approaches to this generation's transformative questions. Our graduate programs highlight intersectional approaches that bring together human, technological, and data literacies to push the boundaries of our disciplines.

We offer diverse program types to meet individual career and academic goals, including terminal degrees (Master of Fine Arts, Master of Architecture); professional degrees (Master of Science, Master of Arts, Master of Design); PlusOne pathways; and Graduate Certificates. Our graduate degree programs are inherently interdisciplinary, led by research faculty across the departments of Art + Design, Architecture, Journalism, Music, and Theatre. Coursework incorporates a range of scholarly, applied, and experiential perspectives, complemented by lively community activities including lecture series, exhibitions, symposia, and more.

This is an exciting time to pursue advanced education and scholarship in creative fields. Never have the arts and culture been so clearly essential to our social, economic, and environmental future: From cultural outreach in underserved communities to designing ethical virtual environments for health and security; from green building innovation to cutting-edge journalism; from provocative performances and thought-provoking installations to incisive data visualizations that change how we view the world—our faculty and students are involved in a wealth of academic endeavors, creative enterprises, and professional experience.

Please use these resources to familiarize yourself with the diverse ranges of programs we offer. Don't hesitate to reach out to the graduate program faculty listed in your fields of interest, and be sure to visit CAMD's graduate programs website (https://camd.northeastern.edu/graduate-students/) often, where you'll find current news and links.

Academic Policies and Procedures

General Information

Four units in the College of Arts, Media and Design offer programs at the graduate level:

- Architecture
- Art + Design
- Interdisciplinary
- Journalism

Master's Degree Policies

The College of Arts, Media and Design (CAMD) graduate studies sets minimum standards for all students to fulfill. In addition, departments and programs may have requirements that exceed the standards outlined below. Finally, the CAMD Graduate Programs General Regulations booklet (found at the college's webpage (https://camd.northeastern.edu/graduate-resources-policies/)) further summarizes the expectations for student conduct, academic life, and the responsibilities of the students and the college to one another.

A candidate for the master's degree must complete a minimum of 30 semester hours of graduate-level coursework and such other study as may be required by the department in which the student is registered. To qualify for the degree, a minimum cumulative grade-point average (GPA) of 3.000, equivalent to a grade of B, must be obtained. This average will be calculated each semester. A student who does not make satisfactory progress toward degree requirements, as specified by the individual department, may be terminated from the program.

To maintain current student status within CAMD, graduate students must make satisfactory progress in their degree, including working toward the graduation requirement of a GPA of 3.000 and the timely completion of coursework. See the university's policy on academic standing ("Minimum Cumulative GPA (p. 36)").

All students must be registered in the last semester of their program. Any student who does not attend Northeastern University for a period of one year will be required to apply for readmission.

Electives

No more than 8 credit hours of electives may be taken outside of CAMD. Any additional non–CAMD elective hours will not count toward the degree.

Graduate Student Scholarship (GSS)

Students who are registered in degree programs are eligible for a CAMD Graduate Student Scholarship (GSS). Award recipients will receive an official award letter from CAMD graduate studies. Pay attention to this letter as it is an official contract that should be read carefully. The GSS is contingent on satisfactory academic progress toward the degree and meeting department-specific guidelines. Recipients must be in full-time status and be registered for a minimum of 8 semester hours. Note, however, that recipients remain eligible for the GSS in their final semester even if they are enrolled in less than 8 semester hours. Receipt of financial support administered by CAMD graduate studies requires that all students receiving awards must maintain a 3.000 cumulative GPA. Students whose cumulative GPA is below 3.000 will be placed on academic probationary status and are not eligible to receive the award while on probation. The GSS can be reactivated by raising the cumulative GPA to 3.000 in the subsequent semester; students who do not meet the minimum GPA requirement at the end of the next semester cannot receive additional probationary periods.

Leave of Absence

Full-time students who are not involved in any academic endeavor for a period of time are required to petition the manager of student services, through their department, for a leave of absence (p. 32) by completing the leave of absence petition through the myNortheastern web portal. CAMD graduate studies will not accept retroactive leave requests. Note that if a student is requesting a leave for medical reasons, students should contact University Health and Counseling Services (http://www.northeastern.edu/uhcs/forms/) at 617.373.2772. Leaves of absence generally are not approved for more than one calendar year at a time. International students must consult with an advisor at the Office of Global Services (https://international.northeastern.edu/ogs/maintaining_status_categories/leaving-nu/) for proper guidance. Leaves of absence are not appropriate for master's degree students who are working on a thesis but are away from the Northeastern campus. Except in the case of medical leaves, being on an approved leave of absence does not extend the amount of time allowed for degree completion or the makeup of incomplete grades.

Time Limitation

For the master's degree, course credits earned in the program of graduate study are valid for a maximum of seven years.

If students wish to apply for an extension of the time limit, they must submit a petition to their department of study. The petition must include a detailed plan for completion of all remaining degree requirements. In the case of time-limit extension requests for master's degree coursework, the department must certify that the content of each of the courses has not changed since the time the student completed the course. If deemed appropriate, the department will recommend approval of the extension to CAMD graduate studies.

Changes in Requirements

The continuing development of CAMD graduate studies forces regular revision of curricula. When no hardship is imposed on the student because of changes and the facilities (e.g., equipment, technology, studios, etc.) of the college permits, the student is encouraged to meet the more recent program requirements. This requires application to change the catalog term of the student's program of study. To accomplish this, the student's advisor can assist the student with the process of applying to change catalog term. However, if it can be demonstrated that doing so imposes a substantial hardship, the requirements of the year in which the student matriculated will be applicable.

Thesis

Theses are required in some programs and should demonstrate the individual's capacity to execute independent work based on original material. Registration for the thesis course is required. Theses must be approved by the departmental graduate committee and must receive a grade of B (3.000) or better to be accepted. Students who have not completed their thesis after having registered for the specified number of thesis credits must register and pay for Thesis Continuation.

Graduate Student Classification

Regular Student

Those students who are admitted to a degree program.

Conditional Student

Students whose admissions files are missing documentation. Conditional students must submit the requested documentation, to the satisfaction of College of Arts, Media and Design (CAMD) graduate studies, no later than the completion of their first month of study. Once the documentation has been submitted, the student's status will be reevaluated.

Provisional Student

Students whose academic records do not qualify them for acceptance as regular students. Provisional students must obtain a B (3.000) average in the first 12 semester hours of study or meet specifically delineated

departmental requirements to qualify for full acceptance to a degree program. Provisional students are not eligible for awards or financial aid.

Special Student

Special students are enrolled on a part-time basis (no more than 6 semester hours per semester). Credit can be earned for a maximum of 12 semester hours over time. Students interested in taking more than 12 semester hours must make a formal application to the degree program through Northeastern's online application portal (https://app.applyyourself.com/AYApplicantLogin/fl_ApplicantConnectLogin.asp?id=neu-grad). Special students who do not register for four consecutive semesters (excluding summer semester) will be subject to review and possible withdrawal by CAMD graduate studies.

Student Status

For academic purposes, a graduate student is considered a full-time student if enrolled in a minimum of 8 semester hours of credit for the semester, with the following exceptions:

- A student is considered full-time if enrolled in a full-time co-op (p. 26).
- All graduate students who are formally registered in thesis continuation may be considered full-time at the discretion of their department. It is ordinarily assumed that such students will be in residence.

Note: Full-time status may be defined differently for federal loan purposes. For information, contact Student Financial Services (https://studentfinance.northeastern.edu/), 617.373.5899.

School of Architecture

Website (https://camd.northeastern.edu/architecture/)

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Master of Architecture

Northeastern offers a Master of Architecture degree accredited by the National Architectural Accrediting Board (http://www.naab.org).

The program leverages the school's outstanding faculty and pragmatically grounded curriculum. The physical and cultural context of Boston serves as a laboratory for the program's design studios and is design focused but with a different approach than many schools. We find opportunities for innovation within the real estate and construction industries and current policy debates—rather than outside them. This is how we intend to move architects to the center of the discussion about the future of our cities.

Students take courses in urban housing, practice-integrated design, and do original research on market-driven building types. The final degree project in the design studio offers an opportunity to leverage this research with real innovations in hybrid types, strategic alterations to existing ones, and to take on the challenge of finding prototypical solutions for systemic problems.

In addition to studio courses, graduate students take seminars in architectural theory and design strategy; and electives are available in real estate development, sustainable building techniques, urban landscape, and other topics. There is also a unique course that looks at case studies of architecture firms in practice, problem solving, and innovation. We seek to have students leave our program with a unique balance of technical, theoretical, and strategic tools to make a real difference in the profession.

Master of Design for Sustainable Urban Environments

The Master of Design for Sustainable Urban Environments (MDes-SUEN) brings together the allied professional fields of environmental design, landscape architecture, and urban planning to offer advanced study and research opportunities in the design of ecologically and economically productive urban environments. The program seeks to supply graduates for the rapidly growing field of sustainable urbanism through a dynamic curricular mix of design, dialogue, and technical courses, enriched by diverse interdisciplinary electives.

The pedagogic and research focus of the MDes is the design, implementation, and management of sustainable urban environments from the scale of individual parcels to regional systems. Key topics include brownfield and waterfront revitalization, sustainable and secure pedestrian environments, urban habitat design and management, and green and blue infrastructure design and planning with an emphasis handling increased storm water and tidal influx in the urban landscape.

The MDes is a unique program of study in which urban landscape design, planning, and policy dovetail with environmental engineering, environmental science, art, and visualization. Boston's history of innovation in environmental design as well as its legacy of urban redevelopment provide a rich backdrop and laboratory of urban, infrastructural, and ecological prototypes that ideally position the program to creatively and critically explore local issues with global implications.

Contemporary urban theory includes a significant body of writing in the area of "Landscape-" and "Ecological-Urbanism," a critical discourse that looks at the full range of environmental strategies for urban sites with an emphasis on ecological thinking. The paradigm of sustainable environmental design is moving away from form-based planning toward dynamic ecosystem services. This program seeks to prepare students to be innovative and entrepreneurial designers able to combine economic, environmental, and social priorities to make next-generation public spaces and systems.

Programs

Master of Architecture (MArch)

- One-Year Program (p. 44)
- Two-Year Program (p. 45)
- Three-Year Program (p. 46)
- Three-Year Program—Advanced Degree Entrance (p. 47)

Master of Design for Sustainable Urban Environments (MDes-SUEN)

- One-Year Program (p. 48)
- Two-Year Program (p. 48)

Master of Architecture—One-Year Program

This program gives eligible candidates the opportunity to get a NAAB-accredited (http://www.naab.org) Master of Architecture degree in one year.

Open to candidates with either a Bachelor of Science in Architecture from Northeastern University or a professional Bachelor of Architecture degree

from an accredited North American program with at least one year of IDP-approved professional experience.

Students engage in a two-semester research and design project based on pertinent contemporary topics chosen by the graduate faculty, or students may propose an independent research and design project. Team research is conducted and compiled into online and physical research books. This body of compiled research then becomes the basis of the intellectual framework for the individual students' design projects. This final degree project parallels an in-depth two-semester professional practice sequence that analyzes all of the contingencies of successful architectural projects, including architectural offices and their project management strategies, real estate development criteria, and associated project finance.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Professional Practice		
ARCH 6430	Case Studies 1	4
ARCH 6440	Case Studies 2	4
Topics and Seminars		
ARCH 6330	Seminar in Modern Architecture	4
ARCH 6340	Graduate Topics in Architecture	4
Research and Project		
ARCH 7130	Master's Research Studio	6
ARCH 7140	Master's Degree Project	6

Elective

Code	Title	Hours
Students must complete a 4-semester-hour graduate elective.		4

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

Plan of Study

Year 1							
Fall	**Hours**	**Spring**	**Hours**	**Summer 1**	**Hours**	**Summer 2**	**Hours**
ARCH 6330	4	ARCH 6340	4	Vacation	0	Vacation	0
ARCH 6430	4	ARCH 6440	4				
ARCH 7130	6	ARCH 7140	6				
Elective (Required)	4						
	18		14		0		0

Total Hours: 32

Master of Architecture—Two-Year Program

This program offers students who have earned a Bachelor of Science in Architecture from an institution other than Northeastern to engage in the urban-focused curriculum that is offered at the School of Architecture. Students are awarded a M.Arch degree, which is NAAB-accredited (http://www.naab.org).

YEAR ONE

Options Studio offers topical content that best aligns with the research and practice expertise of the faculty, which provides students with the latest concepts in architectural design, theory, and research on a consistently updated and rotating basis. Students select their top choices of studio topics and instructors, giving them more flexibility in the areas for which they would like to focus their education. The Comprehensive Design Studio challenges the students to consider architectural connections at all scales, from the nut and bolt to the scale of the door or window to the scale of the whole building and the city. Additionally, students take classes in technology as well as architecture seminars.

YEAR TWO

In the final year, students engage in a two-semester research and design project based on pertinent contemporary topics chosen by the graduate faculty, or students may propose an independent research and design project. Team research is conducted and compiled into online and physical research books. This body of compiled research then becomes the basis of the intellectual framework for the individual students' design projects. This final degree project parallels an in-depth two-semester professional practice sequence that analyzes all of the contingencies of successful architectural projects, including architectural offices and their project management strategies, real estate development criteria, and associated project finance.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Building and Environment		
ARCH 5210	Environmental Systems	4
ARCH 5220	Integrated Building Systems	4
Studio		
ARCH 5115	Option Studio	6
ARCH 5120	Comprehensive Design Studio	6
Case Study		
ARCH 6430	Case Studies 1	4
ARCH 6440	Case Studies 2	4
Topics and Seminars		
ARCH 5310	Design Tactics and Operations	4
ARCH 6330	Seminar in Modern Architecture	4
ARCH 6340	Graduate Topics in Architecture	4
Research and Project		
ARCH 7130	Master's Research Studio	6
ARCH 7140	Master's Degree Project	6

Electives

Code	Title	Hours
Complete 8–16 semester hours (5000 level or above) from outside the following subject area:		8-16
ARCH		

Program Credit/GPA Requirements

60–68 total semester hours required
Minimum 3.000 GPA required

Plan of Study

Year 1

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
ARCH 5115	6	ARCH 5120	6	Vacation	0	Vacation	0
ARCH 5210 and ARCH 5211	4	ARCH 5220	4				
ARCH 5310	4	Elective (Required)	4				
Elective (Required)	4	Elective (Optional)	4				
	18		18		0		0

Year 2

Fall	Hours	Spring	Hours
ARCH 6330	4	ARCH 6340	4
ARCH 6430	4	ARCH 6440	4
ARCH 7130	6	ARCH 7140	6
Elective (Optional)	4		
	18		14

Total Hours: 68

Master of Architecture—Three-Year Program

Open to candidates who do not have a Bachelor of Science in Architecture or equivalent.
Applicants from all disciplines are welcome. Those who have some architecture course work may be eligible for advanced placement.

The program requires three years of study. Students have the option to pursue a summer co-op opportunity managed by the university's co-op program.

After completing a first-year introductory curriculum, students in the three-year program merge into the two-year MArch curriculum. This is a NAAB-accredited (http://www.naab.org) degree program.

YEAR ONE

In the first year, students take intensive studios, technology classes, and architectural history classes to immerse them in the studio culture of the school and to give them a strong foundation to begin the upper-level studios. The introductory graduate skills and design studios are specifically designed for the students in this program who do not have experience doing architectural drawing and designing. Students complete a series of projects that will give them an opportunity to develop the skills and the critical thinking needed in the graduate curriculum.

YEAR TWO

The Option Studio offers topical content that best aligns with the research and practice expertise of the faculty, which provides students with the latest concepts in architectural design, theory, and research on a consistently updated and rotating basis. Students select their top choices of studio topics and instructors, giving them more flexibility in the areas for which they would like to focus their education. The Comprehensive Design Studio in the second semester challenges the students to consider architectural connections at all scales, from architectural detail, to architectural systems, to the whole building and its urban context.

YEAR THREE

In the final year, students engage in a two-semester research and design project based on pertinent contemporary topics chosen by the graduate faculty, or students may propose an independent research and design project. Team research is conducted and compiled into online and physical research books. This body of compiled research then becomes the basis of the intellectual framework for the individual students' design projects. This final degree project parallels an in-depth two-semester professional practice sequence that analyzes all of the contingencies of successful architectural projects, including architectural offices and their project management strategies, real estate development criteria, and associated project finance.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
History		
ARCH 2330	Architecture and the City in the Nineteenth Century	4
ARCH 2340	Modern Architecture	4
Building, Design, and Environment		
ARCH 2240	Architectonic Systems	4
ARCH 3450	Advanced Architectural Communication	4
ARCH 5210	Environmental Systems	4
ARCH 5220	Integrated Building Systems	4
ARCH 5230	Structural Systems	4
Studio		
ARCH 5115	Option Studio	6
ARCH 5120	Comprehensive Design Studio	6
ARCH 6100	Graduate Skills Studio	6
ARCH 6200	Graduate Studio 1: Architectural Design	6
Professional Practice		
ARCH 6430	Case Studies 1	4
ARCH 6440	Case Studies 2	4
Topics and Seminars		
ARCH 5310	Design Tactics and Operations	4
ARCH 6330	Seminar in Modern Architecture	4
Complete the following (repeatable) course twice:		8
ARCH 6340	Graduate Topics in Architecture	
Research and Project		
ARCH 7130	Master's Research Studio	6
ARCH 7140	Master's Degree Project	6

Electives

Code	Title	Hours
Required Electives		
Complete 8 semester hours of non-ARCH courses (required).		8
Optional Electives		
Complete 4 semester hours of ARCH courses (optional). Electives outside architecture may be taken in consultation with your faculty adviser.		

Program Credit/GPA Requirements

96–104 total semester hours required

Minimum 3.000 GPA required

Plan of Study

Year 1

Fall	Hours	Spring	Hours	Summer 1	Hours
ARCH 2240	4	ARCH 2340 and ARCH 2341	4	Vacation	0
ARCH 2330 (and)	4	ARCH 3450 (or required elective)	4		
ARCH 2331		ARCH 5210	4		
ARCH 6100	6	ARCH 521			
Elective (Required)	4	ARCH 6200	6		
	18		18		0

Year 2

Fall	Hours	Spring	Hours
ARCH 5115	6	ARCH 3450 (or required elective)	4
ARCH 5230 (and)	4	ARCH 5120	6
ARCH 5231		ARCH 5220	4
ARCH 5310	4	ARCH 6340 (1 of 2)	4
Optional elective	4		
	18		18

Year 3

Fall	Hours	Spring	Hours
ARCH 6330	4	ARCH 6340 (2 of 2)	4
ARCH 6430	4	ARCH 6440	4
ARCH 7130	6	ARCH 7140	6
Elective (optional)	4		
	18		14

Total Hours: 104

Total credits for the three-year track may range from 96–104 depending on optional electives.

Master of Architecture—Three-Year Program—Advanced Degree Entrance

Open to candidates who do not have a Bachelor of Science in Architecture or an equivalent degree.
Students with some background in architecture may be eligible for advanced placement into the program. Advanced placement will be determined by an applicant's transcript and portfolio.

After completing a first-year introductory curriculum, students in the three-year program merge into the two-year MArch curriculum. This is a NAAB-accredited (http://www.naab.org/)degree program.

Only select courses in the first year of the program will be waived. All waivers are at the discretion of the school and applicants will be required to provide documentation for any waivers (78–100 credits total based on waivers).

The minimum course work for all students in the first year of the program is:

- Two studio courses (minimum 10 credits total)
- Two graduate electives (minimum 8 credits total)

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

All advanced-entry students must complete a minimum of 10 semester hours per semester in the first year. Course waivers are determined by the faculty and students should consult with their advisor.

Prerequisites

Courses listed below may be waived as determined by faculty advisor.

Code	Title	Hours
History		
ARCH 2330	Architecture and the City in the Nineteenth Century	4
ARCH 2340	Modern Architecture	4
Building, Design, and Environment		
ARCH 2240	Architectonic Systems	4
ARCH 5210	Environmental Systems	4
ARCH 5230	Structural Systems	4

Core Requirements

Code	Title	Hours
Building, Design, and Environment		
ARCH 3450	Advanced Architectural Communication	4
ARCH 5220	Integrated Building Systems	4
Studio		
ARCH 5115	Option Studio	6
ARCH 5120	Comprehensive Design Studio	6
ARCH 6100	Graduate Skills Studio	6
ARCH 6200	Graduate Studio 1: Architectural Design	6
Professional Practice		
ARCH 6430	Case Studies 1	4
ARCH 6440	Case Studies 2	4
Topics and Seminars		
ARCH 5310	Design Tactics and Operations	4
ARCH 6330	Seminar in Modern Architecture	4
Complete the following (repeatable) course twice:		8
ARCH 6340	Graduate Topics in Architecture	
Research and Project		
ARCH 7130	Master's Research Studio	6
ARCH 7140	Master's Degree Project	6

Electives

Code	Title	Hours
Required Electives		
Complete 8 semester hours of non-ARCH courses.		8

Additional Elective or Topics	
Complete 8 semester hours of non-ARCH courses.	8

Program Credit/GPA Requirements

78–100 total semester hours required
Minimum 3.000 GPA required

Plan of Study

Year 1

Fall	Hours	Spring	Hours
ARCH 2240	4	ARCH 2340 and ARCH 2341	4
ARCH 2330 (and)	4	ARCH 3450 (or Required Elective)	4
ARCH 2331		ARCH 6200	6
ARCH 5210 (and)	4	Elective (Optional)	4
ARCH 5211			
ARCH 6100	6		
	18		18

Year 2

Fall	Hours	Spring	Hours
ARCH 5115	6	ARCH 3450 (or Required Elective)	4
ARCH 5230 (and)	4	ARCH 5120	6
ARCH 5231		ARCH 5220	4
ARCH 5310	4	ARCH 6340 (1 of 2)	4
Optional Elective	4		
	18		18

Year 3

Fall	Hours	Spring	Hours
ARCH 6430	4	ARCH 6340 (2 of 2)	4
ARCH 6330	4	ARCH 6440	4
ARCH 7130	6	ARCH 7140	6
Elective (Optional)	4		
	18		14

Total Hours: 104

Total credits for the AP track may range from 78–104 depending on waivers and optional electives.
Note: Only courses in year one may be waived. Course waivers are at the discretion of the program director.

Master of Design for Sustainable Urban Environments—One-Year Program

The one-year Master of Design for Sustainable Urban Environments (MDes-SUEN) is open to students holding an accredited, first-professional degree in landscape architecture, architecture, planning, or urban design. The 36-credit program offers a core sequence of advanced design research studios, proseminars, and urban ecology and technology workshops complemented by interdisciplinary electives.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Studio		
SUEN 7130	Master's Research Studio: Design and the Resilient City	6
SUEN 7140	Master's Research Studio: Master's Project	6
Proseminar		
Complete 8 semester hours from the following (repeatable) courses:		8
SUEN 7320	Pro-Seminar: Issues in Designed Urban Environments	
SUEN 6340	Topics in Urban Environmental Design	
Technology		
SUEN 7230	Urban Ecologies and Technologies 1	4
SUEN 7240	Urban Ecologies and Technologies 2	4

Electives

Electives in other disciplines may be taken in consultation with your faculty advisor.

Code	Title	Hours
Complete 8 semester hours from the following subject areas:		8
SUEN, ARCH, LARC, PPUA, LPSC, and SBSY		

Program Credit/GPA Requirements

36 total semester hours required
Minimum 3.000 GPA required

Plan of Study

Year 1

Fall	Hours	Spring	Hours
SUEN 7130	6	SUEN 7140 (or co-op*)	6
SUEN 7230	4	SUEN 7240	4
SUEN 7320 or 6340	4	SUEN 7320	4
Elective (required)	4	Elective (required)	4
	18		18

Total Hours: 36

*Students may opt to do a graduate co-op. Co-op does not count toward degree credits.

Master of Design for Sustainable Urban Environments—Two-Year Program

The two-year Master of Design for Sustainable Urban Environments (MDes-SUEN) is open to students entering with a bachelor's degree in any field. The 64-credit program provides a full year of core skill sets including design; site analysis, implementation, and visualization; history/theory; and policy. This includes introduction to basic earthworks, water, and plants systems as well as the principles of landscape and urban ecology.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Studio		
SUEN 6110	Graduate Studio 1: Sustainable Urban Sites	6
SUEN 6120	Graduate Studio 2: Sustainable Urban Systems	6
SUEN 7130	Master's Research Studio: Design and the Resilient City	6
SUEN 7140	Master's Research Studio: Master's Project	6
Cities: Design and Planning		
SUEN 6310	Cities, Nature, and Design in Contemporary History and Theory	4
LPSC 7312	Cities, Sustainability, and Climate Change	4
Proseminar		
Complete 8 semester hours from the following (repeatable) courses:		8
SUEN 7320	Pro-Seminar: Issues in Designed Urban Environments	
SUEN 6340	Topics in Urban Environmental Design	
Technology		
SUEN 6210	Implementation and Visualization for Urban Environments 1	4
SUEN 6220	Implementation and Visualization for Urban Environments 2	4
SUEN 7230	Urban Ecologies and Technologies 1	4
SUEN 7240	Urban Ecologies and Technologies 2	4

Electives

Electives in other disciplines may be taken in consultation with your faculty advisor.

Code	Title	Hours
Complete 8 semester hours from the following subject areas:		8
SUEN, ARCH, LARC, PPUA, LPSC, SBSY		

Program Credit/GPA Requirements

64 total semester hours required
Minimum 3.000 GPA required

Plan of Study

Year 1

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
SUEN 6110	6	SUEN 6120	6	Vacation	0	Vacation	0
SUEN 6210	4	SUEN 6220	4				
SUEN 6310	4	LPSC 7312	4				
Elective (Required)	4	Elective (Required)	4				
	18		18		0		0

Year 2

Fall	Hours	Spring	Hours
SUEN 7130	6	SUEN 7140 (or co-op)*	6
SUEN 7320 (or)	4	SUEN 7320	4
SUEN 6340		SUEN 7240	4
SUEN 7230	4	Elective (Optional)	4
Elective (Optional)	4		
	18		18

Total Hours: 72

**Note:* Students may opt to do a graduate co-op. Co-op does not count toward degree credits.
Total credits required are 64 (with two optional electives, 72).

Art + Design

Website (https://camd.northeastern.edu/art-design/graduate/)

Jason Donati, MFA
Interim Chair

617.373.4340

The graduate programs in the Department of Art + Design are designed to cultivate capacity and fluency in a range of disciplines and practices to create and deliver value and benefit for an increasingly connected and diverse world. Spanning many subjects, interests, and intentions across disparate fields and manifold practices of art, media, and design, our master's and certificate programs will challenge and inspire you to push the boundaries of cultural production and stewardship and social and civic impact. We strive to empower you to bring your ideas to life through design conversations, media making, and artistic expression and enjoy richly rewarding careers and lives.

Programs

Master of Fine Arts (MFA)

- Experience Design (p. 49)
- Information Design and Data Visualization (p. 50)

Master of Science (MS)

- Experience Design (p. 52)
- Game Science and Design (p. 53)
- Information Design and Data Visualization (p. 54)

Graduate Certificate

- Game Experience Design (p. 54)
- Game Science (p. 55)
- Experience Design (p. 55)
- Information Design and Visualization (p. 56)

Experience Design, MFA

The Master of Fine Arts in Experience Design embraces research-driven design thinking for entrepreneurship, innovation, and other areas, preparing students to be vital contributors and leaders at the intersection of innovation and design.

Experience design is a holistic and integrative approach to design that utilizes investigation into the human experience in specific situations to improve its quality, given an understanding of human goals, needs, and desires. For example, in the context of healthcare, an experience designer does not focus on the design of any one technology product, information system, or physical space. Instead, the designer is charged

with understanding and improving the overall sequence of events that impact the patient before and during a hospital stay as well as through follow-up care.

The experience design program moves beyond design thinking to produce outcomes that demonstrate the value of human-centered research and design methods. It draws on findings from a range of professional and scholarly disciplines (including business, psychology, human-computer interaction, engineering, cybernetics) to understand and shape specific situations. It extends across many industries and aspects of life: healthcare, technology, services, travel, education, entertainment, shopping, dining, and the nature of work itself.

Through examining how people behave in a real context in relation to emerging technologies, the Master of Fine Arts in Experience Design allows graduates from design and related disciplines (such as communications, computer science, business, architecture, art, journalism, humanities, and the social sciences) to gain knowledge and experience in the design competencies. To accomplish these goals, students will learn how to invoke cooperation, collaboration, and integration across disciplines and practices.

The Master of Fine Arts in Experience Design seeks to prepare students to be vital contributors and leaders of professional experience design teams where technological innovation intersects with design. Successful graduates will be able to analyze how people undergo real-world situations, enabling them to enrich experience by orchestrating new design-driven relationships. They will be equipped with the skills to identify shortcomings as well as opportunities for improved engagement between systems and elements—virtual or physical—with the humans who encounter them.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Required Core		
ARTG 5120	Research Methods for Design	4
ARTG 5600	Experience Design Studio 1: Principles	4
ARTG 5610	Design Systems	4
ARTG 5620	Notational Systems for Experience	4
ARTG 5640	Prototyping for Experience Design	4
ARTG 6310	Design for Behavior and Experience	4
ARTG 6600	Experience Design Studio 2: Group and Interpersonal	4
ARTG 6700	Design Studio 3: Synthesis	4
Thesis		
ARTG 7100	Critical Design and Research Seminar	4
ARTG 7910	Design Project and Exhibition	4
ARTG 7990	Thesis	4

Electives

Code	Title	Hours
Complete 16 semester hours of elective courses, such as these in consultation with your advisor:		16
ARTG 5310	Visual Cognition	
ARTG 5320	Statistics for Design	
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 6320	Design of Information-Rich Environments	
ARTG 6330	Information Design Mapping Strategies	
ARTG 6110	Information Design Theory and Critical Thinking	
ARTG 6900	Special Topics in Design	
GSND 6320	Psychology of Play	

Program Credit/GPA Requirements

60 total semester hours required
Minimum 3.000 GPA required

Plan of Study

Sample Two Years, One Co-op (Optional) Plan of Study

Year 1

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
ARTG 5600	4	ARTG 5610	4	Co-op or Vacation	
ARTG 5120	4	ARTG 6310	4		
ARTG 5620	4	ARTG 6600	4		
ARTG 5640	4	Elective	4		
	16		16		0

Year 2

Fall	Hours	Spring	Hours
ARTG 6700	4	ARTG 7910	4
ARTG 7100	4	ARTG 7990	4
Elective	4	Elective	4
Elective	4		
	16		12

Total Hours: 60

Information Design and Data Visualization, MFA

The Master of Fine Arts in Information Design and Data Visualization program uniquely combines design training and analytical methods with distinctive approaches to theoretical, visual, and technical aspects of visual communication. Successful graduates gain expertise in the visual and technological languages of data, applying modes of visual cognition, and using analytics tools to create interactive, data-driven communication and installations.

This design-centric program seeks to prepare graduates to collaborate across a variety of fields and settings, crossing the bridge between technology, public communication, and systems design. Successful graduates are prepared to be professional information designers and data visualization experts in design agencies, research institutions, industry, and public institutions, able to lead and collaborate in this dynamic and burgeoning interdisciplinary field of practice and research. Students also are well positioned to pursue PhDs and academic careers. Students have the unique advantage of studying at a major research university known for interdisciplinary collaboration located in Boston—a global center for technology, science, education, and culture—offering diverse opportunities for practice and research in information design and data visualization.

The MFA-IDDV curriculum includes studio courses and seminars in graphic, information, and interaction design; creative inquiry; research methodologies; data literacies; and visualization technologies. It

integrates faculty instruction with visiting artists and researchers. The degree requires 60 credit hours over two academic years, with an option to engage in Northeastern's renowned co-op program. A thesis project, a written thesis, and an accompanying work exhibition in the thesis show are required.

Learn more about IDDV projects, students, and faculty at northeastern.edu/visualization (http://northeastern.edu/visualization/).

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Studio		
ARTG 5100	Information Design Studio 1: Principles	4
ARTG 6100	Information Design Studio 2: Dynamic Mapping and Models	4
ARTG 6700	Design Studio 3: Synthesis	4
Theory and Research Methods		
ARTG 5310	Visual Cognition	4
ARTG 5320	Statistics for Design	4
ARTG 5330	Visualization Technologies 1: Fundamentals	4
ARTG 6110	Information Design Theory and Critical Thinking	4
Design and History		
ARTG 5110	Information Design History	4
ARTG 5130	Visual Communication for Information Design	4
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	4
Thesis		
ARTG 7100	Critical Design and Research Seminar	4
ARTG 7910	Design Project and Exhibition	4
ARTG 7990	Thesis	4

Electives

Code	Title	Hours
In consultation with faculty advisor, complete two courses from the following (one of the electives can be chosen from any Northeastern graduate courses):		8
ARTG 5120	Research Methods for Design	
ARTG 5430	Visualization Technologies 2: Advanced Practices	
ARTG 5620	Notational Systems for Experience	
ARTG 5640	Prototyping for Experience Design	
ARTG 6310	Design for Behavior and Experience	
ARTG 6320	Design of Information-Rich Environments	
ARTG 6330	Information Design Mapping Strategies	
ARTG 6900	Special Topics in Design	
ARTE 5901	Special Topics in Art and Design Studio	
JRNL 6341	Telling Your Story with Data	

Program Credit/GPA Requirements

60 total semester hours required
Minimum 3.000 GPA required

Plan of Study

Sample Two Years, Optional Summer Co-op

Year 1

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
ARTG 5100	4	ARTG 5310	4	Co-op or vacation	0
ARTG 5130	4	ARTG 5320	4		
ARTG 5150	3	ARTG 6100	4		
ARTG 5151	1	ARTG 6110	4		
ARTG 5330	4				
	16		16		0

Year 2

Fall	Hours	Spring	Hours
ARTG 5110	4	ARTG 7910	4
ARTG 6700	4	ARTG 7990	4
ARTG 7100	4	Elective	4
Elective	4		
	16		12

Total Hours: 60

Sample Three Years, Co-op in Fall

Year 1

Fall	Hours	Spring	Hours
ARTG 5100	4	ARTG 5310	4
ARTG 5130	4	ARTG 5320	4
ARTG 5150	3	ARTG 6100	4
ARTG 5151	1	ARTG 6110	4
ARTG 5330	4		
	16		16

Year 2

Fall	Hours	Spring	Hours
Co-op	0	ARTG 7100	4
ARTG 6700	4	ARTG 7910	4
		Elective	4
	4		12

Year 3

Fall	Hours
ARTG 5110	4
ARTG 7990	4
Elective	4
	12

Total Hours: 60

Sample Three Years, Co-op in Spring

Year 1

Fall	Hours	Spring	Hours
ARTG 5100	4	ARTG 5310	4
ARTG 5130	4	ARTG 5320	4

ARTG 5150	3	ARTG 6100	4
ARTG 5151	1	ARTG 6110	4
ARTG 5330	4		
	16		16

Year 2

Fall	Hours	Spring	Hours
ARTG 5110	4	Co-op	0
ARTG 6700	4		
ARTG 7100	4		
	12		0

Year 3

Fall	Hours	Spring	Hours
Elective	4	ARTG 7910	4
Elective	4	ARTG 7990	4
	8		8

Total Hours: 60

Sample Three Years, Two Co-ops

(Research co-op track)

Year 1

Fall	Hours	Spring	Hours
ARTG 5100	4	ARTG 5310	4
ARTG 5130	4	ARTG 5320	4
ARTG 5150	3	ARTG 6100	4
ARTG 5151	1	ARTG 6110	4
ARTG 5330	4		
	16		16

Year 2

Fall	Hours	Spring	Hours
ARTG 7100	4	Co-op*	0
Co-op	0		
	4		0

Year 3

Fall	Hours	Spring	Hours
ARTG 5110	4	ARTG 7910	4
ARTG 6700	4	ARTG 7990	4
Elective	4		
Elective	4		
	16		8

Total Hours: 60

*The second co-op must be a research-oriented co-op related to the thesis after completion of ARTG 7100 with the permission of the program coordinator.

Experience Design, MS

The Master of Science in Experience Design embraces research-driven design thinking for entrepreneurship, innovation, and other areas, preparing students to be vital contributors and leaders at the intersection of innovation and design.

Experience design is a holistic and integrative approach to design that utilizes investigation into the human experience in specific situations to improve its quality, given an understanding of human goals, needs, and desires. For example, in the context of healthcare, an experience designer does not focus on the design of any one technology product, information system, or physical space. Instead, the designer is charged with understanding and improving the overall sequence of events that impact the patient before and during a hospital stay as well as through follow-up care.

The experience design program moves beyond design thinking to produce outcomes that demonstrate the value of human-centered research and design methods. It draws on findings from a range of professional and scholarly disciplines (including business, psychology, human-computer interaction, engineering, cybernetics) to understand and shape specific situations. It extends across many industries and aspects of life: healthcare, technology, services, travel, education, entertainment, shopping, dining, and the nature of work itself.

Through examining how people behave in a *real* context in relation to emerging technologies, the Master of Science in Experience Design allows graduates from design and related disciplines (such as communications, computer science, business, architecture, art, journalism, humanities, and the social sciences) to gain knowledge and experience in the design competencies. To accomplish these goals, students will learn how to invoke cooperation, collaboration, and integration across disciplines and practices.

The Master of Science in Experience Design seeks to prepare students to be vital contributors and leaders of professional experience design teams where technological innovation intersects with design. Successful graduates will be able to analyze how people undergo real-world situations, enabling them to enrich experience by orchestrating new design-driven relationships. They will be equipped with the skills to identify shortcomings as well as opportunities for improved engagement between systems and elements—virtual or physical—with the humans who encounter them.

The MS degree is intended for graduate students from related fields—media, design, communications, data science, and more—who would like to acquire competencies in experience design to complement their skills and address their professional needs. Embedded in the course offering of our Master of Fine Arts in Experience Design (p. 49) program, students in the MS program will have the opportunity to join MFA students for activities such as attending guest lectures and workshops.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
ARTG 5120	Research Methods for Design	4
ARTG 5600	Experience Design Studio 1: Principles	4
ARTG 5610	Design Systems	4
ARTG 5620	Notational Systems for Experience	4
ARTG 6310	Design for Behavior and Experience	4
ARTG 6600	Experience Design Studio 2: Group and Interpersonal	4

Electives

Code	Title	Hours
Complete 2 elective courses (4 credits each) such as these in consultation with your adviser:		8
ARTG 5310	Visual Cognition	

ARTG 5320	Statistics for Design
ARTG 5330	Visualization Technologies 1: Fundamentals
ARTG 5640	Prototyping for Experience Design
ARTG 6110	Information Design Theory and Critical Thinking
ARTG 6320	Design of Information-Rich Environments
Other electives may be chosen in consultation with program coordinator.	

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

Plan of Study

Year 1

Fall	Hours	Spring	Hours
ARTG 5120	4	ARTG 5610	4
ARTG 5600	4	ARTG 6310	4
ARTG 5620	4	ARTG 6600	4
Elective	4	Elective	4
	16		16

Total Hours: 32

*Students may opt to do a graduate co-op. Co-op does not count toward credits required for the degree.

Game Science and Design, MS

The **Master of Science (MS) in Game Science and Design** is a program that seeks to give students a comprehensive understanding of how successful game products are created in a player-centric environment. Successful graduates who wish to become professional game developers or game user research experts should be able to collaborate effectively in this dynamic and burgeoning field of practice and research. Focusing on the science of game development, students have an opportunity to learn the design and technological skills needed to build a game and develop a deep understanding of playability and analytics that makes products successful in an increasingly competitive marketplace.

The game industry has expanded to include social and mobile gaming; augmented and virtual reality; as well as games in health, education, and training. Rapid innovations are happening in player psychology, middleware, graphics and authoring tools, game mechanics, and artificial intelligence and narrative techniques. It has become an increasingly competitive space.

The selectiveness of the industry and the diversity of the skills required mean that students seeking entry need both broad and deep skills. As an emergent industry using diverse technology and collaborative practices, the game industry needs professionals with interdisciplinary skill sets who can blend knowledge about development with knowledge about evaluation methods and players' behavior and psychology.

Jointly offered by Northeastern's College of Arts, Media and Design and Khoury College of Computer Sciences (https://www.khoury.northeastern.edu/), the **Master of Science in Game Science and Design** is a one-of-a-kind interdisciplinary program that seeks to prepare students to meet this need by weaving together science and design. This is a two-year, 34-credit-hour program.

All admitted students will be assigned to an advisor who will help them select a pathway with a coherent set of electives depending on their career goals. The advisor will also monitor their progress through the master's degree.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Required Core		
GSND 5110 and GSND 5111 and GSND 5112	Game Design and Analysis and Seminar for GSND 5110 and Recitation for GSND 5110	5
GSND 5122	Business Models in the Game Industry	1
GSND 5130	Mixed Research Methods for Games	4
Thesis		
GSND 6330	Player Experience	4
GSND 7990	Thesis	4

Electives

Code	Title	Hours
Game Design or Development		
Complete one of the following:		4
CS 5150	Game Artificial Intelligence	
CS 5850	Building Game Engines	
GSND 6240	Exploratory Concept Design	
GSND 6250	Spatial and Temporal Design	
Game User Research or Analytics		
Complete one of the following:		4
CS 5340	Computer/Human Interaction	
GSND 6320	Psychology of Play	
GSND 6340	Biometrics for Design	
GSND 6350	Data-Driven Player Modeling	

Code	Title	Hours
Other Electives List		
Complete any two of the previously listed courses or from the following (courses not listed below may be completed in consultation with your faculty advisor):		8
ARTG 5130	Visual Communication for Information Design	
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 5610	Design Systems	
ARTG 5640	Prototyping for Experience Design	
ARTG 6310	Design for Behavior and Experience	
CS 5520	Mobile Application Development	
CS 5610	Web Development	
DA 5020	Collecting, Storing, and Retrieving Data	
DA 5030	Introduction to Data Mining/Machine Learning	

INSH 5302	Information Design and Visual Analytics
JRNL 6341	Telling Your Story with Data

Program Credit/GPA Requirements

34 total semester hours required
Minimum 3.000 GPA required

Plan of Study

Sample Two Years, One Co-op (Optional) Plan of Study

Year 1

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
GSND 5110 and GSND 5111 and GSND 5112	5	Elective	4	Co-op (optional)	0
GSND 5130	4	Elective	4		
	9		8		0

Year 2

Fall	Hours	Spring	Hours
GSND 5122	1	Elective	4
GSND 6330	4	GSND 7990	4
Elective	4		
	9		8

Total Hours: 34

Note: Co-op or Thesis Co-op is optional in consultation with faculty advisor.

Information Design and Data Visualization, MS

The Master of Science in Information Design and Data Visualization is a two-semester research- and analysis-oriented program focusing on visual interfaces to communicate and explore digital information. Successful graduates may become professional information designers and data visualization experts able to collaborate effectively in this dynamic and burgeoning field of practice and research, prepared to work in data-driven areas including design, technology, business, health, education, and public institutions. The curriculum is designed to train students in design principles, critical inquiry, and the analytical and creative practices needed to assume leadership roles in an evolving interdisciplinary field. Coursework focuses on the translation of data and information into visual languages and the integration of theoretical, cognitive, and technical aspects of visualizations that engage a broad range of audiences. From this master's program, students have multiple options to expand their advanced studies along diverse avenues, including adding graduate certificates in related topics such as user analytics, data analytics, experience design, and cultural entrepreneurship; engaging in co-op opportunities; and applying to proceed academically into a terminal Master of Fine Arts degree.

To learn more visit the Information Design and Data Visualization (https://camd.northeastern.edu/program/information-design-and-visualization/) page.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
ARTG 5100	Information Design Studio 1: Principles	4
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	4
ARTG 5310	Visual Cognition	4
ARTG 5320	Statistics for Design	4
ARTG 5330	Visualization Technologies 1: Fundamentals	4
ARTG 6100	Information Design Studio 2: Dynamic Mapping and Models	4
ARTG 6110	Information Design Theory and Critical Thinking	4

Elective

Code	Title	Hours
Complete one of the following:		4
ARTG 5110	Information Design History	
ARTG 5120	Research Methods for Design	
ARTG 5130	Visual Communication for Information Design	
ARTG 5430	Visualization Technologies 2: Advanced Practices	
ARTG 6310	Design for Behavior and Experience	
ARTG 6320	Design of Information-Rich Environments	
ARTG 6330	Information Design Mapping Strategies	

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

Plan of Study

Year 1

Fall	Hours	Spring	Hours
ARTG 5100	4	ARTG 5310	4
ARTG 5150 and ARTG 5151	4	ARTG 5320	4
ARTG 5330	4	ARTG 6100	4
Elective	4	ARTG 6110	4
	16		16

Total Hours: 32

Game Experience Design, Graduate Certificate

The Graduate Certificate in Game Experience Design offers training in the skills, tools, and methods needed to design successful game products, including social and mobile gaming; augmented and virtual reality; as well as games for health, education, and science. Students gain hands-on experience in designing games under faculty with industry expertise in game design. Game design courses focus on innovation; societal

impact; and player-centric, experiential design approaches. The Graduate Certificate in Game Experience Design is a one-year, 17-semester-hour program. Upon successful completion of the certificate, students can opt to apply to the Master of Science in Game Science and Design and, if accepted, transfer credits gained through the certificate.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
GSND 5110 and GSND 5111 and GSND 5112	Game Design and Analysis and Seminar for GSND 5110 and Recitation for GSND 5110	5
GSND 5130	Mixed Research Methods for Games	4

Electives

Code	Title	Hours
Complete 8 semester hours from the following:		8
ARTG 5640	Prototyping for Experience Design	
GSND 6250	Spatial and Temporal Design	
GSND 6340	Biometrics for Design	
GSND 6460	Generative Game Design	

Program Credit/GPA Requirements

17 total semester hours required
Minimum 3.000 GPA required

Game Science, Graduate Certificate

The Graduate Certificate in Game Science offers training in assessing, tracking, and analyzing player experience using game analytics methods and techniques, biometrics, and research methods including interviews and surveys. Students gain hands-on experience with these methods and techniques under faculty guidance with industry experts in game science. The game development process has shifted from "design, develop, release" to "design, develop, release, and continuously fine-tune based on user data." Game science plays a critical role in this new process. The Graduate Certificate in Game Science is a one-year, 17-semester-hour program. Upon successful completion of the certificate, students can opt to apply to the Master of Science in Game Science and Design and, if accepted, transfer credits gained through the certificate.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
GSND 5110 and GSND 5111 and GSND 5112	Game Design and Analysis and Seminar for GSND 5110 and Recitation for GSND 5110	5
GSND 5130	Mixed Research Methods for Games	4

Electives

Code	Title	Hours
Complete two of the following:		8
GSND 6320	Psychology of Play	
GSND 6340	Biometrics for Design	
GSND 6350	Data-Driven Player Modeling	

Program Credit/GPA Requirements

17 total semester hours required
Minimum 3.000 GPA required

Experience Design, Graduate Certificate

The Graduate Certificate in Experience Design embraces research-driven design thinking for entrepreneurship, innovation, and other areas, preparing students to be vital contributors and leaders at the intersection of innovation and design.

Experience design is a holistic and integrative approach to design that utilizes investigation into the human experience in specific situations to improve its quality, given an understanding of human goals, needs, and desires. For example, in the context of healthcare, an experience designer does not focus on the design of any one technology product, information system, or physical space. Instead, the designer is charged with understanding and improving the overall sequence of events that impact the patient before and during a hospital stay as well as through follow-up care.

The Graduate Certificate in Experience Design moves beyond design thinking to produce outcomes that demonstrate the value of human-centered research and design methods. It draws on findings from a range of professional and scholarly disciplines (including business, psychology, human-computer interaction, engineering, cybernetics) to understand and shape specific situations. It extends across many industries and aspects of life: healthcare, technology, services, travel, education, entertainment, shopping, dining, and the nature of work itself.

Through examining how people behave in a *real* context in relation to emerging technologies, the Graduate Certificate in Experience Design allows working professionals or graduates from design and related disciplines (such as communications, computer science, business, architecture, art, journalism, humanities, and the social sciences) to gain knowledge and experience in the design competencies. To accomplish these goals, students need to learn how to invoke cooperation, collaboration, and integration across disciplines and practices.

The Graduate Certificate in Experience Design is designed to prepare students to be vital contributors and leaders of professional experience design teams where technological innovation intersects with design. Successful graduates will be able to analyze how people undergo real-world situations, enabling them to enrich experience by orchestrating new design-driven relationships. They will be equipped with the skills to identify shortcomings as well as opportunities for improved engagement between systems and elements—virtual or physical—with the humans who encounter them.

The certificate is intended for practitioners and graduate students from related fields—media, design, communications, data science, and more—who would like to acquire competencies in experience design to complement their skills and address their professional needs. Embedded in the course offering of our Master of Fine Arts in Experience Design (p. 49) program, students in the certificate program will have the opportunity to join MFA students for activities such as attending guest lectures and workshops.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
ARTG 5610	Design Systems	4
ARTG 5620	Notational Systems for Experience	4
ARTG 6310	Design for Behavior and Experience	4

Elective

Code	Title	Hours
Complete 4 semester hours of 5000- to 6000-level course work in the following subject area:		4
ARTG		

Program Credit/GPA Requirements

16 total semester hours required
Minimum 3.000 GPA required

Information Design and Visualization, Graduate Certificate

The Graduate Certificate in Information Design and Visualization focuses on the data-driven analytical and visual design of information, preparing students to communicate visually while engaging advanced data analytics to produce meaningful information environments.

Successful graduates of the Certificate in Information Design and Visualization are professionals who are prepared to tackle new information communication challenges and communicate and collaborate with researchers in a variety of fields, as well as stakeholders and the public. Throughout the course of the certificate, students master how to think visually, while also learning how to produce effective, meaningful visual information from various sources of data.

The certificate is intended for practitioners and graduate students from related fields—media, design, communications, data science, and more—who would like to acquire competencies in information design and data visualization to complement their skills and address their professional needs. Embedded in the course offering of our Master of Fine Arts in Information Design and Visualization (http://www.northeastern.edu/camd/artdesign/academic-programs/mfa-in-information-design-and-visualization/) program, students in the certificate program will have the opportunity to join MFA students for activities such as attending guest lectures and workshops.

To learn more, visit the Visualization (https://www.northeastern.edu/visualization/) and Information Design and Visualization (http://camd.northeastern.edu/program/information-design-and-visualization/) portals.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
ARTG 5130	Visual Communication for Information Design	4
ARTG 5330	Visualization Technologies 1: Fundamentals	4

Electives

Code	Title	Hours
Complete two from the following:		8
ARTG 5100	Information Design Studio 1: Principles	
ARTG 5110	Information Design History	
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	
ARTG 5310	Visual Cognition	
ARTG 5320	Statistics for Design	
ARTG 5430	Visualization Technologies 2: Advanced Practices	
ARTG 6100	Information Design Studio 2: Dynamic Mapping and Models	
ARTG 6310	Design for Behavior and Experience	
ARTG 6320	Design of Information-Rich Environments	
ARTG 6330	Information Design Mapping Strategies	
ARTG 6900	Special Topics in Design	
ARTG 5000 or 6000 level course		

Program Credit/GPA Requirements

16 total semester hours required
Minimum 3.000 GPA required

School of Journalism

Website (http://www.northeastern.edu/camd/journalism/)

Jonathan Kaufman, MA
Professor and Director

617.373.3236
617.373.8773 (fax)

Welcome to the graduate programs at Northeastern University's School of Journalism. Our school offers a Master of Arts in Journalism and a Master of Science in Media Advocacy. The Master of Arts in Journalism degree is designed to merge traditional journalism with the latest technology. Students new to the field or those with experience can choose one of two tracks—professional journalism or media innovation—to prepare them for the challenges faced by legacy and new media in the digital age. The Master of Science in Media Advocacy is designed to teach strategic advocacy skills and prepare graduates to succeed as resilient, media-empowered citizens in a global society. Moreover, these programs offer students hands-on training in preparation for careers in reporting, editing, multimedia design and production, social media, and data journalism.

As part of Northeastern's College of Arts, Media and Design, our graduate students are also part of an interdisciplinary and creative community. Our core curriculum is supplemented by electives that take advantage of course offerings from within our college and from other colleges in the university. And with our experiential education opportunities and outstanding co-op program, students do not have to wait until after graduation to begin developing skills as reporters, media advocates, or public relations professionals.

It is our goal to help you put your passion into practice. To that end, our graduate programs afford students the opportunity to study in Boston

with a small and dedicated faculty of specialists with years of experience and extensive contacts in the media world.

Programs

Master of Arts (MA)

- Journalism (p. 57)

Master of Science (MS)

- Media Advocacy (p. 57)

Journalism, MA

The School of Journalism offers two pathways in a Master of Arts degree that seeks to prepare students for the challenges faced by legacy and new media in the digital age.

Students new to the field or those with experience can choose programs tailored to help them thrive during this time. Our programs are designed to merge traditional journalism with the latest information technology. Our professional track is designed for those with little or no journalism experience who want to pursue a career in journalism. Our media innovation track is designed for students with previous journalism experience who want to learn digital and multimedia skills.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirement

Code	Title	Hours
JRNL 6340	Fundamentals of Digital Journalism	4

Tracks

Complete one of the following two tracks:

PROFESSIONAL TRACK

Code	Title	Hours
JRNL 6200	Enterprise Reporting 1	4
JRNL 6201	Enterprise Reporting 2	4
JRNL 6202	Perspective on Journalism Ethics	4

MEDIA INNOVATION TRACK

Code	Title	Hours
JRNL 6306	Media Innovation Studio 1	4
JRNL 6307	Media Innovation Studio 2	4
JRNL 6341	Telling Your Story with Data	4

Electives

Code	Title	Hours
Complete 20 semester hours from the following areas:		20
JRNL 5309 to JRNL 7976		
Courses from other disciplines may be taken in consultation with your faculty advisor.		
No more than two courses outside of CAMD may be taken.		

Program Credit/GPA Requirements

36 total semester hours required
Minimum 3.000 GPA required

Plan of Study

Professional Track: Sample Two Years with Co-op

Year 1

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
JRNL 6100	1	JRNL 6201	4	Vacation	0	Co-op	0
JRNL 6200	4	JRNL 6202	4				
JRNL 6340	4	Elective 2	4				
Elective 1	4						
	13		12		0		0

Year 2

Fall	Hours	Spring	Hours
Co-op	0	Eletive 3	4
		Elective 4	4
		Elective 5	4
	0		12

Total Hours: 37

Media Innovation Track: Sample One-and-a-Half Years with No Co-op

Year 1

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
JRNL 6340	4	JRNL 6306	4	Vacation	0	Vacation	0
JRNL 6341	4	Elective 2	4				
Elective 1	4	Elective 3	4				
	12		12		0		0

Year 2

Fall	Hours
JRNL 6307	4
Elective 4	4
Elective 5	4
	12

Total Hours: 36

Media Advocacy, MS

The Master of Science in Media Advocacy places particular focus on developing direct and indirect advocacy skills: that is, to influence government decision makers directly and to change minds indirectly through shifting public opinion. The program uniquely combines grounding in governmental structures and the legal system with sophisticated training in the latest communication techniques including social media, web communications, and videography, as well as data analytics and data-driven storytelling. Successful graduates will be empowered to promote the public agenda of employers ranging from mission-driven organizations, such as the ACLU or the Sierra Club, to industry leaders, such as hospitals and technology companies, to lobbying and strategic communications groups and political consulting firms.

Program Requirements

Core Requirements

Code	Title	Hours
JRNL 5400	Media and Advocacy in Theory and Practice	4
JRNL 5480	Research for Media Strategy	4

LW 6400	Law, Policy and Legal Argument	4
LW 7667	Law and Ethics of Advocacy	3

Electives

Code	Title	Hours
A minimum of 17 credits of electives is required. No more than 8 semester hours can be taken outside of the College of Arts, Media, and Design or the School of Law.		17
Complete a minimum of 4 semester hours of coursework from the College of Arts, Media, and Design. Choose from recommended focus areas of JRNL, ARTD, ARTG, COMM, and INAM (additional areas may be chosen in consultation with your adviser).		
Complete a minimum of 5 semester hours of coursework from the School of Law.		

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

Plan of Study

Sample One-and-a-Half Years with No Co-op

Year 1

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
JRNL 5400	4	JRNL 5480	4	Vacation	0	Vacation	0
LW 6400	4	Elective 2	3-4				
Elective 1	3-4	Elective 3	3-4				
	11-12		10-12		0		0

Year 2

Fall	Hours
LW 7667	3
Elective 4	3-4
Elective 5	3-4
Elective 6	3-4
	12-15

Total Hours: 33-39

Interdisciplinary Programs

Welcome to interdisciplinary graduate studies in the College of Arts, Media and Design. Here you'll find courses and programs that embrace shared dialogue and experiential learning across creative fields. These interdisciplinary master's programs and graduate certificates place collaboration at the core of their mission, integrating frameworks, methods, and practices to support students in developing truly innovative approaches and outcomes. Our interdisciplinary degree and certificate options provide a strong foundation of use-inspired, experientially informed coursework and research opportunities.

The Creative Practice Leadership degree program brings together faculty, scholars, and practitioners across the performing arts, fine arts, and design fields to work with students to explore new forms of practice and leadership within contemporary culture. Students engage in a shared core, then develop a customized course of study, allowing focus on a breadth of issues.

The Arts Administration and Cultural Entrepreneurship master's degree and graduate certificate programs give students foundational to advanced training in the skills and techniques essential to leading arts and culture organizations today, combining the human literacies of collaboration and communication with the technical basis of arts organizational visioning, planning, and sustainable management.

The Urban Planning and Policy program is jointly offered between the college's School of Architecture and the School of Public Policy and Urban Affairs within the College of Social Science and Humanities. The curriculum provides a strong foundational knowledge base and allows specialization into the closely related areas of sustainable urban planning and contemporary approaches to urban policy for global cities.

Programs

Doctor of Philosophy (PhD)

- Interdisciplinary Design and Media (p. 58)

Master of Science (MS)

- Arts Administration and Cultural Entrepreneurship (p. 60)
- Creative Practice Leadership (p. 61)
- Urban Planning and Policy (p. 62)

Graduate Certificate

- Arts Administration (p. 64)
- Cultural Entrepreneurship (p. 65)

Dual Degree

- Law, JD / Creative Practice Leadership, MS (p. 66)

Interdisciplinary Design and Media, PhD

The PhD provides a rigorous, globally aware, practice-based, and human-centered approach to advanced scholarship. It aims to cultivate researcher-designers with a versatile repertoire of methods and a passion for applying those skills to the emerging epistemic perspective of integrated human, technological, and data frameworks within creative collaboration across disciplinary boundaries. The degree is designed to attract entrepreneurial self-starters who seek to break ground and invent new fields through hybrid and integrated approaches to knowledge creation.

The PhD emphasizes four pillars of excellence within a research culture:

- Engaging with the nature of human experience through innovative, interdisciplinary approaches to design
- Investigating new forms of digital media and data-driven communication across diverse disciplines
- Articulating how creativity can embrace connections between artistic practices, innovation, entrepreneurship, and research
- Connecting with changing forms of technology and media to foster shared experiences and exchange within local and global communities

The PhD is unique in its focus on practice-based research or scholarship applied to or conducted through making or creation. This is an emerging area that has been applied internationally to a wide range of creative fields and industries, many of which are represented within the College of Arts, Media and Design: music, theatre, design, studio art, games, architecture, journalism, and others. It differs from other forms of knowledge creation in that it rigorously cultivates the creation of artifacts as a mode of producing new knowledge, theories, and methodologies. Practice-based research integrates fields such as creativity and cognition or human-computer interaction to understand how practice operates, to enact that knowledge in practical applications, and to use the acts

of creation themselves as a research methodology. PhD students will be encouraged to conduct their research in—and in some cases create —"living labs" embedded in real-world contexts and through on- and off-campus research partnerships.

The PhD degree program is composed of a common core and pathways of specialization. The core is centered around three areas: design research, which provides a methodology for understanding the ways design and media touch every aspect of daily life at every level of society; ethical practice, which engages with the humanistic concerns of design and cultural production; and experiential learning, which offers students the opportunity to produce research and conduct fieldwork with partner organizations.

Specialized pathways, customized according to the program of study as approved by the PhD advisers and vetted by external experts, include:

- Information design and visualization
- Design research
- Creative research

Degree Requirements

The PhD degree requires completion of at least 48 semester credit hours beyond a bachelor's degree. Students who enter with an undergraduate degree will typically need four to five years to complete the program.

Qualifying Examination

The qualifying exam is a written and/or oral examination in the primary and secondary research fields that ensures the student is intimately familiar with the relevant scholarly work in her or his area of concentration. The pedagogical role is not in the examination itself but in the rigorous preparation of the primary and secondary fields by the student, approved by the adviser. Prior to the qualifying exam, the student prepares a document that outlines the selected primary and secondary fields, provides an overview of the current state of research, and assembles a list of relevant literature that will serve as the basis for the examination. The emphasis of the examination (for example, short essays, a lecture presenting a scholarly argument) is to be useful for the dissertation research. Typically, the student takes the qualifying examination during the second year.

Dissertation Proposal Defense

To ensure students complete satisfactory dissertations that are appropriate for their focus area(s), all students are required to submit and defend a dissertation proposal prior to advancing to candidacy. The dissertation proposal is a detailed document outlining the scholarly context, methods, arguments, and activities underpinning the dissertation. It will include a detailed research plan and timeline and is to be approved by the student's dissertation committee, which the student has to assemble in advance. The student then defends the accepted dissertation proposal in the context of the research seminar, inviting feedback from faculty and other students. The dissertation proposal defense is open to the entire CAMD PhD community and constitutes the last step before degree candidacy.

Degree Candidacy

A student is considered a PhD degree candidate after:

- Successfully completing core and specialization courses with a minimum of a 3.000 cumulative GPA and no grades lower than a B in core courses
- Passing the qualifying exam
- Submitting and successfully defending the dissertation proposal

Advising and Committee Formation

Each entering student will be assigned to a faculty adviser based on their interests who will guide students in completing their core requirements of their degree. Ideally, this person will also serve as their thesis committee chair, but they may transition to another committee chair as they transition into ABD status. As part of this process, in addition to their thesis committee chair, they will also be expected to identify two other readers representing their secondary and, if applicable, tertiary disciplines areas. The advisory committee will be responsible for guiding the students through their individual research proposal process, helping them to develop a robust research methodology and clear plan for completion. The advisory committee will also be responsible for identifying an appropriate external expert to consult at key stages of degree progression. The advisers will also guide the students through the thesis project and its written component. Where applicable, committee members will also mentor and support the student through funded research.

Dissertation Defense

Each student will, with the aid of their adviser and committee, define the final product. The research component will typically consist of empirical and/or theoretical scholarship created using a methodology appropriate for the topic and field that is fully integrated with the practice component. The synergy between creative practice and research can take the form of knowledge production through a variety of potential means: production of digital and physical artifacts, software and hardware applications, games, paintings, documentaries, comics, or exhibitions, design projects or products, theatrical productions, musical compositions, performances, or other formats. The work will include a written dissertation that can also be paired with other modes of conveyance, such as a documentary, demonstration, performance, or exhibition. A key function of the dissertation will be to contextualize the practical work in contemporary scholarship and discourse, clearly articulating its rationale and contribution to the field. Over the course of their studies, students are expected to produce peer-reviewed submissions based on their work.

The dissertation defense follows a similar format to the proposal defense. Acceptable dissertation models may include long-form (book-style) dissertations, multiple publishable papers, a system build-evaluate model, or other creative formats enumerated above.

Program Requirements

Milestones

Annual review
Individual path (including advisers)
Teaching requirement
Qualifying examination
Dissertation proposal
Dissertation committee
Dissertation defense

Required Coursework

Code	Title	Hours
INAM 7000	Introduction to Research in Interdisciplinary Design and Media	4
INAM 7001	Research Methods in Interdisciplinary Design and Media	4
INAM 7900	Research Seminar	4
INAM 7901	Dissertation Writing Seminar	4
Research Methods Elective		

Complete one research methods elective from this list or in consultation with your adviser:		4
ARCH 6340	Graduate Topics in Architecture	
ARTG 5110	Information Design History	
ARTG 5120	Research Methods for Design	
ARTG 5310	Visual Cognition	
ARTG 5320	Statistics for Design	
ARTG 5620	Notational Systems for Experience	
ARTG 6110	Information Design Theory and Critical Thinking	
ARTG 6900	Special Topics in Design	
GSND 5110	Game Design and Analysis	
GSND 5130	Mixed Research Methods for Games	
GSND 6320	Psychology of Play	
GSND 6340	Biometrics for Design	
GSND 6350	Data-Driven Player Modeling	
GSND 6984	Research	
INAM 6300	Models for Applied Inquiry in Creative Practice	
JRNL 5400	Media and Advocacy in Theory and Practice	
Dissertation		
INAM 9990	Dissertation Term 1	
INAM 9991	Dissertation Term 2	

Discipline-Specific Coursework

Code	Title	Hours
Complete 28 semester hours of discipline-specific coursework in consultation with your domain-specific adviser and committee members.		28

A minimum of 48 credit hours of coursework beyond the undergraduate degree is required.
Minimum 3.000 cumulative GPA and no grades lower than a B in core courses.

Plan of Study

Year 1

Fall	Hours	Spring	Hours
INAM 7000	4	INAM 7900	4
INAM 7001	4	Research methods elective	4
Discipline-specific coursework	4	Discipline-specific coursework	4
	12		12

Year 2

Fall	Hours	Spring	Hours
Discipline-specific coursework	4	Discipline-specific coursework	4
Discipline-specific coursework	4	Discipline-specific coursework	4
Discipline-specific coursework	4	INAM 7901	4
	12		12

Year 3

Fall	Hours	Spring	Hours
Qualifying exams	0	Teaching requirement, TA	0
Teaching requirement, TA	0	INAM 9991	0
INAM 9990	0		
	0		0

Year 4

Fall	Hours	Spring	Hours
Teaching requirement, teacher of record	0	Teaching requirement, teacher of record	0
INAM 9996	0	INAM 9996	0
	0		0

Year 5

Fall	Hours	Spring	Hours
INAM 9996	0	INAM 9996	0
	0		0

Total Hours: 48

Arts Administration and Cultural Entrepreneurship, MS

The arts and cultural industries are key drivers of each nation's economy, contributing more than $730 billion annually in the United States alone. While the economic impact of the arts and cultural industries can be measured, their social impacts are often underestimated. Music, dance, visual art, and theatre are critical to how we perceive, interpret, and critique the world and people around us. The arts articulate our beliefs, politics, familial and community ties, and history.

Arts administrators are the bridge between creative practitioners and audiences and between arts institutions and supportive stakeholders. In today's digitally driven, highly competitive, and increasingly global economy, traditional institutions for visual and performing arts face critical sustainability challenges. Leaders in the arts must adopt the creative thinking and problem-solving skills of an entrepreneur in order to envision new models for creative practice, audience engagement, and funding.

The interdisciplinary Master of Science in Arts Administration and Cultural Entrepreneurship (AACE) prepares arts leaders to both convey the human necessity of creative expression and apply creative thinking to manage resources, inspire audience engagement, and sustain financial support. The arts, and audience opportunities to experience them, are more dynamic and diverse than ever before, flourishing in major arts institutions as well as nonhierarchical organizations, from artist-run spaces and community organizations to annual festivals and pop-up exhibitions. It is time for a transformation in leadership training that matches the ingenuity of today's most exciting experiments in music, dance, theatre, and the visual arts. Arts leaders must also be equipped with the administrative, analytical, and technological skill sets necessary to excel within the complex, interdependent arts ecosystem.

The AACE curriculum is designed to meet the changing needs of arts leaders, from administrators in arts institutions to creative practitioners and entrepreneurs eager to make their art startup a reality. The program focuses on leadership innovation in a range of performance, visual arts, and cultural organizations. As an intellectual and practical course of study that merges the expertise of academics, creative professionals,

administrators, and entrepreneurs, the program's aim is to support sustainable creative practice.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Arts Administration Foundation		
AACE 6000	Arts and Culture Organizational Leadership	3
AACE 6010	Planning for Arts and Cultural Organizations	3
AACE 6020	Experiential Study in Arts Administration	3
Cultural Entrepreneurship Foundation		
AACE 6200	Programming and Community Engagement for Cultural Entrepreneurs	3
AACE 6210	Building Value Through Cultural Enterprise	3
AACE 6220	Innovative Approaches to Audience Engagement	3

Electives

Code	Title	Hours
Arts Administration Directed Elective		
AACE 6110	Information Technology for Arts and Cultural Organizations	3
Cultural Entrepreneurship Directed Elective		
Complete one of the following:		3
ENTR 6212	Business Planning for New Ventures	
ENTR 6210	Managing Operations in Early Stage Ventures	
ENTR 6214	Social Enterprise	
ENTR 6216	Global Social Entrepreneurship and Innovation	
ENTR 6218	Business Model Design and Innovation	
TECE 6222	Emerging and Disruptive Technologies	
TECE 6250	Lean Design and Development	
Experiential Electives in Arts Leadership		
Complete two of the following courses not taken to fulfill above requirements:		6
ARTG 6310	Design for Behavior and Experience	
MUSI 5540	Special Topics in Music Industry	
MUSI 6000	Management of Music Organizations	
MUSI 6300	Intellectual Property for Creative Practice Leadership	
MUSI 6400	Marketing Strategies in the Music Industry	

Program Credit/GPA Requirements

30 total semester hours required
Minimum 3.000 GPA required

Plan of Study

Sample Plans of Study: One Year

Year 1

Fall	Hours	Spring	Hours	Summer 1	Hours
AACE 6000	3	AACE 6020	3	Cultural entrepreneurship directed elective	3
AACE 6010	3	AACE 6220	3	Experiential elective 2	3
AACE 6200	3	Arts administration directed elective	3		
AACE 6210	3	Experiential elective 1	3		
	12		12		6

Total Hours: 30

One and a Half Years

Year 1

Fall	Hours	Spring	Hours
AACE 6000	3	AACE 6020	3
AACE 6010	3	AACE 6220	3
AACE 6200	3	Arts administration directed elective	3
AACE 6210	3		
	12		9

Year 2

Fall	Hours
Cultural entrepreneurship directed elective	3
Experiential elective 1	3
Experiential elective 2	3
	9

Total Hours: 30

Creative Practice Leadership, MS

Website (https://camd.northeastern.edu/program/creative-practice-leadership/)

Through a series of four transdisciplinary core courses and four discipline-weighted, student-selected electives in the performing and visual arts, the MS Creative Practice Leadership offers a two-semester, intensive, Masters-level program of training in and exploration of new approaches to leadership in the fields of critical creative practice, cultural entrepreneurship, and innovation in the arts and entertainment industries. Grounded in a broadly interdisciplinary approach, the goal is to enable administrators and practitioners in the creative professions to become transformational leaders and change agents for a rapidly evolving cultural environment.

The MS Creative Practice Leadership engages administration, curation, advocacy and other forms of cultural communication and intermediation from the point of view that creative practice leadership must become more than an outwardly successful business or administrative exercise; rather, such leadership must re-examine past assumptions about, and envision new parameters for how, success is defined. The ethos underlying the design of courses in this program is that leadership in the arts and creative industries brings a responsibility to the progress, vitality and sustainability of the world that those creative enterprises seek to embrace, a responsibility that requires critical thinking and deeply thoughtful exploration, along with the skills necessary for implementation.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
INAM 6100	Critical Foundations of Creative Practice Leadership	4
INAM 6200	Topics in Communication Strategies	4
INAM 6210	Projects in Creative Practice Leadership	4
INAM 6300	Models for Applied Inquiry in Creative Practice	4

Electives

Code	Title	Hours
Complete 16 semester hours in the following subject areas in consultation with your advisor:		16
AACE, ARTG, ARTH, COMM, INAM, JRNL, MUSI, THTR, 5000 level or above		

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

Plan of Study

Sample One Year, No Co-op

Year 1

Fall	Hours	Spring	Hours
INAM 6100	4	INAM 6210	4
INAM 6200	4	INAM 6300	4
Elective	4	Elective	4
Elective	4	Elective	4
	16		16

Total Hours: 32

Sample Two Year, One Co-op

Year 1

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
INAM 6100	4	INAM 6210	4	Elective	4	Co-op	
INAM 6200	4	INAM 6300	4				
Elective	4						
Elective	4						
	16		8		4		0

Year 2

Fall	Hours
Co-op	
Elective[1]	4
	4

Total Hours: 32

[1] International students cannot take an online elective in their last term as their only class.

Urban Planning and Policy, MS

The Master of Science in Urban Planning and Policy (MUPP) program trains leaders interested in building just and sustainable solutions to today's critical urban problems. Students in the program develop the theoretical and analytical tools to understand contemporary challenges of social and environmental injustice in cities and urban regions. They develop professional tools to work effectively in the realms of planning, policy, politics, and advocacy to impact urban challenges, including affordable housing provision, equitable and sustainable economic growth, sustainable transportation, and climate change adaptation and mitigation. This innovative program combines the expertise in urban planning and policy analysis data analytics of the School of Public Policy and Urban Affairs with expertise in physical planning, design, and data visualization at the School of Architecture. The core curriculum of the program provides students with a solid foundation in essential skills and concepts, including techniques of effective community engagement, research design and statistics, economic analysis, legal foundations of urban planning and policy, and the history of urban development and urban planning. Students also have the opportunity to develop substantial expertise in a specialization area, including urban analytics, urban sustainability and resilience, urban design and physical planning, and urban development policy and planning.

The optional cooperative education experience (co-op) is available to eligible students. Cooperative education is central to both the Northeastern experience and to the College of Social Sciences and Humanities experiential liberal arts framework. Northeastern's signature co-op ecosystem provides qualified master's students with six-month work experiences in businesses, nonprofits, and government agencies in Boston and across the United States. Graduate students take their work from campus learning spaces, apply their knowledge outside of the classroom, and then bring knowledge and skills gained in community learning spaces back to our campus learning spaces during the cocurricular experiential integration course.

In addition to the co-op option, students in the MUPP program have opportunities to gain experience in the application of their knowledge and skills via internships, class projects, and a capstone research report. They graduate prepared for careers working for state and local government, federal agencies, community development corporations and other nonprofit organizations, research institutes, and as private-sector planning consultants.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Planning and Policy		
LPSC 5201	Law and the City	4
PPUA 6201	The 21st-Century City: Urban Opportunities and Challenges in a Global Context	4
PPUA 6502	Economic Analysis for Policy and Planning	4
SUEN 6340	Topics in Urban Environmental Design	4
Research Design		
INSH 6300	Research Methods in the Social Sciences	4
Quantitative Techniques		
Students in the urban analytics focus area are encouraged to take INSH 5301.		
Choose one from the following:		4
INSH 5301	Introduction to Computational Statistics	
INSH 6500	Statistical Analysis	

Focus Areas

Complete one of the following focus areas:

- Urban Design and Physical Planning (p. 63)
- Urban Analytics (p. 63)
- Sustainability and Resilience (p. 63)
- Urban Development Policy and Planning (p. 63)

URBAN DESIGN AND PHYSICAL PLANNING

Code	Title	Hours
Gateway Course		
ARCH 6340	Graduate Topics in Architecture	4
Tracks		
Complete one of the following tracks:		8
Urban Design and Real Estate		
ARCH 5310	Design Tactics and Operations	
ARCH 5530	Innovative Models in Real Estate Development and Design	
Physical Planning and Design for Sustainable Urbanism		
SUEN 7230	Urban Ecologies and Technologies 1	
SUEN 7240	Urban Ecologies and Technologies 2	
Urban Experience Track		
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	
ARTG 6310	Design for Behavior and Experience	
Capstone		
SUEN 6120	Graduate Studio 2: Sustainable Urban Systems	6

URBAN ANALYTICS

Code	Title	Hours
Gateway Course		
PPUA 5262	Big Data for Cities	4
Required Courses		
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	4
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	4
Capstone		
PPUA 7673	Capstone in Public Policy and Urban Affairs	4

SUSTAINABILITY AND RESILIENCE

Code	Title	Hours
Gateway Course		
LPSC 7312	Cities, Sustainability, and Climate Change	4
or SUEN 6310	Cities, Nature, and Design in Contemporary History and Theory	
Methods		
Complete one of the following:		4
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
SUEN 7230	Urban Ecologies and Technologies 1	
Capstone		
PPUA 7673	Capstone in Public Policy and Urban Affairs	4
Elective		
Complete one of the following:		4
PPUA 5231	Transportation Policy	
PPUA 5234	Land Use and Urban Growth Policy	
PPUA 5238	Climate Change and Global Urbanization	
PPUA 5249	Sustainable Urban Coastal Policy	
PPUA 5260	Ecological Economics	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
SUEN 6110	Graduate Studio 1: Sustainable Urban Sites	
SUEN 6120	Graduate Studio 2: Sustainable Urban Systems	
SUEN 6220	Implementation and Visualization for Urban Environments 2	
SUEN 6310	Cities, Nature, and Design in Contemporary History and Theory	
SUEN 6340	Topics in Urban Environmental Design	
SUEN 7230	Urban Ecologies and Technologies 1	
SUEN 7240	Urban Ecologies and Technologies 2	
SUEN 7320	Pro-Seminar: Issues in Designed Urban Environments	

URBAN DEVELOPMENT POLICY AND PLANNING

Code	Title	Hours
Gateway Course		
Complete one of the following:		4
PPUA 5230	Housing Policy	
PPUA 5231	Transportation Policy	

PPUA 5233	Contemporary Community Development	
PPUA 5265	Urban and Regional Policy in Developing Countries	
Methods		
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	4
or PPUA 5236	Introduction to Real Estate Development for Urban Policy Makers	
Capstone		
PPUA 7673	Capstone in Public Policy and Urban Affairs	4
Elective		
Complete one of the following:		4
PPUA 5230	Housing Policy	
PPUA 5231	Transportation Policy	
PPUA 5232	Immigration and Urban America	
PPUA 5233	Contemporary Community Development	
PPUA 5234	Land Use and Urban Growth Policy	
PPUA 5236	Introduction to Real Estate Development for Urban Policy Makers	
PPUA 5270	Food Systems and Public Policy	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6530	State and Local Public Finance	
PPUA 6551	Nonprofit Organizations and Social Change	
SUEN 6110	Graduate Studio 1: Sustainable Urban Sites	
SUEN 6120	Graduate Studio 2: Sustainable Urban Systems	
SUEN 6340	Topics in Urban Environmental Design	

Electives

Code	Title	Hours
Complete two of the following:		8
ARCH 5310	Design Tactics and Operations	
ARCH 5530	Innovative Models in Real Estate Development and Design	
ARCH 6100	Graduate Skills Studio	
ARCH 6330	Seminar in Modern Architecture	
ARCH 6340	Graduate Topics in Architecture	
ARTG 5100	Information Design Studio 1: Principles	
ARTG 5120	Research Methods for Design	
ARTG 5130	Visual Communication for Information Design	
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 6330	Information Design Mapping Strategies	
DA 5020	Collecting, Storing, and Retrieving Data	
DA 5030	Introduction to Data Mining/Machine Learning	
INSH 5302	Information Design and Visual Analytics	
PPUA 5230	Housing Policy	
PPUA 5231	Transportation Policy	
PPUA 5232	Immigration and Urban America	
PPUA 5233	Contemporary Community Development	
PPUA 5234	Land Use and Urban Growth Policy	
PPUA 5236	Introduction to Real Estate Development for Urban Policy Makers	
PPUA 5238	Climate Change and Global Urbanization	
PPUA 5245	Education Policy in the United States	
PPUA 5249	Sustainable Urban Coastal Policy	
PPUA 5260	Ecological Economics	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
PPUA 5265	Urban and Regional Policy in Developing Countries	
PPUA 5270	Food Systems and Public Policy	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6530	State and Local Public Finance	
PPUA 6551	Nonprofit Organizations and Social Change	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	
SUEN 6110	Graduate Studio 1: Sustainable Urban Sites	
SUEN 6120	Graduate Studio 2: Sustainable Urban Systems	
SUEN 6210	Implementation and Visualization for Urban Environments 1	
SUEN 6220	Implementation and Visualization for Urban Environments 2	
SUEN 6310	Cities, Nature, and Design in Contemporary History and Theory	
SUEN 6340	Topics in Urban Environmental Design	
SUEN 7230	Urban Ecologies and Technologies 1	
SUEN 7240	Urban Ecologies and Technologies 2	
SUEN 7320	Pro-Seminar: Issues in Designed Urban Environments	

Optional Co-op Experience

Code	Title	Hours
Requires two consecutive semesters of Co-op Work Experience and Experiential Integration:		2
PPUA 6964 and INSH 6864	Co-op Work Experience and Experiential Integration	

Program Credit/GPA Requirements

48 total semester hours required (50 with optional co-op)
Minimum 3.000 GPA required

Arts Administration, Graduate Certificate

Today's arts sector is more vital and dynamic than ever, flourishing in both arts institutions and "non-hierarchical organizations," from artist-run spaces to community organizations. This context, paired with changes in the funding climate over the past 30 years, has generated a need to transform leadership training in the arts. Creative thinkers must be

equipped with administrative, analytical, entrepreneurial, and technological skill sets to work within the complex, interdependent arts and cultural ecosystem.

The **Graduate Certificate in Arts Administration** offers an interdisciplinary graduate program focused on leadership innovation in performance, visual arts, cultural, and community organizations.

The Graduate Certificate in Arts Administration challenges students to create diverse, viable, and sustainable arts and culture projects and organizations; to use entrepreneurial practices in order to create transformation; to develop and deploy new arts and culture sector-focused business and analytic skills; and to design innovative planning and engagement strategies. Course and project work embeds experiential opportunities to explore and demonstrate transformational arts management approaches.

The required curriculum includes three core and one directed elective for a total of 12 credit hours. All courses can be completed online.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
AACE 6000	Arts and Culture Organizational Leadership	3
AACE 6010	Planning for Arts and Cultural Organizations	3
AACE 6020	Experiential Study in Arts Administration	3

Elective

Code	Title	Hours
Complete one of the following:		3
AACE 6110	Information Technology for Arts and Cultural Organizations	
AACE 6200	Programming and Community Engagement for Cultural Entrepreneurs	
AACE 6210	Building Value Through Cultural Enterprise (Building Value through Cultural Enterprise)	

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

Cultural Entrepreneurship, Graduate Certificate

Cultural entrepreneurs combine their passion for creative and cultural products and programs with creative, out-of-the-box thinking to forge the resilience of the arts sectors and the wider communities they serve. Cultural entrepreneurs employ innovative approaches to audience engagement – like a roving theater company, pop-up museum, or a smartphone app for artistic collaboration – to deliver artistic value to wide and diverse audiences and make a positive social, environmental, and economic impact. Today's cultural entrepreneurs operate in diverse professional environments, from consulting for organizational transformation to launching a creative startup. By understanding community impacts and activating a range of cultural and creative experiences, cultural entrepreneurs play a crucial role in ensuring the vitality of artistic engagement, advancing community goals, and strengthening society.

The **Graduate Certificate in Cultural Entrepreneurship** empowers students with a critical, creative perspective on arts programming and management and a myriad of creative management tools that harness new technologies for artistic engagement.

The Graduate Certificate in Cultural Entrepreneurship offers an interdisciplinary program to create diverse and viable projects and organizations for artistic experience and positive social impact. The program prepares students to become innovators in a range of artistic and cultural disciplines, from music, visual art, theater, and dance to community-building and transformation. The curriculum offers students the opportunity to identify opportunities for evolution in the arts and cultural sectors and to develop critical, creative practices; leadership acumen; and skill sets in arts management, strategic planning, and performance analysis to conceive and implement creative, cultural programming for community engagement and positive impact.

The program learning objectives provide students with opportunities to:

- Develop an understanding of methods and tools used to conceptualize, scope, pilot, evaluate, iterate and launch cultural entrepreneurship projects;
- Align creative practice and arts enterprise strategies with opportunities, challenges and resources to achieve desired impact;
- Apply communication, engagement and evaluation techniques to develop and sustain diverse audiences and stakeholder relationships;
- Engage in critical analysis of the work of peers and industry leaders by analyzing and contextualizing the quality, viability and sustainability of culturally-driven entrepreneurship.

The required curriculum includes three core courses and one directed elective for a total of 12 credit hours. All courses can be completed online.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
AACE 6200	Programming and Community Engagement for Cultural Entrepreneurs	3
AACE 6210	Building Value Through Cultural Enterprise (Building Value through Cultural Enterprise)	3
AACE 6220	Innovative Approaches to Audience Engagement (Experiential Study in Cultural Entrepreneurship)	3

Elective

Code	Title	Hours
Complete one of the following:		3
AACE 6000	Arts and Culture Organizational Leadership	
AACE 6010	Planning for Arts and Cultural Organizations	

AACE 6110	Information Technology for Arts and Cultural Organizations
ENTR 6212	Business Planning for New Ventures

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

Law, JD / Creative Practice Leadership, MS

Students seeking to put their legal skills to work in music, the arts, or other creative industries can choose to combine their JD degree with a Master of Science in Creative Practice Leadership. By combining courses such as copyright law or entertainment law with a co-op in a creative industry, students can gain the legal knowledge and expertise that will make them effective legal advocates for their clients. Through their coursework in creative practice leadership, students will explore new approaches to transformational leadership in the fields of critical creative practice, cultural entrepreneurship, and innovation in the arts and entertainment industries. Students who pursue the JD alongside the Master of Science in Creative Practice Leadership can take up to 16 credits of courses that count toward both degrees, accelerating their educational path; students should consult their advisors in the School of Law and the College of Arts, Media and Design for more information.

All JD students, including FlexJD students, are ordinarily eligible to apply into dual degree pathways.

D'Amore-McKim School of Business

Website (https://damore-mckim.northeastern.edu/?utm_medium=website&utm_source=catalog)

Emery A. Trahan, PhD, Interim Dean

Kate E. Klepper, MBA, Associate Dean of Graduate Programs

Northeastern University's D'Amore-McKim School of Business is known for its experience-driven educational model that fuses robust classroom education with real-world application. We aim to prepare students for the future of work that is being transformed by technology and data. D'Amore-McKim's graduate programs are specifically designed to develop leaders and innovators equipped with data, technological, and human skills—from creativity to an entrepreneurial mindset—to meet the demands of this fast-paced and changing global economy.

Here, students have the opportunity to learn from our respected business faculty who share their interdisciplinary research and expertise daily, many of whom are founders of tech startups and respected management leaders. In our classrooms, students study alongside an experienced and diverse group of peers who share their passion for business and innovation. Everything we do is fueled by the power of experience.

Graduate School of Business Administration
617.373.5992

Most graduate degrees: gradbusiness@northeastern.edu
Most graduate certificates: gradcertificates@northeastern.edu
Online MBA, Online Master of Science in Finance, Online Master of Science in Taxation, and Online Graduate Certificates: onlinegradbusiness@northeastern.edu

Graduate School of Professional Accounting
617.373.3244
gspa@northeastern.edu

Master of Science

Northeastern University's D'Amore-McKim School of Business develops leaders and thinkers who will guide the future of work that is being transformed by advances in an ever-evolving digital landscape. D'Amore-McKim master's degree programs (https://damore-mckim.northeastern.edu/programs/?s&filters%5B0%5D=program%7Ctype%7Cgraduate&filters%5B1%5D=program%7Ctype%7Cmasters) are designed to prepare students and professionals to meet the future of work in a fast-paced and changing global economy.

Here, students will have the opportunity to learn from our respected business faculty, many of whom are consultants, founders of tech startups, and respected management leaders. Students will study alongside a group of diverse classmates who share their passions and interests.

Master's degrees are offered for full-time, part-time, and online study.

Programs

Master of Science (MS)

- Business Analytics (p. 66)
- Innovation (p. 67)
- International Management (p. 67)
- Management (p. 68)
- Technological Entrepreneurship (p. 72)

Master of Science in Accounting (MSA)

- Accounting (p. 72)

Master of Science in Finance (MSF)

- Finance (p. 73)
- Finance—Evening/Part-Time (p. 73)
- Finance—Online (p. 74)
- Quantitative Finance (p. 74)

Master of Science in International Business (MSIB)

- International Business (p. 75)

Master of Science in Taxation (MST)

- Taxation—Online (p. 75)

Business Analytics, MS

D'Amore-McKim's Master of Science in Business Analytics (https://damore-mckim.northeastern.edu/programs/ms-business-analytics/?utm_medium=website&utm_source=catalog&utm_campaign=ftmsba) is designed to prepare students for a management or business leadership role in which they will be required to recognize and respond to potential challenges and make strategic decisions during times of uncertainty.

Courses allow students to build the skills to not only know what data to analyze but also to understand how to leverage that data for strategic decision making. Through in-class case studies and a capstone project, professors will share real company data and students will explore questions such as how to build sales, enhance marketing, or strengthen a company's infrastructure. This curriculum is designed to

prepare students for a world of business affected by big data and rapid technological change.

This 30-credit master's degree is offered for full-time study on campus or 100 percent online.

Program Requirements

Core Requirements

Code	Title	Hours
MISM 6200	Introduction to Business Analytics	3
MISM 6202	Foundations of Data Analysis for Business	3
MISM 6203	Business Analytics Methods	3
MISM 6210	Information Visuals and Dashboards for Business	3
MISM 6212	Data Mining and Machine Learning for Business	3
MISM 6213	Business Information Design, Quality, and Strategy	3
MISM 6214	Business Analytics Capstone	3

Elective Coursework

Code	Title	Hours
Complete 9 semester hours from the following:		9
HRMG 6223	Global Talent Management	
MKTG 6232	Engaging Customers and Markets	
MKTG 6294	Customer-Centric Research Methods for Marketing	
MKTG 6295	Customer Performance Modeling	
STRT 6210	Workforce Metrics and Analytics	

Program Credit/GPA Requirements

30 total semester hours required
Minimum 3.000 GPA required

Innovation, MS

D'Amore-McKim's Master of Science in Innovation (https://damore-mckim.northeastern.edu/programs/ms-innovation/?utm_medium=website&utm_source=catalog&utm_campaign=msi) is designed specifically for working professionals who want to become innovation leaders.

Courses allow students to study the principles of innovation from multiple perspectives through project work, case studies, and real-world application possibly at your own organization. Students will have an opportunity to learn about product and service development, financing innovation, go-to-market strategies, lean development, managing high-performance teams, and more.

This 30-semester-hour master's degree is offered online with courses beginning in January.

Program Requirements

Core Requirements

Code	Title	Hours
ACCT 6280	Planning and Budgeting for Innovation	3
ENTR 6217	Lean Innovation	3
ENTR 6222	Competing in Dynamic, Innovation-Driven Markets	3
FINA 6284	Financing Innovation and Growth	3
HRMG 6280	The Human Side of Innovation	3
MGMT 6280	Innovation for Next-Generation Products and Systems	3
MGSC 6281	Service Innovation and Management	3
MKTG 6280	Gaining Customer Insight	3
MKTG 6283	Marketing and Selling Innovation	3
Complete one of the following:		3
On-campus students only		
BUSN 6280	How Executives Shape and Lead Innovation and Enterprise Growth	
Online students only		
ENTR 6225	Acquisitions, Alliances, and Growth	

Program Credit/GPA Requirements

30 total semester hours required
Minimum 3.000 GPA required

International Management, MS

Business leadership in this disruptive age requires strong business skills coupled with cultural agility, global workforce management knowledge, and the ability to bridge local and international operations. Our innovative Master of Science in International Management (https://damore-mckim.northeastern.edu/programs/ms-international-management/?utm_medium=website&utm_source=catalog&utm_campaign=msim) program aims to prepare students to respond to challenges and deliver successful solutions on a global scale quickly and confidently.

Core courses and elective offerings delve into topics ranging from international trade to globalization of the world economy and are designed to help you thrive in today's international marketplace. Core courses focus on cultural agility, leadership, and workforce management and align with the D'Amore-McKim School of Business strategic vision of preparing students for the digital-first global business world.

The 30-semester-hour Master of Science in International Management is offered for full- and part-time study and begins in September.

Program Requirements

Core Requirements

Code	Title	Hours
INTB 6200	Managing the Global Enterprise	3
INTB 6226	Becoming a Global Leader	3
STRT 6210	Workforce Metrics and Analytics	3
Complete one of the following:		3
FINA 6204	International Financial Management	
INTB 6230	International Field Study	
MKTG 6212	International Marketing	
Complete one of the following:		3
INTB 6260	Advanced Topics in Global Management and Strategy	
STRT 6200	Strategic Decision Making in a Changing Environment	

Electives

Code	Title	Hours
Recommended Electives		
Complete 15 semester hours from the following:		15
ACCT 6200	Financial Reporting and Managerial Decision Making 1	
ACCT 6201	Financial Reporting and Managerial Decision Making 2	
FINA 6204	International Financial Management	
MECN 6203	Global Managerial Economics	
MKTG 6212	International Marketing	
SCHM 6213	Global Supply Chain Strategy	
Additional elective options: any graduate-level business course for which you meet the prerequisites. ACCT, BUSN, ENTR, FINA, INTB, MECN, MGMT, MGSC, MKTG, SCHM, STRT, TECE		

Program Credit/GPA Requirements

30 total semester hours required
Minimum GPA 3.000 required

Management, MS

Overview

D'Amore-McKim's Master of Science in Management program is designed to ensure students gain the business knowledge and skills they need to thrive in today's digitally driven landscape. The curriculum is designed to teach students how to think, not what to think, as they build the business expertise that employers value.

A Flexible Core Curriculum

Students take one course in each of these four key domains: managing organizations, data-driven management, strategy and growth, and finance and operations. Students without a background in these areas have an opportunity to build foundational skills, and those with experience may select higher-level courses that are designed to expand their knowledge.

Customize Your Curriculum

Students personalize their program to match their interests and career opportunities by choosing from over 65 electives taught by D'Amore-McKim's industry-leading faculty.

Gain Diverse Perspectives

Students may take one course at another Northeastern University graduate school. This is an opportunity to gain diverse perspectives by pursuing an interdisciplinary course complementary to their goals.

Experience-Powered Learning

Students will have opportunities to obtain real-world experiences that help them gain fresh perspective while using relevant skills. Students can help grow an idea into a startup business with Northeastern's student-run venture accelerator or join a small team tasked with solving a business challenge with one of our corporate partners.

This 30-semester-hour master's degree is offered for full-time, part-time, and online study.

Program Requirements

Core Requirements

Code	Title	Hours
Required Core		
Managing Organizations		
Complete 3 semester hours from the following:		3
HRMG 6200	Managing People and Organizations	
HRMG 6212	Creating an Innovative Organization	
HRMG 6214	A Management Perspective of Human Resource Management	
HRMG 6223	Global Talent Management	
INTB 6226	Becoming a Global Leader	
MGMT 6213	Managing Ethics in the Workplace and Marketplace	
MGMT 6214	Negotiations	
MGMT 6225	Sustainability and Leadership	
MGMT 6226	Sustainability and the Business Environment	
Data-Driven Management		
Complete 3 semester hours from the following:		3
ACCT 6200	Financial Reporting and Managerial Decision Making 1	
MISM 6200	Introduction to Business Analytics	
MISM 6202	Foundations of Data Analysis for Business	
MISM 6203	Business Analytics Methods	
MISM 6210	Information Visuals and Dashboards for Business	
MISM 6212	Data Mining and Machine Learning for Business	
MKTG 6200	Creating and Sustaining Customer Markets	
MKTG 6234	Marketing Analytics	
SCHM 6215	Supply Chain Analytics	
STRT 6210	Workforce Metrics and Analytics	
Strategy and Growth		
Complete 3 semester hours from the following:		3
ENTR 6200	Enterprise Growth and Innovation	
ENTR 6222	Competing in Dynamic, Innovation-Driven Markets	
ENTR 6225	Acquisitions, Alliances, and Growth	
INTB 6200	Managing the Global Enterprise	
MKTG 6216	Market Focused Strategy	
SCHM 6213	Global Supply Chain Strategy	
STRT 6200	Strategic Decision Making in a Changing Environment	
Finance and Operations		
Complete 3 semester hours from the following:		3
FINA 6309	Foundations of Accounting and Finance	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	
SCHM 6201	Operations and Supply Chain Management	
SCHM 6214	Sourcing and Procurement	

SCHM 6221	Sustainability and Supply Chain Management
SCHM 6223	Managing Healthcare Supply Chain Operations

Concentration Options

Students may apply for one of the following concentrations. Each concentration requires 12 semester hours as noted below.

- Analytics (p. 69)
- Brand Management
- Business Management for Healthcare (p. 69)
- Corporate Finance
- Corporate Innovation
- Entrepreneurship (p. 70)
- International Business (p. 70)
- Investments (p. 70)
- Leading People & Organizations (p. 70)
- Marketing (p. 70)
- Marketing Analytics (p. 70)
- Operations and Supply Chain Management (p. 71)
- Sustainability and Business (p. 71)

CONCENTRATION IN ANALYTICS

Code	Title	Hours
Required Core		
MISM 6200	Introduction to Business Analytics	3
Electives		
Complete 9 semester hours from the following:		9
MISM 6202	Foundations of Data Analysis for Business	
MISM 6203	Business Analytics Methods	
MISM 6210	Information Visuals and Dashboards for Business	
MISM 6212	Data Mining and Machine Learning for Business	
MISM 6213	Business Information Design, Quality, and Strategy	
MISM 6214	Business Analytics Capstone	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	
MKTG 6234	Marketing Analytics	
SCHM 6215	Supply Chain Analytics	
STRT 6210	Workforce Metrics and Analytics	

CONCENTRATION IN BRAND MANAGEMENT

Code	Title	Hours
Required Core		
MKTG 6200	Creating and Sustaining Customer Markets	3
MKTG 6223	Brand and Advertising Management	3
Electives		
Complete 6 semester hours from the following:		6
MKTG 6210	Marketing Research	
MKTG 6214	New Product Development	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6226	Consumer Behavior	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	

CONCENTRATION IN BUSINESS MANAGEMENT FOR HEALTHCARE

Code	Title	Hours
Required Core		
HINF 5105	The American Healthcare System	3
HRMG 6220	Health Organization Management	3
STRT 6220	Strategic Management for Healthcare Organizations	3
Complete 3 semester hours from the following:		
FINA 6220	Healthcare Finance	3
or SCHM 6223	Managing Healthcare Supply Chain Operations	
Optional Electives		
Note: Electives are not required; the following course(s) are suggested beyond the concentration:		
ENTR 6214	Social Enterprise	
FINA 6220	Healthcare Finance	
HINF 5101	Introduction to Health Informatics and Health Information Systems	
HINF 6202	Business of Healthcare Informatics	
HINF 6205	Creation and Application of Medical Knowledge	
MGMT 6214	Negotiations	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6226	Consumer Behavior	
PHTH 5232	Evaluating Healthcare Quality	
PHTH 5234	Economic Perspectives on Health Policy	
SCHM 6223	Managing Healthcare Supply Chain Operations	

CONCENTRATION IN CORPORATE FINANCE

Code	Title	Hours
Required Core		
FINA 6200	Value Creation through Financial Decision Making	3
FINA 6205	Financial Strategy	3
Electives		
Complete 6 semester hours from the following:		6
FINA 6204	International Financial Management	
FINA 6213	Investment Banking	
FINA 6214	Mergers and Acquisitions	
FINA 6215	Business Turnarounds	
FINA 6216	Valuation and Value Creation	
FINA 6260	Entrepreneurial Finance and Venture Capital	

CONCENTRATION IN CORPORATE INNOVATION

Code	Title	Hours
Electives		
Complete 12 semester hours from the following:		12
ARTG 5610	Design Systems	
ENTR 6200	Enterprise Growth and Innovation	
ENTR 6217	Lean Innovation	

ENTR 6222	Competing in Dynamic, Innovation-Driven Markets
ENTR 6224	Intellectual Property and Other Legal Aspects of Business and Innovation
ENTR 6225	Acquisitions, Alliances, and Growth
GE 5100	Product Development for Engineers
HRMG 6212	Creating an Innovative Organization
HRMG 6280	The Human Side of Innovation
MGMT 6280	Innovation for Next-Generation Products and Systems
TECE 6340	The Technical Entrepreneur as Leader

CONCENTRATION IN ENTREPRENEURSHIP

Code	Title	Hours
Electives		
Complete 12 semester hours from the following:		12
FINA 6260	Entrepreneurial Finance and Venture Capital	
GE 5030	Iterative Product Prototyping for Engineers	
ENTR 6210	Managing Operations in Early Stage Ventures	
ENTR 6212	Business Planning for New Ventures	
ENTR 6214	Social Enterprise	
ENTR 6218	Business Model Design and Innovation	
ENTR 6219	Financing Ventures from Early Stage to Exit	
ENTR 6220	Family Business Leadership and Governance	
ENTR 6230	Platform Innovation	
MKTG 6214	New Product Development	
TECE 6222	Emerging and Disruptive Technologies	
TECE 6230	Entrepreneurial Marketing and Selling	
TECE 6250	Lean Design and Development	
TECE 6300	Managing a Technology-Based Business	

CONCENTRATION IN INTERNATIONAL BUSINESS

Code	Title	Hours
Required Core		
INTB 6200	Managing the Global Enterprise	3
Electives		
Complete 9 semester hours from the following:		9
INTB 6212	Cultural Aspects of International Business	
INTB 6226	Becoming a Global Leader	
INTB 6230	International Field Study	
INTB 6249	Digitization of International Business	

CONCENTRATION IN INVESTMENTS

Code	Title	Hours
Required Core		
FINA 6200	Value Creation through Financial Decision Making	3
FINA 6203	Investment Analysis	3
Electives		
Complete 6 semester hours from the following:		6
FINA 6211	Financial Risk Management	
FINA 6212	Fixed Income Securities and Risk	
FINA 6213	Investment Banking	
FINA 6217	Real Estate Finance and Investment	
FINA 6219	Portfolio Management	

CONCENTRATION IN LEADING PEOPLE & ORGANIZATIONS

Code	Title	Hours
Required Core		
HRMG 6200	Managing People and Organizations	3
Electives		
Complete 9 semester hours from the following:		9
HRMG 6212	Creating an Innovative Organization	
HRMG 6218	Great Companies	
HRMG 6220	Health Organization Management	
HRMG 6223	Global Talent Management	
MGMT 6214	Negotiations	
STRT 6210	Workforce Metrics and Analytics	

CONCENTRATION IN MARKETING

Code	Title	Hours
Required Core		
MKTG 6200	Creating and Sustaining Customer Markets	3
Electives		
Complete 9 semester hours from the following:		9
MKTG 6210	Marketing Research	
MKTG 6212	International Marketing	
MKTG 6214	New Product Development	
MKTG 6216	Market Focused Strategy	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6222	Digital Marketing	
MKTG 6223	Brand and Advertising Management	
MKTG 6224	B2B and Strategic Sales	
MKTG 6226	Consumer Behavior	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	
MKTG 6234	Marketing Analytics	
MKTG 6260	Special Topics in Marketing	

CONCENTRATION IN MARKETING ANALYTICS

Code	Title	Hours
Required Core		
MKTG 6200	Creating and Sustaining Customer Markets	3
MKTG 6234	Marketing Analytics	3
Electives		
Complete 6 semester hours from the following:		6
MKTG 6210	Marketing Research	
MKTG 6216	Market Focused Strategy	
MKTG 6222	Digital Marketing	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	

CONCENTRATION IN OPERATIONS AND SUPPLY CHAIN MANAGEMENT

Code	Title	Hours
Required Core		
SCHM 6201	Operations and Supply Chain Management	3
SCHM 6213	Global Supply Chain Strategy	3
Electives		
Complete 6 semester hours from the following:		6
SCHM 6211	Logistics and Transportation Management	
SCHM 6212	Executive Roundtable in Supply Chain Management	
SCHM 6214	Sourcing and Procurement	
SCHM 6215	Supply Chain Analytics	
SCHM 6221	Sustainability and Supply Chain Management	
SCHM 6223	Managing Healthcare Supply Chain Operations	
SCHM 6224	Demand Planning and Forecasting	

CONCENTRATION IN SUSTAINABILITY AND BUSINESS

Code	Title	Hours
Required Core		
MECN 6200	Global Competition and Market Dominance	3
Electives		
Complete 9 semester hours from the following:		9
ENTR 6214	Social Enterprise	
ENTR 6216	Global Social Entrepreneurship and Innovation	
INTB 6217	Creating Sustainable Competitive Advantage through Global Innovation	
MECN 6205	Sustainability and the Economics of Markets	
MGMT 6225	Sustainability and Leadership	
MGMT 6226	Sustainability and the Business Environment	
SCHM 6221	Sustainability and Supply Chain Management	

Electives

Code	Title	Hours
Students may choose any courses leveled 6000 or higher for which they meet eligibility requirements from the following (18 elective semester hours are required):		18
ACCT, BUSN, ENTR, FINA, HRMG, INTB, MECN, MGMT, MKTG, MISM, STRT, SCHM, or TECE		
Students may also select one of the following to be used as an elective course:		
AACE 6000	Arts and Culture Organizational Leadership	
ARTG 5150	Information Visualization Principles and Practices	
ARTG 5151	Information Design Critique Seminar	
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 5600	Experience Design Studio 1: Principles	
ARTG 5610	Design Systems	
ARTG 5620	Notational Systems for Experience	
ARTG 5640	Prototyping for Experience Design	
ARTG 6110	Information Design Theory and Critical Thinking	
ARTG 6310	Design for Behavior and Experience	
ARTG 6330	Information Design Mapping Strategies	
BINF 6200	Bioinformatics Programming	
BINF 6308	Bioinformatics Computational Methods 1	
BINF 6309	Bioinformatics Computational Methods 2	
BIOT 5120	Foundations in Biotechnology	
BIOT 5219	The Biotechnology Enterprise	
BIOT 5400	Scientific Information Management for Biotechnology Managers	
BIOT 5631	Cell Culture Processes for Biopharmaceutical Production	
BIOT 6214	Experimental Design and Biostatistics	
CS 5100	Foundations of Artificial Intelligence	
CS 5200	Database Management Systems	
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
DS 5110	Introduction to Data Management and Processing	
ECON 5140	Applied Econometrics	
GE 5030	Iterative Product Prototyping for Engineers	
GE 5100	Product Development for Engineers	
GSND 5110	Game Design and Analysis	
GSND 6320	Psychology of Play	
GSND 6330	Player Experience	
GSND 6340	Biometrics for Design	
GSND 6350	Data-Driven Player Modeling	
HINF 5101	Introduction to Health Informatics and Health Information Systems	
HINF 5105	The American Healthcare System	
HINF 6202	Business of Healthcare Informatics	
HINF 6205	Creation and Application of Medical Knowledge	
IE 5640	Data Mining for Engineering Applications	
IE 6600	Computation and Visualization for Analytics	
IE 7374	Special Topics in Industrial Engineering	
INSH 5301	Introduction to Computational Statistics	
INSH 5302	Information Design and Visual Analytics	
JRNL 5311	Design for Storytelling	
JRNL 5400	Media and Advocacy in Theory and Practice	
JRNL 6305	Topics	
JRNL 6340	Fundamentals of Digital Journalism	
JRNL 6341	Telling Your Story with Data	

ME 5645	Environmental Issues in Manufacturing and Product Use
PHIL 5001	Global Justice
PHIL 5005	Information Ethics
PHIL 5010	AI Ethics
PHTH 5232	Evaluating Healthcare Quality
PHTH 5234	Economic Perspectives on Health Policy
PPUA 6553	Nonprofit Financial Resource Development

Program Credit/GPA Requirements

30 total semester hours required

Minimum 3.000 GPA required

Technological Entrepreneurship, MS

D'Amore-McKim's Master of Science in Technological Entrepreneurship (https://damore-mckim.northeastern.edu/programs/ms-technological-entrepreneurship/?utm_medium=website&utm_source=catalog&utm_campaign=ms-technological-entrepreneurship) offers students an immersion in frameworks and methods needed for successful entrepreneurship. This program is designed to help students learn how to translate needs into new designs for products and services, prototype designs, explore business models, and craft business plans and pitches for investors.

Students will have an opportunity to start companies and help coach other startups within our on-campus accelerator, IDEA. IDEA provides Northeastern entrepreneurs with resources necessary to compete in the challenging world of startups.

This is a 30-credit master's degree and is offered for full-time and part-time study. The full-time option is designed for completion in three semesters, starting in September and completing coursework in June. The part-time option is designed for completion in two calendar years. Students are encouraged to work with their academic advisers on course sequencing.

Program Requirements

Core Requirements

Code	Title	Hours
Entrepreneurship		
ENTR 6200	Enterprise Growth and Innovation	3
ENTR 6212	Business Planning for New Ventures	3
ENTR 6218	Business Model Design and Innovation	3
ENTR 6219	Financing Ventures from Early Stage to Exit	3
Technological Entrepreneurship		
TECE 6222	Emerging and Disruptive Technologies	3
TECE 6230	Entrepreneurial Marketing and Selling	3
TECE 6250	Lean Design and Development	3
TECE 6300	Managing a Technology-Based Business	3
TECE 6340	The Technical Entrepreneur as Leader	3

Elective

Code	Title	Hours
Complete 3 credit hours from the following subject areas:		3
ACCT, BUSN, ENTR, FINA, HRMG, INTB, MECN, MKTG, MGMT, SCHM, STRT, or TECE		

Program Credit/GPA Requirements

30 total semester hours required
Minimum 3.000 GPA required

Accounting, MSA

D'Amore-McKim's Master of Science in Accounting (http://www.damore-mckim.northeastern.edu/academic-programs/graduate-programs/ms/accounting/?utm_medium=website&utm_source=catalog&utm_campaign=msa) is designed to provide students with the knowledge, skills, and credit hours needed to pursue CPA licensure and begin their career in seven months.

The program curriculum examines the financial, managerial, accounting, legal, and ethical considerations of accounting. Students will also discover an integration of analytics into the coursework, preparing them for the rise of big data accounting. In the classroom, industry-leading faculty will share acumen drawn from years of practice as CPAs and PhDs at Big Four and other public accounting firms. The curriculum is approved by the Board of Public Accountancy in Massachusetts.

Students will have the opportunity to specialize their studies in either audit or tax, guiding them toward the career that best suits their goals. In the audit track, students take courses geared toward being a professional in the audit and assurance industry. This means extensive exposure to ethics, auditing research, forensic accounting, and a detailed understanding of the industry environment. In the tax track, students are exposed to the intricacies of the tax industry with detailed coursework and experience with tax research and communications, state and local taxation, income tax accounting, and international taxation.

Students will be registered for classes by a Graduate School of Professional Accounting advisor. Students should contact an advisor at 617-373-3244 with any questions or requests.

This is a full-time, 30-semester-hour master's degree. Classes begin in late May and end in December.

Program Requirements

Core Requirements

Code	Title	Hours
Accounting		
ACCT 6203	Business Entity Taxation	3
ACCT 6204	Financial Reporting for Integrated Multinational Enterprises	3
ACCT 6229	Accounting for Foreign Currency Transactions	1
Ethics		
ACCT 6253	Ethics in the Accounting Profession	3
Financial Reporting		
ACCT 6207	Contemporary and Emerging Issues in Financial Reporting	3
ACCT 6216	Financial Reporting for Governments and Nonprofit Entities	2

Tracks

Complete one of the following tracks:

AUDIT TRACK

Code	Title	Hours
Required Core		
ACCT 6205	Auditing in a Big Data Environment	3
ACCT 6217	Corporate Governance, Ethics, and Financial Reporting	3
ACCT 6254	Accounting Research and Communication	3

TAXATION TRACK

Code	Title	Hours
Required Core		
ACCT 6231	Corporations and Shareholders	3
ACCT 6235	Partners and Partnerships	3
ACCT 6254	Accounting Research and Communication	3

Electives

Code	Title	Hours
Complete 6 semester hours from the following (note: students may work with their academic advisor to substitute an eligible alternative course for one of the electives listed below):		6
ACCT 5255	Forensic Accounting	
ACCT 5256	Internal Auditing	
ACCT 6239	State and Local Taxation	
ACCT 6240	International Taxation: Inbound Transactions	
ACCT 6246	Retirement Plans	
ACCT 6248	Income Taxation of Trusts and Estates	

Program Credit/GPA Requirements

30 total semester hours required
Minimum 3.000 GPA required

Finance, MSF

D'Amore-McKim's practice-oriented full-time Master of Science in Finance (https://damore-mckim.northeastern.edu/programs/ms-finance/?utm_medium=website&utm_source=catalog&utm_campaign=ftmsf) is designed to provide students with the comprehensive financial knowledge they need to excel in the high-paced financial field that is rapidly changing with the introduction of new technology.

Courses help students become financial experts with the skills to diversify financial portfolios, effectively minimize risks, maximize return on investments, and sustain growth. Students interested in pursuing the Chartered Financial Analyst designation will find CFA preparations integrated into their coursework.

This 30-semester-hour master's degree is offered for full-time study.

Program Requirements

Core Requirements

Code	Title	Hours
Required Core		
FINA 6201	Financial Theory and Policy	3
or FINA 6200	Value Creation through Financial Decision Making	
FINA 6202	Analysis of Financial Institutions and Markets	3
FINA 6203	Investment Analysis	3
FINA 6204	International Financial Management	3
FINA 6205	Financial Strategy	3
FINA 6206	Finance Seminar	3
Optional		
BUSN 6200	Career Management	

Electives

Code	Title	Hours
Complete four electives (course offerings are at the discretion of the finance department):		12
FINA 6211	Financial Risk Management	
FINA 6212	Fixed Income Securities and Risk	
FINA 6214	Mergers and Acquisitions	
FINA 6217	Real Estate Finance and Investment	
FINA 6219	Portfolio Management	
FINA 6260	Entrepreneurial Finance and Venture Capital	
FINA 6292	Advanced Topics in Finance	

Program Credit/GPA Requirements

30 total semester hours required
Minimum 3.000 GPA required

Finance, MSF—Evening / Part-Time Program

D'Amore-McKim's Part-Time Master of Science in Finance (https://damore-mckim.northeastern.edu/programs/ms-finance/?utm_medium=website&utm_source=catalog&utm_campaign=ptmsf) is designed to provide students with the comprehensive financial knowledge they need to excel in the high-paced financial field that is rapidly changing with the introduction of new technology.

Core courses and elective offerings help students become financial experts with the skills to diversify financial portfolios, effectively minimize risks, maximize return on investments, and sustain growth. Students interested in pursuing the Chartered Financial Analyst designation will find CFA preparations integrated into their coursework.

Northeastern is the world leader in experiential education, and students may experience this as they integrate classroom study with professional experience through the 360 Huntington Fund (the Fund), a $1 million student-managed mutual fund. Students may earn 1 semester hour per semester by participating in the Fund and may fulfill a 3-semester-hour elective course requirement by participating in the Fund for three terms.

This 30-semester-hour master's degree is offered for part-time study, with courses beginning in September.

Program Requirements

Core Requirements

Code	Title	Hours
FINA 6201	Financial Theory and Policy	3
or FINA 6200	Value Creation through Financial Decision Making	

FINA 6202	Analysis of Financial Institutions and Markets	3
FINA 6203	Investment Analysis	3
FINA 6204	International Financial Management	3
FINA 6205	Financial Strategy	3
FINA 6206	Finance Seminar	3

Electives

Code	Title	Hours
Finance Electives		
Complete 9 semester hours of FINA courses.		9
Business Elective		
Complete 3 semester hours in one of the following subject areas:		3
ACCT, ENTR, FINA, HRMG, INTB, MECN, MKTG, MGMT, SCHM, or STRT		
Note: An additional finance course may be taken as an elective.		

Program Credit/GPA Requirements

30 total semester hours required
Minimum 3.000 GPA required

Finance, MSF—Online

D'Amore-McKim's practice-oriented Online Master of Science in Finance (https://damore-mckim.northeastern.edu/programs/ms-finance/?utm_medium=website&utm_source=catalog&utm_campaign=omsf) is designed to provide students with the comprehensive financial knowledge they need to excel in the high-paced financial field that is rapidly changing with the introduction of new technology.

Core courses and elective offerings help students become financial experts with the skills to diversity financial portfolios, effectively minimize risks, maximize return on investments, and sustain growth. Students interested in pursuing the Chartered Financial Analyst designation will find CFA preparations integrated into their coursework.

Students may enhance their studies by selecting either a Corporate Finance or an Investments Track. In the Corporate Finance Track, courses focus on the sourcing and allocation of capital in an organization to achieve an overall objective, such as maximizing shareholder value for a for-profit entity. In the Investments Track, courses examine financial instruments and portfolios of securities.

Students have the option of participating in International Field Study as an elective. This course allows eligible students to study and travel abroad over approximately eight intensive days gaining new perspectives on global business, and meet faculty and fellow classmates in person.

This 30-semester hours master's degree is offered for online study, with courses beginning six times a year.

Program Requirements

Core Requirements

Code	Title	Hours
FINA 6201	Financial Theory and Policy	3
FINA 6202	Analysis of Financial Institutions and Markets	3
FINA 6203	Investment Analysis	3
FINA 6204	International Financial Management	3
FINA 6205	Financial Strategy	3
FINA 6206	Finance Seminar	3

Electives

Code	Title	Hours
Complete 12 semester hours from the following:		12
Corporate Finance Track		
FINA 6211	Financial Risk Management	
FINA 6213	Investment Banking	
FINA 6214	Mergers and Acquisitions	
FINA 6215	Business Turnarounds	
FINA 6216	Valuation and Value Creation	
Investments Track		
FINA 6211	Financial Risk Management	
FINA 6212	Fixed Income Securities and Risk	
FINA 6213	Investment Banking	
FINA 6216	Valuation and Value Creation	
FINA 6217	Real Estate Finance and Investment	
FINA 6219	Portfolio Management	
Global Experience		
INTB 6230	International Field Study	

Program Credit/GPA Requirements

30 total semester hours required
Minimum 3.000 GPA required

Quantitative Finance, MSF

D'Amore-McKim's full-time MS Quantitative Finance (https://damore-mckim.northeastern.edu/programs/ms-finance/?utm_medium=website&utm_source=catalog&utm_campaign=ftmsf) is designed to provide students with financial knowledge and mathematically demanding technical and analytical expertise.

Core courses and elective offerings allow students to integrate economics, mathematics, and computer science with financial theory and application. This quantitative finance curriculum will prepare students to thrive in a financial services industry that is changing rapidly with the introduction of new technology. Students interested in pursuing the Chartered Financial Analyst designation will find CFA preparations integrated into their coursework.

Northeastern is the world leader in experiential education, and students may experience this as they integrate classroom study with professional experience through the 360 Huntington Fund (the Fund), a nearly $1 million student-managed mutual fund. Students may earn 1 semester hour per semester by participating in the Fund and may fulfill an elective course requirement by participating in the Fund for three terms.

This 30-semester hours master's degree is offered for full-time study, with courses beginning in September.

Program Requirements

Core Requirements

Code	Title	Hours
FINA 6203	Investment Analysis	3
FINA 6331	Corporate Finance	3

FINA 6332	Fundamentals of Financial Math and Financial Markets	3
FINA 6333	Data Analytics in Finance	3
FINA 6334	Empirical Methods in Finance	3
FINA 6335	Derivatives and Risk Analytics	3

Electives

Code	Title	Hours
Complete 12 semester hours from the following:		12
CS 5100	Foundations of Artificial Intelligence	
CS 5200	Database Management Systems	
ECON 5140	Applied Econometrics	
FINA 6207	Financial Modeling	
FINA 6204	International Financial Management	
FINA 6214	Mergers and Acquisitions	
FINA 6216	Valuation and Value Creation	
FINA 6217	Real Estate Finance and Investment	
FINA 6219	Portfolio Management	
FINA 6260	Entrepreneurial Finance and Venture Capital	
FINA 6292	Advanced Topics in Finance	
FINA 6336	Fixed-Income Securities and Derivatives	
FINA 6337	Computational Methods in Finance	
FINA 6338	Alternative Investments	
FINA 6339	Quantitative Portfolio Management	
FINA 6340	Financial Markets and Banking in the Postcrisis Era	
FINA 6360	Fund Management for Analysts	

Program Credit/GPA Requirements

30 total semester hours required
Minimum 3.000 GPA required

International Business, MSIB

The MS in International Business (https://damore-mckim.northeastern.edu/programs/ms-international-business/?utm_medium=website&utm_source=catalog&utm_campaign=ms-international-business) is designed to expose talented, driven students to the global business environment. Courses will help students become culturally agile, possess a global mindset, and be prepared to navigate an increasingly interconnected and fast-paced world. Students will have opportunities to develop critical skills to handle the challenges organizations and businesses face when operating internationally.

The 30-credit Master of Science in International Business is offered for full- and part-time study and begins in September. The full-time option is designed for completion in one year, including two semester terms and two summer terms. The part-time option is designed for completion in two calendar years with study in the fall and spring terms.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Required Core		
FINA 6204	International Financial Management	3
FINA 6209	Introduction to International Accounting and Finance	3
INTB 6200	Managing the Global Enterprise	3
INTB 6226	Becoming a Global Leader	3
MECN 6203	Global Managerial Economics	3
MKTG 6206	International Marketing	3
SCHM 6213	Global Supply Chain Strategy	3
International Field Study		
INTB 6230	International Field Study	3

Electives

Code	Title	Hours
Complete 6 credit hours from the following subject areas:		6
ACCT, BUSN, ENTR, FINA, HRMG, INTB, STRT, TECE, MECN, MKTG, MGMT, MGSC, SCHM		
Students may also consider political science (POLS) or sociology (SOCL) courses.		

Program Credit/GPA Requirements

30 total semester hours required
Minimum 3.000 GPA required

Taxation, MST—Online

Always changing and increasingly complex, the issue of taxes demands a resilient leader who can navigate industry shifts and economic trends caused by digital transformation. D'Amore-McKim's Online Master of Science in Taxation (https://damore-mckim.northeastern.edu/programs/ms-taxation/) is designed to provide students with the knowledge and skills needed to excel in the ever-changing realm of tax laws and regulations.

In this program, students will explore the latest challenges brought about by developments in technology, federal laws, and international policies through a strategic, future-focused lens. Students also have the option to tailor their degree by selecting a track of study, choosing between taxation of entities and taxation of individuals. In the taxation of entities track, students will advance their expertise in local, state, and international taxation. In the taxation of individuals track, students will expand their knowledge of insurance, investments, trusts and estates, income tax liabilities, and retirement plans.

This is a 30-semester-hour master's degree and is offered 100 percent online. There are five available start dates throughout the year, and the program can be completed in 20 months.

Program Requirements

Core Requirements

Code	Title	Hours
ACCT 5230	Federal Tax Issues and Analysis	3
ACCT 5232	Estate and Gift Taxation	3
ACCT 6231	Corporations and Shareholders	3
ACCT 6235	Partners and Partnerships	3
ACCT 6292	Tax Research, Practice, and Ethics	3

Electives

Code	Title	Hours
Complete 15 semester hours from the following:		15
ACCT 6239	State and Local Taxation	
ACCT 6240	International Taxation: Inbound Transactions	
ACCT 6241	International Taxation: Outbound Transactions	
ACCT 6243	Advanced Flow-Through Entities	
ACCT 6246	Retirement Plans	
ACCT 6264	Planning for Estate Tax Issues	
ACCT 6265	Tax Accounting for Income Taxes	
INTB 6230	International Field Study	

Program Credit/GPA Requirements

30 total semester hours required
Minimum 3.000 GPA required

Master of Business Administration

The business world is global, ever-evolving, and influenced by changes in technology. To succeed in this environment, business leaders must have technological, data, and human skills—from creativity to an entrepreneurial mindset. A D'Amore-McKim MBA (https://damore-mckim.northeastern.edu/programs/?s=&filters%5B%5D=program%7Ctype%7Cmba) is designed to prepare students for a future of work affected by technological change.

The D'Amore-McKim MBA learning model integrates business knowledge and helps students prepare for a world of business affected by rapid technological change, through learning experiences inside and outside the classroom. At the D'Amore-McKim School of Business, experience-powered learning is at the heart of everything we do.

Each of D'Amore-McKim's industry-aligned MBA programs offer students the opportunity to build a personal network with fellow students, renowned faculty, and alumni—all while becoming the leaders that today's rapidly changing business world demands.

MBA programs are offered full-time, part-time, and online.

Programs

- Business Administration, MBA—Full-Time (p. 76)
- Business Administration, MBA—Part-Time (p. 81)
- Business Administration, MBA—Online (p. 84)

Business Administration, MBA—Full-Time

Northeastern has reinvented the Full-Time MBA (https://damore-mckim.northeastern.edu/programs/full-time-mba/) for today's rapidly changing world. Our Full-Time MBA program integrates business knowledge with a deep understanding of technology, preparing students to stay ahead of change and become the leaders that today's business world demands. Students will choose from a wide-ranging list of in-demand electives and concentrations—including our signature MBA x concentrations, which allows them to develop a unique nonbusiness skill set.

Experience-Powered Learning

Learning by doing is a hallmark of a Northeastern MBA. Students will integrate classroom study with professional experience in their choice of experience-fueled electives and through their corporate residency. Far removed from the typical internship, students will work full time at a leading firm or startup in their field and have significant responsibilities as they work to deliver on organizational goals. Students can choose a three-month, six-month, or even two six-month residencies.

Select Two Concentrations

Students will select two concentrations to complete their MBA coursework, which include both in-demand business concentrations and our unique MBA x concentrations. Business concentrations include analytics, brand management, business management for healthcare, corporate finance, corporate innovation, entrepreneurship, international business, investments, leading people & organizations, marketing, marketing analytics, operations and supply chain management, and sustainability and business. MBA x concentrations consist of graduate coursework in highly relevant, nonbusiness fields offered through partnerships with other Northeastern colleges. MBA x concentrations include artificial intelligence, bioinformatics, biotechnology industry, cybersecurity, data science, data visualization, experience design, game design and analytics, information ethics, media innovation and advocacy, and software development.

Build an Interdisciplinary Skill Set

Students will select six interdisciplinary (nonbusiness) credits of their choice. They can mix and match the content that interests them from a diverse list of eligible graduate courses across Northeastern colleges.

Program Requirements

Core Requirements

Code	Title	Hours
Required Core		
Marketing		
MKTG 6318	Customer Value and the Enterprise	2
Strategic Decision Making		
ACCT 6318	Analyzing Accounting Data for Strategic Decision Making	2
STRT 6318	Strategic Planning for the Future	2
Management		
FINA 6318	Financial Management	2
HRMG 6318	Managing the Organization	2
SCHM 6318	Managing Operations and the Supply Chain	2
Innovation and Social Impact		
BUSN 6363	Social Impact of Business	2
ENTR 6318	Innovating and Creating Futures	2
Career Management		
BUSN 6200	Career Management	0
BUSN 6950	MBA Skills Workshop	0
Corporate Residency		
BUSN 6964	Co-op Work Experience	0
Three-month, six-month, or up to two six-month corporate residency options		

Concentration Options

Complete two of the following concentrations:

CONCENTRATION IN ANALYTICS

Code	Title	Hours
Required Core		
BUSN 6365	Business Analytics	3
Electives		
Complete 9 semester hours from the following:		9
CS 5100	Foundations of Artificial Intelligence	
CS 5200	Database Management Systems	
ECON 5140	Applied Econometrics	
IE 6600	Computation and Visualization for Analytics	
INSH 5302	Information Design and Visual Analytics	
MISM 6203	Business Analytics Methods	
MISM 6210	Information Visuals and Dashboards for Business	
MISM 6212	Data Mining and Machine Learning for Business	
MISM 6213	Business Information Design, Quality, and Strategy	
MISM 6214	Business Analytics Capstone	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	
MKTG 6234	Marketing Analytics	
SCHM 6215	Supply Chain Analytics	
STRT 6210	Workforce Metrics and Analytics	

CONCENTRATION IN BRAND MANAGEMENT

Code	Title	Hours
Required Core		
MKTG 6320	Advanced Marketing Management	3
MKTG 6223	Brand and Advertising Management	3
Electives		
Complete 6 semester hours from the following:		6
MKTG 6210	Marketing Research	
MKTG 6214	New Product Development	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6226	Consumer Behavior	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	

CONCENTRATION IN BUSINESS MANAGEMENT FOR HEALTHCARE

Code	Title	Hours
Required Core		
HINF 5105	The American Healthcare System	3
HRMG 6220	Health Organization Management	3
STRT 6220	Strategic Management for Healthcare Organizations	3
Complete 3 semester hours from the following:		
FINA 6220	Healthcare Finance	3
or SCHM 6223	Managing Healthcare Supply Chain Operations	
Optional Electives		
Note: Electives are not required; the following course(s) are suggested beyond the concentration:		3-9
ENTR 6214	Social Enterprise	
HINF 5101	Introduction to Health Informatics and Health Information Systems	
FINA 6220	Healthcare Finance	
HINF 6202	Business of Healthcare Informatics	
HINF 6205	Creation and Application of Medical Knowledge	
MGMT 6214	Negotiations	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6226	Consumer Behavior	
PHTH 5232	Evaluating Healthcare Quality	
PHTH 5234	Economic Perspectives on Health Policy	
SCHM 6223	Managing Healthcare Supply Chain Operations	

CONCENTRATION IN CORPORATE FINANCE

Code	Title	Hours
Required Core		
FINA 6320	Advanced Financial Management	3
Complete 3 semester hours from the following:		3
FINA 6203	Investment Analysis	3
FINA 6216	Valuation and Value Creation	3
FINA 6260	Entrepreneurial Finance and Venture Capital	3
Electives		
Complete 6 semester hours from the following:		6
FINA 6203	Investment Analysis	
FINA 6204	International Financial Management	
FINA 6205	Financial Strategy	
FINA 6207	Financial Modeling	

FINA 6211	Financial Risk Management
FINA 6213	Investment Banking
FINA 6214	Mergers and Acquisitions
FINA 6215	Business Turnarounds
FINA 6216	Valuation and Value Creation
FINA 6217	Real Estate Finance and Investment
FINA 6260	Entrepreneurial Finance and Venture Capital
MECN 6200	Global Competition and Market Dominance

CONCENTRATION IN CORPORATE INNOVATION

Code	Title	Hours
Required Core		
ENTR 6320	Innovation, Entrepreneurship, and Dynamic Competition	3
Electives		
Complete 9 semester hours from the following:		9
ARTG 5610	Design Systems	
ENTR 6200	Enterprise Growth and Innovation	
ENTR 6217	Lean Innovation	
ENTR 6224	Intellectual Property and Other Legal Aspects of Business and Innovation	
ENTR 6225	Acquisitions, Alliances, and Growth	
GE 5100	Product Development for Engineers	
HRMG 6212	Creating an Innovative Organization	
HRMG 6280	The Human Side of Innovation	
MGMT 6280	Innovation for Next-Generation Products and Systems	
TECE 6340	The Technical Entrepreneur as Leader	

CONCENTRATION IN ENTREPRENEURSHIP

Code	Title	Hours
Required Core		
ENTR 6320	Innovation, Entrepreneurship, and Dynamic Competition	3
Electives		
Complete 9 semester hours from the following:		9
ENTR 6210	Managing Operations in Early Stage Ventures	
ENTR 6212	Business Planning for New Ventures	
ENTR 6214	Social Enterprise	
ENTR 6218	Business Model Design and Innovation	
ENTR 6219	Financing Ventures from Early Stage to Exit	
ENTR 6220	Family Business Leadership and Governance	
ENTR 6230	Platform Innovation	
FINA 6260	Entrepreneurial Finance and Venture Capital	
GE 5030	Iterative Product Prototyping for Engineers	
MKTG 6214	New Product Development	
TECE 6222	Emerging and Disruptive Technologies	
TECE 6230	Entrepreneurial Marketing and Selling	
TECE 6250	Lean Design and Development	
TECE 6300	Managing a Technology-Based Business	

CONCENTRATION IN INTERNATIONAL BUSINESS

Code	Title	Hours
Required Core		
INTB 6200	Managing the Global Enterprise	3
Electives		
Complete 9 semester hours from the following:		9
FINA 6204	International Financial Management	
INTB 6212	Cultural Aspects of International Business	
INTB 6226	Becoming a Global Leader	
INTB 6230	International Field Study	
INTB 6232	Doing Business in Emerging Markets	
MKTG 6212	International Marketing	

CONCENTRATION IN INVESTMENTS

Code	Title	Hours
Required Core		
FINA 6320	Advanced Financial Management	3
FINA 6203	Investment Analysis	3
Electives		
Complete 6 semester hours from the following:		6
FINA 6204	International Financial Management	
FINA 6207	Financial Modeling	
FINA 6211	Financial Risk Management	
FINA 6212	Fixed Income Securities and Risk	
FINA 6213	Investment Banking	
FINA 6214	Mergers and Acquisitions	
FINA 6216	Valuation and Value Creation	
FINA 6217	Real Estate Finance and Investment	
FINA 6219	Portfolio Management	
FINA 6260	Entrepreneurial Finance and Venture Capital	
FINA 6360	Fund Management for Analysts	
FINA 6361	Fund Management for Managers	
MECN 6200	Global Competition and Market Dominance	

CONCENTRATION IN LEADING PEOPLE & ORGANIZATIONS

Code	Title	Hours
Note: Only one course outside HRMG and MGMT may be taken to fulfill the concentration.		
Complete 12 semester hours from the following:		12
HRMG 6212	Creating an Innovative Organization	
HRMG 6218	Great Companies	
HRMG 6221	Power and Influence	
HRMG 6223	Global Talent Management	
INTB 6226	Becoming a Global Leader	
MGMT 6214	Negotiations	
STRT 6210	Workforce Metrics and Analytics	

CONCENTRATION IN MARKETING

Code	Title	Hours
Required Core		
MKTG 6320	Advanced Marketing Management (Advanced Marketing Management)	3
Electives		
Complete 9 semester hours from the following:		9
MKTG 6210	Marketing Research	
MKTG 6212	International Marketing	
MKTG 6214	New Product Development	
MKTG 6216	Market Focused Strategy	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6222	Digital Marketing	
MKTG 6223	Brand and Advertising Management	
MKTG 6224	B2B and Strategic Sales	
MKTG 6226	Consumer Behavior	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	
MKTG 6234	Marketing Analytics	
MKTG 6260	Special Topics in Marketing	

CONCENTRATION IN MARKETING ANALYTICS

Code	Title	Hours
Required Core		
MKTG 6320	Advanced Marketing Management (Advanced Marketing Management)	3
MKTG 6234	Marketing Analytics	3
Electives		
Complete 6 semester hours from the following:		6
MKTG 6210	Marketing Research	
MKTG 6216	Market Focused Strategy	
MKTG 6222	Digital Marketing	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	

CONCENTRATION IN OPERATIONS AND SUPPLY CHAIN MANAGEMENT

Code	Title	Hours
Required Core		
SCHM 6213	Global Supply Chain Strategy	3
Electives		
Complete 9 semester hours from the following:		9
SCHM 6211	Logistics and Transportation Management	
SCHM 6212	Executive Roundtable in Supply Chain Management	
SCHM 6214	Sourcing and Procurement	
SCHM 6215	Supply Chain Analytics	
SCHM 6221	Sustainability and Supply Chain Management	
SCHM 6223	Managing Healthcare Supply Chain Operations	
SCHM 6224	Demand Planning and Forecasting	

CONCENTRATION IN SUSTAINABILITY AND BUSINESS

Code	Title	Hours
Complete 12 semester hours from the following:		12
ENTR 6214	Social Enterprise	
ENTR 6216	Global Social Entrepreneurship and Innovation	
INTB 6217	Creating Sustainable Competitive Advantage through Global Innovation	
MECN 6200	Global Competition and Market Dominance	
MECN 6205	Sustainability and the Economics of Markets	
MGMT 6225	Sustainability and Leadership	
MGMT 6226	Sustainability and the Business Environment	
SCHM 6221	Sustainability and Supply Chain Management	

CONCENTRATION IN MBA X ARTIFICIAL INTELLIGENCE

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	4
CS 6120	Natural Language Processing	4
CS 6140	Machine Learning	4

CONCENTRATION IN MBA X BIOINFORMATICS

Code	Title	Hours
BINF 6308	Bioinformatics Computational Methods 1	4
BINF 6309	Bioinformatics Computational Methods 2	4
BINF 6200	Bioinformatics Programming	4

CONCENTRATION IN MBA X BIOTECHNOLOGY INDUSTRY

Code	Title	Hours
BIOT 5120	Foundations in Biotechnology	3
BIOT 5400	Scientific Information Management for Biotechnology Managers	3
BIOT 5631	Cell Culture Processes for Biopharmaceutical Production	3
BIOT 6214	Experimental Design and Biostatistics	2
Complete one additional semester hour of BUSN coursework.		1

CONCENTRATION IN MBA X CYBERSECURITY

Code	Title	Hours
CY 5770	Software Vulnerabilities and Security	4
CY 6750	Cryptography and Communications Security	4
CS 6760	Privacy, Security, and Usability	4

CONCENTRATION IN MBA X DATA SCIENCE

Code	Title	Hours
CS 5200	Database Management Systems	4
CS 6140	Machine Learning	4
CS 6220	Data Mining Techniques	4

CONCENTRATION IN MBA X DATA VISUALIZATION

Code	Title	Hours
Required Core		
ARTG 5150	Information Visualization Principles and Practices	3
ARTG 5151	Information Design Critique Seminar	1
ARTG 5330	Visualization Technologies 1: Fundamentals	4
Electives		
Complete 4 semester hours from the following:		4
ARTG 5310	Visual Cognition	
ARTG 6110	Information Design Theory and Critical Thinking	
ARTG 6330	Information Design Mapping Strategies	

CONCENTRATION IN MBA X EXPERIENCE DESIGN

Code	Title	Hours
Required Core		
ARTG 5610	Design Systems	4
ARTG 6310	Design for Behavior and Experience	4
Electives		
Complete 4 semester hours from the following:		4
ARTG 5600	Experience Design Studio 1: Principles	
ARTG 5620	Notational Systems for Experience	
ARTG 5640	Prototyping for Experience Design	

CONCENTRATION IN MBA X GAME DESIGN AND ANALYTICS

Code	Title	Hours
Required Core		
GSND 5110	Game Design and Analysis	4
GSND 6350	Data-Driven Player Modeling	4
Electives		
Complete 4 semester hours from the following:		4
GSND 6320	Psychology of Play	
GSND 6330	Player Experience	
GSND 6340	Biometrics for Design	
GSND 6350	Data-Driven Player Modeling	

CONCENTRATION IN MBA X INFORMATION ETHICS

Code	Title	Hours
Complete two of the following:		8
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
PHIL 5005	Information Ethics	
PHIL 5010	AI Ethics	
Complete one of the following:		4
PHIL 5001	Global Justice	
PHIL 5005	Information Ethics	
PHIL 5010	AI Ethics	

CONCENTRATION IN MBA X MEDIA INNOVATION AND ADVOCACY

Code	Title	Hours
Required Core		
JRNL 5400	Media and Advocacy in Theory and Practice	4
JRNL 6340	Fundamentals of Digital Journalism	4
Electives		
Complete 4 semester hours from the following:		4
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	
JRNL 5311	Design for Storytelling	
JRNL 6305	Topics	
JRNL 6341	Telling Your Story with Data	

CONCENTRATION IN MBA X SOFTWARE DEVELOPMENT

Code	Title	Hours
CS 5500	Foundations of Software Engineering	4
CS 5610	Web Development	4
CS 5520	Mobile Application Development	4

ELECTIVES

Code	Title	Hours
Experiential Requirement		
Complete 3 semester hours from the following:		3
BUSN 6351	Experiential Education	
BUSN 6945	Washington Campus Seminar	
INTB 6238	Global Project	
INTB 6230	International Field Study	
FINA 6360	Fund Management for Analysts	
FINA 6361	Fund Management for Managers	
Open Electives		
In consultation with advisor, complete 6 semester hours from the following:		6
ACCT, BUSN, ENTR, FINA, HRMG, INTB, MECN, MGMT, MKTG, SCHM, STRT, and TECE		
Interdisciplinary Requirement		
Complete 6 semester hours outside of D'Amore-McKim School of Business; please consult program director for course options:		6
AACE 6000	Arts and Culture Organizational Leadership	
ARTG 5150	Information Visualization Principles and Practices	
ARTG 5151	Information Design Critique Seminar	
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 5600	Experience Design Studio 1: Principles	
ARTG 5610	Design Systems	
ARTG 5620	Notational Systems for Experience	
ARTG 5640	Prototyping for Experience Design	
ARTG 6110	Information Design Theory and Critical Thinking	
ARTG 6310	Design for Behavior and Experience	
ARTG 6330	Information Design Mapping Strategies	
BINF 6200	Bioinformatics Programming	
BINF 6308	Bioinformatics Computational Methods 1	
BINF 6309	Bioinformatics Computational Methods 2	
BIOT 5120	Foundations in Biotechnology	
BIOT 5219	The Biotechnology Enterprise	

BIOT 5400	Scientific Information Management for Biotechnology Managers
BIOT 5631	Cell Culture Processes for Biopharmaceutical Production
BIOT 6214	Experimental Design and Biostatistics
CS 5100	Foundations of Artificial Intelligence
CS 5200	Database Management Systems
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights
DS 5110	Introduction to Data Management and Processing
ECON 5140	Applied Econometrics
GE 5030	Iterative Product Prototyping for Engineers
GE 5100	Product Development for Engineers
GSND 5110	Game Design and Analysis
GSND 6320	Psychology of Play
GSND 6330	Player Experience
GSND 6340	Biometrics for Design
GSND 6350	Data-Driven Player Modeling
HINF 5101	Introduction to Health Informatics and Health Information Systems
HINF 5105	The American Healthcare System
HINF 6202	Business of Healthcare Informatics
HINF 6205	Creation and Application of Medical Knowledge
IE 5640	Data Mining for Engineering Applications
IE 6600	Computation and Visualization for Analytics
IE 7374	Special Topics in Industrial Engineering
INSH 5301	Introduction to Computational Statistics
INSH 5302	Information Design and Visual Analytics
JRNL 5311	Design for Storytelling
JRNL 5400	Media and Advocacy in Theory and Practice
JRNL 6305	Topics
JRNL 6340	Fundamentals of Digital Journalism
JRNL 6341	Telling Your Story with Data
ME 5645	Environmental Issues in Manufacturing and Product Use
PHIL 5001	Global Justice
PHIL 5005	Information Ethics
PHIL 5010	AI Ethics
PHTH 5232	Evaluating Healthcare Quality
PHTH 5234	Economic Perspectives on Health Policy
PPUA 6553	Nonprofit Financial Resource Development

Program Credit/GPA Requirements

55 total semester hours required
Minimum 3.000 GPA required

Business Administration, MBA—Part-Time

Today's rapidly changing business world demands transformative business leaders, and D'Amore-McKim's Part-Time MBA (https://damore-mckim.northeastern.edu/programs/part-time-mba/?utm_medium=website&utm_source=catalog&utm_campaign=part-time-mba) program is designed for motivated professionals who seek to expand their skills and accelerate their careers.

Students can choose from a wide range of in-demand business concentrations, including analytics, brand management, business management for healthcare, corporate finance, corporate innovation, corporate renewal, entrepreneurship, international business, investments, leading people & organizations, marketing, marketing analytics, mutual fund management, operations and supply chain management, and sustainability and business.

This 60-semester-hour master's degree is offered in person for part-time study, with evening courses beginning in September and January. Not all courses may be offered every term. Students are encouraged to work with their academic advisors when planning their schedules.

Program Requirements

Core Requirements

Code	Title	Hours
Accounting		
ACCT 6200	Financial Reporting and Managerial Decision Making 1	3
ACCT 6201	Financial Reporting and Managerial Decision Making 2	1.5
Management		
HRMG 6200	Managing People and Organizations	3
INTB 6200	Managing the Global Enterprise	3
MGSC 6200	Information Analysis	3
MGSC 6204	Managing Information Resources	1.5
SCHM 6201	Operations and Supply Chain Management	3
STRT 6200	Strategic Decision Making in a Changing Environment	3
Marketing		
MECN 6200	Global Competition and Market Dominance	3
MKTG 6200	Creating and Sustaining Customer Markets	3
Finance		
FINA 6200	Value Creation through Financial Decision Making	3
Entrepreneurship		
ENTR 6200	Enterprise Growth and Innovation	3

Concentration Options

Students may apply for up to two concentrations. Each concentration requires 9 semester hours except for the Healthcare Management concentration, which requires 12 semester hours.

- Analytics (p. 82)
- Brand Management (p. 82)
- Business Management for Healthcare (p. 82)
- Corporate Finance (p. 82)

CONCENTRATION IN ANALYTICS

Code	Title	Hours
Required Core		
MISM 6200	Introduction to Business Analytics	3
Electives		
Complete 6 semester hours from the following:		6
MISM 6202	Foundations of Data Analysis for Business	
MISM 6203	Business Analytics Methods	
MISM 6210	Information Visuals and Dashboards for Business	
MISM 6212	Data Mining and Machine Learning for Business	
MISM 6213	Business Information Design, Quality, and Strategy	
MISM 6214	Business Analytics Capstone	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	
MKTG 6234	Marketing Analytics	
SCHM 6215	Supply Chain Analytics	
STRT 6210	Workforce Metrics and Analytics	

CONCENTRATION IN BRAND MANAGEMENT

Code	Title	Hours
Required Core		
MKTG 6223	Brand and Advertising Management	3
Electives		
Complete 6 semester hours from the following:		6
MKTG 6210	Marketing Research	
MKTG 6214	New Product Development	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6226	Consumer Behavior	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	

CONCENTRATION IN BUSINESS MANAGEMENT FOR HEALTHCARE

Code	Title	Hours
Required Core		
HINF 5105	The American Healthcare System	3
HRMG 6220	Health Organization Management	3
STRT 6220	Strategic Management for Healthcare Organizations	3
Elective		
Complete 3 semester hours from the following:		3
ENTR 6214	Social Enterprise	
FINA 6220	Healthcare Finance	
HINF 5101	Introduction to Health Informatics and Health Information Systems	
HINF 6202	Business of Healthcare Informatics	
HINF 6205	Creation and Application of Medical Knowledge	
MGMT 6214	Negotiations	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6226	Consumer Behavior	
PHTH 5232	Evaluating Healthcare Quality	
PHTH 5234	Economic Perspectives on Health Policy	
SCHM 6223	Managing Healthcare Supply Chain Operations	

CONCENTRATION IN CORPORATE FINANCE

Code	Title	Hours
Required Core		
FINA 6205	Financial Strategy	3
Electives		
Complete 6 semester hours from the following:		6
FINA 6204	International Financial Management	
FINA 6207	Financial Modeling	
FINA 6211	Financial Risk Management	
FINA 6213	Investment Banking	
FINA 6214	Mergers and Acquisitions	
FINA 6215	Business Turnarounds	
FINA 6216	Valuation and Value Creation	
FINA 6217	Real Estate Finance and Investment	
FINA 6260	Entrepreneurial Finance and Venture Capital	

CONCENTRATION IN CORPORATE INNOVATION

Code	Title	Hours
Complete 9 semester hours from the following:		9
ARTG 5610	Design Systems	
ENTR 6200	Enterprise Growth and Innovation	
ENTR 6217	Lean Innovation	
ENTR 6222	Competing in Dynamic, Innovation-Driven Markets	
ENTR 6225	Acquisitions, Alliances, and Growth	
GE 5100	Product Development for Engineers	
HRMG 6212	Creating an Innovative Organization	
HRMG 6280	The Human Side of Innovation	
MGMT 6280	Innovation for Next-Generation Products and Systems	
TECE 6340	The Technical Entrepreneur as Leader	

CONCENTRATION IN CORPORATE RENEWAL

Code	Title	Hours
Complete 9 semester hours from the following:		9
ENTR 6214	Social Enterprise	
ENTR 6224	Intellectual Property and Other Legal Aspects of Business and Innovation	
FINA 6215	Business Turnarounds	

FINA 6216	Valuation and Value Creation
HRMG 6212	Creating an Innovative Organization
HRMG 6213	Leadership
HRMG 6218	Great Companies
HRMG 6223	Global Talent Management
MGMT 6210	Law for Managers and Entrepreneurs
MGMT 6214	Negotiations
MKTG 6216	Market Focused Strategy

CONCENTRATION IN ENTREPRENEURSHIP

Code	Title	Hours
Complete 9 semester hours from the following:		9
ENTR 6210	Managing Operations in Early Stage Ventures	
ENTR 6212	Business Planning for New Ventures	
ENTR 6214	Social Enterprise	
ENTR 6218	Business Model Design and Innovation	
ENTR 6219	Financing Ventures from Early Stage to Exit	
ENTR 6220	Family Business Leadership and Governance	
ENTR 6230	Platform Innovation	
FINA 6260	Entrepreneurial Finance and Venture Capital	
GE 5030	Iterative Product Prototyping for Engineers	
MKTG 6214	New Product Development	
TECE 6222	Emerging and Disruptive Technologies	
TECE 6230	Entrepreneurial Marketing and Selling	
TECE 6250	Lean Design and Development	
TECE 6300	Managing a Technology-Based Business	

CONCENTRATION IN INTERNATIONAL BUSINESS

Code	Title	Hours
Required Core		
INTB 6212	Cultural Aspects of International Business	3
Electives		
Complete 6 semester hours from the following:		6
ENTR 6225	Acquisitions, Alliances, and Growth	
FINA 6204	International Financial Management	
INTB 6217	Creating Sustainable Competitive Advantage through Global Innovation	
INTB 6226	Becoming a Global Leader	
INTB 6230	International Field Study	
INTB 6232	Doing Business in Emerging Markets	
INTB 6249	Digitization of International Business	
MKTG 6212	International Marketing	
SCHM 6213	Global Supply Chain Strategy	

CONCENTRATION IN INVESTMENTS

Code	Title	Hours
Required Core		
FINA 6203	Investment Analysis	3
Electives		
Complete 6 semester hours from the following:		6
FINA 6207	Financial Modeling	
FINA 6211	Financial Risk Management	
FINA 6212	Fixed Income Securities and Risk	
FINA 6213	Investment Banking	
FINA 6217	Real Estate Finance and Investment	
FINA 6219	Portfolio Management	
FINA 6292	Advanced Topics in Finance	

CONCENTRATION IN LEADING PEOPLE & ORGANIZATIONS

Code	Title	Hours
Complete 9 semester hours from the following:		9
HRMG 6212	Creating an Innovative Organization	
HRMG 6218	Great Companies	
HRMG 6221	Power and Influence	
HRMG 6223	Global Talent Management	
INTB 6226	Becoming a Global Leader	
MGMT 6214	Negotiations	
STRT 6210	Workforce Metrics and Analytics	

CONCENTRATION IN MARKETING

Code	Title	Hours
Electives		
Complete 9 semester hours from the following:		9
MKTG 6210	Marketing Research	
MKTG 6212	International Marketing	
MKTG 6214	New Product Development	
MKTG 6216	Market Focused Strategy	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6222	Digital Marketing	
MKTG 6223	Brand and Advertising Management	
MKTG 6224	B2B and Strategic Sales	
MKTG 6226	Consumer Behavior	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	
MKTG 6234	Marketing Analytics	
MKTG 6260	Special Topics in Marketing	

CONCENTRATION IN MARKETING ANALYTICS

Code	Title	Hours
Required Core		
MKTG 6234	Marketing Analytics	3
Electives		
Complete 6 semester hours from the following:		6
MKTG 6210	Marketing Research	
MKTG 6216	Market Focused Strategy	
MKTG 6222	Digital Marketing	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	

CONCENTRATION IN MUTUAL FUND MANAGEMENT

Code	Title	Hours
Required Core		
FINA 6203	Investment Analysis	3
FINA 6219	Portfolio Management	3
Elective		

Complete 3 semester hours through our student-managed mutual fund. Each course is 1 semester hour and may be taken multiple times. At least 1 semester hour must be as a fund manager (FINA 6361).		3
FINA 6360	Fund Management for Analysts	
or FINA 6361	Fund Management for Managers	

CONCENTRATION IN OPERATION AND SUPPLY CHAIN MANAGEMENT

Code	Title	Hours
Required		
SCHM 6201	Operations and Supply Chain Management	3
Electives		
Complete 6 semester hours from the following:		6
SCHM 6211	Logistics and Transportation Management	
SCHM 6212	Executive Roundtable in Supply Chain Management	
SCHM 6213	Global Supply Chain Strategy	
SCHM 6214	Sourcing and Procurement	
SCHM 6215	Supply Chain Analytics	
SCHM 6221	Sustainability and Supply Chain Management	
SCHM 6223	Managing Healthcare Supply Chain Operations	
SCHM 6224	Demand Planning and Forecasting	

CONCENTRATION IN SUSTAINABILITY AND BUSINESS

Code	Title	Hours
Complete 9 semester hours from the following:		9
ENTR 6214	Social Enterprise	
ENTR 6216	Global Social Entrepreneurship and Innovation	
INTB 6217	Creating Sustainable Competitive Advantage through Global Innovation	
MECN 6205	Sustainability and the Economics of Markets	
MGMT 6225	Sustainability and Leadership	
MGMT 6226	Sustainability and the Business Environment	
SCHM 6221	Sustainability and Supply Chain Management	

ELECTIVES

Code	Title	Hours
Students may complete any courses leveled 6000 or higher for which they meet eligibility requirements from the following:		27
ACCT, BUSN, ENTR, FINA, HRMG, INTB, MECN, MGMT, MKTG, MISM, STRT, SCHM, or TECE		
Elective courses are either 1 or 3 semester hours. No more than 6 semester hours can be drawn from 1-semester-hour courses.		

PROGRAM CREDIT/GPA REQUIREMENTS

60 semester hours required
Minimum 3.000 GPA required

Business Administration, MBA—Online

D'Amore-McKim's Online MBA (https://damore-mckim.northeastern.edu/programs/online-mba/?utm_medium=website&utm_source=catalog&utm_campaign=online-mba) provides students advanced business knowledge and essential skills employers are seeking in today's rapidly changing business world. Designed for busy working professionals, this MBA program aims to prepare students for the future of work.

Students can tailor their Online MBA by choosing from eight in-demand concentrations, including finance, business management for healthcare , innovation entrepreneurship, high technology management, international management, operations and supply chain management, marketing, and sustainability and business.

Students have the option of participating in an International Field Study as an elective. This course allows eligible students to study and travel abroad over approximately eight intensive days gaining new perspectives on global business, and meet faculty and fellow classmates in person. Students can also participate in a one-week campus residency elective course provided at the main Boston campus.

This 50-semester hours master's degree is offered online, with six entry terms per year. Students may complete their coursework in as little as two years.

Program Requirements

Core Requirements

Code	Title	Hours
Accounting		
ACCT 6272	Financial Statement Preparation and Analysis	2.25
ACCT 6273	Identifying Strategic Implications in Accounting Data	2.25
Management		
SCHM 6201	Operations and Supply Chain Management	3
HRMG 6200	Managing People and Organizations	3
INTB 6200	Managing the Global Enterprise	3
MGSC 6204	Managing Information Resources	1.5
MGMT 6213	Managing Ethics in the Workplace and Marketplace	2
Marketing		
MKTG 6200	Creating and Sustaining Customer Markets	3
MECN 6200	Global Competition and Market Dominance	3
Analysis		
FINA 6200	Value Creation through Financial Decision Making	3
MGSC 6200	Information Analysis	3
STRT 6200	Strategic Decision Making in a Changing Environment	3
Entrepreneurship		
ENTR 6200	Enterprise Growth and Innovation	3

Electives

Code	Title	Hours
Complete 15 semester hours from the following subject areas:		15
ENTR, FINA, HRMG, INTB, MKTG, MGMT, MGSC, SCHM, or INTB 6230		

Note: Additional finance courses may be taken as electives.

Concentration Options

- Business Management for Healthcare (p. 85)
- Finance (p. 85)
- High Technology Management (p. 85)
- Innovation Entrepreneurship (p. 85)
- International Management (p. 85)
- Marketing (p. 85)
- Operations and Supply Chain Management (p. 85)
- Sustainability and Business (p. 85)

CONCENTRATION IN BUSINESS MANAGEMENT FOR HEALTHCARE

Code	Title	Hours
Complete 9 semester hours from the following:		9
FINA 6220	Healthcare Finance	
MGSC 6221	Introduction to Health Informatics and Health Information Systems	
MGMT 6222	Healthcare Industry	
MGMT 6223	Strategic Decision Making for Healthcare Professionals	

CONCENTRATION IN FINANCE

Code	Title	Hours
Complete 9 semester hours from the following:		9
FINA 6203	Investment Analysis	
FINA 6204	International Financial Management	
FINA 6205	Financial Strategy	
FINA 6213	Investment Banking	
FINA 6214	Mergers and Acquisitions	
FINA 6215	Business Turnarounds	
FINA 6216	Valuation and Value Creation	
FINA 6220	Healthcare Finance	
MECN 6205	Sustainability and the Economics of Markets	
FINA 6225	Entrepreneurial Finance for High Tech Companies	

CONCENTRATION IN HIGH TECHNOLOGY MANAGEMENT

Code	Title	Hours
Complete 9 semester hours from the following:		
ENTR 6212	Business Planning for New Ventures	3
FINA 6225	Entrepreneurial Finance for High Tech Companies	3
HRMG 6217	Virtual, Vicious Teams: Building and Leading High-Performance Teams	3

CONCENTRATION IN INNOVATION ENTREPRENEURSHIP

Code	Title	Hours
Complete 9 semester hours from the following:		9
ENTR 6210	Managing Operations in Early Stage Ventures	
ENTR 6211	Entrepreneurship: Services and Retail Business Creation	
ENTR 6212	Business Planning for New Ventures	
ENTR 6216	Global Social Entrepreneurship and Innovation	
FINA 6225	Entrepreneurial Finance for High Tech Companies	
MKTG 6214	New Product Development	

CONCENTRATION IN INTERNATIONAL MANAGEMENT

Code	Title	Hours
Complete 9 semester hours from the following:		9
ENTR 6216	Global Social Entrepreneurship and Innovation	
FINA 6204	International Financial Management	
INTB 6212	Cultural Aspects of International Business	
INTB 6217	Creating Sustainable Competitive Advantage through Global Innovation	
MKTG 6212	International Marketing	
SCHM 6213	Global Supply Chain Strategy	

CONCENTRATION IN MARKETING

Code	Title	Hours
Complete 9 semester hours from the following:		9
MKTG 6210	Marketing Research	
MKTG 6212	International Marketing	
MKTG 6214	New Product Development	
MKTG 6216	Market Focused Strategy	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6223	Brand and Advertising Management	

CONCENTRATION IN OPERATIONS AND SUPPLY CHAIN MANAGEMENT

Code	Title	Hours
Complete 9 semester hours from the following:		9
SCHM 6211	Logistics and Transportation Management	
SCHM 6213	Global Supply Chain Strategy	
SCHM 6214	Sourcing and Procurement	
SCHM 6221	Sustainability and Supply Chain Management	

CONCENTRATION IN SUSTAINABILITY AND BUSINESS

Code	Title	Hours
Complete 9 semester hours from the following:		9
MECN 6205	Sustainability and the Economics of Markets	
MGMT 6225	Sustainability and Leadership	
MGMT 6226	Sustainability and the Business Environment	
SCHM 6221	Sustainability and Supply Chain Management	

Program Credit/GPA Requirements

50 total semester hours required
Minimum 3.000 GPA required

Combined Degrees

Northeastern University's D'Amore-McKim School of Business is known for its experience-driven educational model that fuses robust classroom education with real-world application. Our interdisciplinary combined degree graduate programs are specifically designed for students whose interests and goals may span multiple academic disciplines or areas of expertise. Through our combined programs, we develop leaders and thinkers by combining the rigorous graduate coursework of the D'Amore-McKim MBA with rigorous coursework of a specialized master's degree.

Learn more about these programs on the D'Amore-McKim website (https://damore-mckim.northeastern.edu/programs/).

Programs

- Accounting and Business Administration, MSAMBA (p. 86)
- Finance and Business Administration, MSFMBA (p. 87)
- Finance and Business Administration, MSFMBA—Part-Time (p. 91)
- Finance and Business Administration, MSFMBA—Online (p. 94)
- Quantitative Finance and Business Administration, MSFMBA (p. 95)

Accounting and Business Administration, MSAMBA

Overview

D'Amore-McKim's Master of Science in Accounting/Master of Business Administration (https://damore-mckim.northeastern.edu/programs/ms-accounting-mba/) combined degree program is designed to put nonaccounting majors on an accelerated path toward a successful career in accounting. Our 15-month curriculum is constructed in partnership with some of the leading accounting firms and maintains a sharp focus on both accounting and business insights, including a four-course concentration in business analytics.

Analytics Concentration

As students develop their accounting knowledge through master's-level courses in accounting, they also enhance their analytical skills through an MBA concentration in business analytics. These four courses will prepare our students with a foundational understanding of how data can be used to support business decision making and create a measurable improvement on organizational performance.

Corporate Residency

Starting in January, students will have the opportunity to leverage their newly acquired skills in a three-month paid corporate residency at a leading accounting firm. This residency will offer an invaluable experience at the intersection of business and accounting as they work on real projects and expand their professional network. Far removed from the typical internship, this will take work experience to a whole new level—as a valued member of the team at a Big Four or other top firm, students are fully integrated in their company, working side by side with other accountants to deliver on organizational goals.

Program Requirements

Students in this program will automatically be registered for classes by the advising team in the Graduate School of Professional Accounting. Please contact an advisor at 617-373-3244 with any questions or requests.

Business Administration Core Requirements

Code	Title	Hours
Marketing		
MKTG 6318	Customer Value and the Enterprise	2
Strategic Decision Making		
STRT 6318	Strategic Planning for the Future	2
Management		
FINA 6318	Financial Management	2
HRMG 6318	Managing the Organization	2
SCHM 6318	Managing Operations and the Supply Chain	2
Innovation and Social Impact		
ENTR 6318	Innovating and Creating Futures	2
MGMT 6211	Business Law and Professional Ethics	2

Accounting Requirements

Code	Title	Hours
Required Core		
ACCT 6223	Audit and Other Assurance Services	6
ACCT 6224	Taxation of Individuals and Business Entities	6
ACCT 6226	Strategic Cost Management	3
ACCT 6227	Accounting for Business Combinations	3
ACCT 6228	Contemporary Issues in Accounting Theory	3
Financial Reporting		
ACCT 6217	Corporate Governance, Ethics, and Financial Reporting	3
ACCT 6220	Corporate Financial Reporting and Decision Making 1	3
ACCT 6221	Corporate Financial Reporting and Decision Making 2	6
ACCT 6222	Corporate and Governmental/Nonprofit Financial Reporting and Decision Making	6

Analytics Concentration Requirements

Code	Title	Hours
Required Courses		
BUSN 6365	Business Analytics	3
MGSC 6201	Information Systems and Technology	3
MISM 6210	Information Visuals and Dashboards for Business	3
MISM 6212	Data Mining and Machine Learning for Business	3

Elective

Code	Title	Hours
Open Elective		
In consultation with advisor, complete 3 semester hours from the following:		3
ACCT, BUSN, ENTR, FINA, HRMG, INTB, MECN, MGMT, MKTG, SCHM, STRT, and TECE		

Corporate Residency Requirement

Code	Title	Hours
BUSN 6964	Co-op Work Experience	0

Program Credit/GPA Requirements

68 total semester hours required
Minimum 3.000 GPA required

Finance and Business Administration, MSFMBA

Overview

Today's rapidly evolving business world is disrupting industries, and businesses need leaders highly skilled in both finance and business. The Full-Time Master of Science in Finance/Master of Business Administration (https://damore-mckim.northeastern.edu/programs/full-time-ms-finance-mba/?utm_source=neu-course-catalog&utm_medium=referral&utm_campaign=ftmsfmba-mofu) combined degree program is designed to integrate business knowledge with a deep understanding of finance, preparing students to be the leaders that today's business world demands.

Corporate Residency

The corporate residency will offer an invaluable experience at the intersection of business and finance. Students work on real projects and make significant contributions to a team. They can choose a three-, six-month, or even two six-month residencies. Far removed from the typical internship, this will take their work experience to a whole new level—as a valued member of the team at a leading business, students will be fully integrated in company culture, working side-by-side with staff members to deliver on organizational goals.

Finance Major

Students have an opportunity to develop managerial potential and practical finance skills in key areas such as valuation, mergers and acquisitions, risk management, insurance, and investments. The Master of Science in Finance portion of the combined degree curriculum fulfills the necessary finance major requirements.

Concentration

Students select one concentration. The analytics concentration is recommended. Additional business concentration options include brand management, business management for healthcare, corporate innovation, entrepreneurship, international business, leading people & organizations, marketing, marketing analytics, operations and supply chain management, and sustainability and business. MBA x (https://damore-mckim.northeastern.edu/programs/mba-x/) concentrations are also available for students, which offer an opportunity to complete a 12-semester-hour concentration in partnership with one of Northeastern's eligible professional colleges. MBA x concentration options include artificial intelligence, bioinformatics, biotechnology industry, cybersecurity, data science, data visualization, experience design, game design and analytics, information ethics, media innovation and advocacy, and software development.

Program Requirements

Business Administration Core Requirements

Code	Title	Hours
Required Core		
Marketing		
MKTG 6318	Customer Value and the Enterprise	2
Strategic Decision Making		
ACCT 6318	Analyzing Accounting Data for Strategic Decision Making	2
STRT 6318	Strategic Planning for the Future	2
Management		
FINA 6318	Financial Management	2
HRMG 6318	Managing the Organization	2
SCHM 6318	Managing Operations and the Supply Chain	2
Innovation and Social Impact		
BUSN 6363	Social Impact of Business	2
ENTR 6318	Innovating and Creating Futures	2
Career Management		
BUSN 6200	Career Management	0
BUSN 6950	MBA Skills Workshop	0
Corporate Residency		
BUSN 6964	Co-op Work Experience	0
Three-month, six-month, or two six-month Corporate Residency placement options		

Finance Major Requirements

Code	Title	Hours
Required Core		
FINA 6320	Advanced Financial Management	3
FINA 6202	Analysis of Financial Institutions and Markets	3
FINA 6203	Investment Analysis	3
FINA 6204	International Financial Management	3
FINA 6205	Financial Strategy	3
FINA 6206	Finance Seminar	3
Electives		
Complete 6 semester hours of finance elective work (FINA).		6

CONCENTRATION OPTIONS

Complete one of the following concentrations:

- Analytics (p. 88) (*Recommended)*
- Brand Management (p. 88)
- Business Management for Healthcare (p. 88)
- Corporate Innovation (p. 88)
- Entrepreneurship (p. 88)
- International Business (p. 89)
- Leading People & Organizations (p. 89)
- Marketing (p. 89)
- Marketing Analytics (p. 89)
- Operations and Supply Chain Management (p. 89)
- Sustainability and Business (p. 89)
- MBA x Artificial Intelligence (p. 90)
- MBA x Bioinformatics (p. 90)
- MBA x Biotechnology Industry (p. 90)
- MBA x Cybersecurity (p. 90)
- MBA x Data Science (p. 90)
- MBA x Data Visualization (p. 90)
- MBA x Experience Design (p. 90)
- MBA x Game Design and Analytics (p. 90)
- MBA x Information Ethics (p. 90)

- MBA x Media Innovation and Advocacy (p. 90)
- MBA x Software Development (p. 90)

CONCENTRATION IN ANALYTICS

Code	Title	Hours
Required Core		
BUSN 6365	Business Analytics	3
Electives		
Complete 9 semester hours from the following:		9
CS 5100	Foundations of Artificial Intelligence	
CS 5200	Database Management Systems	
ECON 5140	Applied Econometrics	
IE 6600	Computation and Visualization for Analytics	
INSH 5302	Information Design and Visual Analytics	
MISM 6203	Business Analytics Methods	
MISM 6210	Information Visuals and Dashboards for Business	
MISM 6212	Data Mining and Machine Learning for Business	
MISM 6213	Business Information Design, Quality, and Strategy	
MISM 6214	Business Analytics Capstone	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	
MKTG 6234	Marketing Analytics	
SCHM 6215	Supply Chain Analytics	
STRT 6210	Workforce Metrics and Analytics	

CONCENTRATION IN BRAND MANAGEMENT

Code	Title	Hours
Required Core		
MKTG 6320	Advanced Marketing Management	3
MKTG 6223	Brand and Advertising Management	3
Electives		
Complete 6 semester hours from the following:		6
MKTG 6210	Marketing Research	
MKTG 6214	New Product Development	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6226	Consumer Behavior	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	

CONCENTRATION IN BUSINESS MANAGEMENT FOR HEALTHCARE

Code	Title	Hours
Required Core		
FINA 6220	Healthcare Finance	3
or SCHM 6223	Managing Healthcare Supply Chain Operations	
HINF 5105	The American Healthcare System	3
HRMG 6220	Health Organization Management	3
STRT 6220	Strategic Management for Healthcare Organizations	3
Complete 3 semester hours from the following:		
Optional Electives		
Note: Electives are not required; the following course(s) are suggested beyond the concentration:		3-9
ENTR 6214	Social Enterprise	
FINA 6220	Healthcare Finance	
HINF 5101	Introduction to Health Informatics and Health Information Systems	
HINF 6202	Business of Healthcare Informatics	
HINF 6205	Creation and Application of Medical Knowledge	
MGMT 6214	Negotiations	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6226	Consumer Behavior	
PHTH 5232	Evaluating Healthcare Quality	
PHTH 5234	Economic Perspectives on Health Policy	
SCHM 6223	Managing Healthcare Supply Chain Operations	

CONCENTRATION IN CORPORATE INNOVATION

Code	Title	Hours
Required Core		
ENTR 6320	Innovation, Entrepreneurship, and Dynamic Competition	3
Electives		
Complete 9 semester hours from the following:		9
ARTG 5610	Design Systems	
ENTR 6200	Enterprise Growth and Innovation	
ENTR 6217	Lean Innovation	
ENTR 6224	Intellectual Property and Other Legal Aspects of Business and Innovation	
ENTR 6225	Acquisitions, Alliances, and Growth	
GE 5100	Product Development for Engineers	
HRMG 6212	Creating an Innovative Organization	
HRMG 6280	The Human Side of Innovation	
MGMT 6280	Innovation for Next-Generation Products and Systems	
TECE 6340	The Technical Entrepreneur as Leader	

CONCENTRATION IN ENTREPRENEURSHIP

Code	Title	Hours
Required Core		
ENTR 6320	Innovation, Entrepreneurship, and Dynamic Competition	3
Electives		
Complete 9 semester hours from the following:		9
ENTR 6210	Managing Operations in Early Stage Ventures	
ENTR 6212	Business Planning for New Ventures	
ENTR 6214	Social Enterprise	
ENTR 6218	Business Model Design and Innovation	
ENTR 6219	Financing Ventures from Early Stage to Exit	
ENTR 6220	Family Business Leadership and Governance	
ENTR 6230	Platform Innovation	

FINA 6260	Entrepreneurial Finance and Venture Capital
GE 5030	Iterative Product Prototyping for Engineers
MKTG 6214	New Product Development
TECE 6222	Emerging and Disruptive Technologies
TECE 6230	Entrepreneurial Marketing and Selling
TECE 6250	Lean Design and Development
TECE 6300	Managing a Technology-Based Business

CONCENTRATION IN INTERNATIONAL BUSINESS

Code	Title	Hours
Required Core		
INTB 6200	Managing the Global Enterprise	3
Electives		
Complete 9 semester hours from the following:		9
FINA 6204	International Financial Management	
INTB 6212	Cultural Aspects of International Business	
INTB 6226	Becoming a Global Leader	
INTB 6230	International Field Study	
INTB 6232	Doing Business in Emerging Markets	
MKTG 6212	International Marketing	

CONCENTRATION IN LEADING PEOPLE & ORGANIZATIONS

Code	Title	Hours
Note: Only one course outside HRMG and MGMT may be taken to fulfill the concentration.		
Complete 12 semester hours from the following:		12
HRMG 6212	Creating an Innovative Organization	
HRMG 6218	Great Companies	
HRMG 6221	Power and Influence	
HRMG 6223	Global Talent Management	
INTB 6226	Becoming a Global Leader	
MGMT 6214	Negotiations	
STRT 6210	Workforce Metrics and Analytics	

CONCENTRATION IN MARKETING

Code	Title	Hours
Required Core		
MKTG 6320	Advanced Marketing Management (Advanced Marketing Management)	3
Electives		
Complete 9 semester hours from the following:		9
MKTG 6210	Marketing Research	
MKTG 6212	International Marketing	
MKTG 6214	New Product Development	
MKTG 6216	Market Focused Strategy	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6222	Digital Marketing	
MKTG 6223	Brand and Advertising Management	
MKTG 6224	B2B and Strategic Sales	
MKTG 6226	Consumer Behavior	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	
MKTG 6234	Marketing Analytics	
MKTG 6260	Special Topics in Marketing	

CONCENTRATION IN MARKETING ANALYTICS

Code	Title	Hours
Required Core		
MKTG 6320	Advanced Marketing Management (Advanced Marketing Management)	3
MKTG 6234	Marketing Analytics	3
Electives		
Complete 6 semester hours from the following:		6
MKTG 6210	Marketing Research	
MKTG 6216	Market Focused Strategy	
MKTG 6222	Digital Marketing	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	

CONCENTRATION IN OPERATIONS AND SUPPLY CHAIN MANAGEMENT

Code	Title	Hours
Required Core		
SCHM 6213	Global Supply Chain Strategy	3
Electives		
Complete 9 semester hours from the following:		9
SCHM 6211	Logistics and Transportation Management	
SCHM 6212	Executive Roundtable in Supply Chain Management	
SCHM 6214	Sourcing and Procurement	
SCHM 6215	Supply Chain Analytics	
SCHM 6221	Sustainability and Supply Chain Management	
SCHM 6223	Managing Healthcare Supply Chain Operations	
SCHM 6224	Demand Planning and Forecasting	

CONCENTRATION IN SUSTAINABILITY AND BUSINESS

Code	Title	Hours
Complete 12 semester hours from the following:		12
ENTR 6214	Social Enterprise	
ENTR 6216	Global Social Entrepreneurship and Innovation	
INTB 6217	Creating Sustainable Competitive Advantage through Global Innovation	
MECN 6200	Global Competition and Market Dominance	
MECN 6205	Sustainability and the Economics of Markets	
MGMT 6225	Sustainability and Leadership	
MGMT 6226	Sustainability and the Business Environment	
SCHM 6221	Sustainability and Supply Chain Management	

CONCENTRATION IN MBA X ARTIFICIAL INTELLIGENCE

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	4
CS 6120	Natural Language Processing	4
CS 6140	Machine Learning	4

CONCENTRATION IN MBA X BIOINFORMATICS

Code	Title	Hours
BINF 6308	Bioinformatics Computational Methods 1	4
BINF 6309	Bioinformatics Computational Methods 2	4
BINF 6200	Bioinformatics Programming	4

CONCENTRATION IN MBA X BIOTECHNOLOGY INDUSTRY

Code	Title	Hours
BIOT 5120	Foundations in Biotechnology	3
BIOT 5400	Scientific Information Management for Biotechnology Managers	3
BIOT 5631	Cell Culture Processes for Biopharmaceutical Production	3
BIOT 6214	Experimental Design and Biostatistics	2
Complete one additional semester hour of BUSN coursework.		1

CONCENTRATION IN MBA X CYBERSECURITY

Code	Title	Hours
CY 5770	Software Vulnerabilities and Security	4
CY 6750	Cryptography and Communications Security	4
CS 6760	Privacy, Security, and Usability	4

CONCENTRATION IN MBA X DATA SCIENCE

Code	Title	Hours
CS 5200	Database Management Systems	4
CS 6140	Machine Learning	4
CS 6220	Data Mining Techniques	4

CONCENTRATION IN MBA X DATA VISUALIZATION

Code	Title	Hours
Required		
ARTG 5150	Information Visualization Principles and Practices	3
ARTG 5151	Information Design Critique Seminar	1
ARTG 5330	Visualization Technologies 1: Fundamentals	4
Electives		
Complete 4 semester hours from the following:		4
ARTG 5310	Visual Cognition	
ARTG 6110	Information Design Theory and Critical Thinking	
ARTG 6330	Information Design Mapping Strategies	

CONCENTRATION IN MBA X EXPERIENCE DESIGN

Code	Title	Hours
Required		
ARTG 5610	Design Systems	4
ARTG 6310	Design for Behavior and Experience	4
Electives		
Complete 4 semester hours from the following:		4
ARTG 5600	Experience Design Studio 1: Principles	
ARTG 5620	Notational Systems for Experience	
ARTG 5640	Prototyping for Experience Design	

CONCENTRATION IN MBA X GAME DESIGN AND ANALYTICS

Code	Title	Hours
Required		
GSND 5110	Game Design and Analysis	4
GSND 6350	Data-Driven Player Modeling	4
Electives		
Complete 4 semester hours from the following:		4
GSND 6320	Psychology of Play	
GSND 6330	Player Experience	
GSND 6340	Biometrics for Design	
GSND 6350	Data-Driven Player Modeling	

CONCENTRATION IN MBA X INFORMATION ETHICS

Code	Title	Hours
Complete two of the following:		8
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
PHIL 5005	Information Ethics	
PHIL 5010	AI Ethics	
Complete one of the following:		4
PHIL 5001	Global Justice	
PHIL 5005	Information Ethics	
PHIL 5010	AI Ethics	

CONCENTRATION IN MBA X MEDIA INNOVATION AND ADVOCACY

Code	Title	Hours
Required		
JRNL 5400	Media and Advocacy in Theory and Practice	4
JRNL 6340	Fundamentals of Digital Journalism	4
Electives		
Complete 4 semester hours from the following:		4
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	
JRNL 5311	Design for Storytelling	
JRNL 6305	Topics	
JRNL 6341	Telling Your Story with Data	

CONCENTRATION IN MBA X SOFTWARE DEVELOPMENT

Code	Title	Hours
CS 5500	Foundations of Software Engineering	4
CS 5610	Web Development	4
CS 5520	Mobile Application Development	4

ELECTIVES

Code	Title	Hours
Experiential Requirement		
Complete 3 semester hours from the following:		3
BUSN 6351	Experiential Education	
BUSN 6945	Washington Campus Seminar	
INTB 6230	International Field Study	

INTB 6238	Global Project
FINA 6360	Fund Management for Analysts
FINA 6361	Fund Management for Managers
Open Electives	
In consultation with advisor, complete 6 semester hours from the following:	6
ACCT, BUSN, ENTR, FINA, HRMG, INTB, MECN, MGMT, MKTG, SCHM, STRT, and TECE	
Interdisciplinary Requirement	
Complete 6 semester hours outside of D'Amore-Mckim School of Business; please consult program director for course options:	6
AACE 6000	Arts and Culture Organizational Leadership
ARTG 5150	Information Visualization Principles and Practices
ARTG 5151	Information Design Critique Seminar
ARTG 5330	Visualization Technologies 1: Fundamentals
ARTG 5600	Experience Design Studio 1: Principles
ARTG 5610	Design Systems
ARTG 5620	Notational Systems for Experience
ARTG 5640	Prototyping for Experience Design
ARTG 6110	Information Design Theory and Critical Thinking
ARTG 6310	Design for Behavior and Experience
ARTG 6330	Information Design Mapping Strategies
BINF 6200	Bioinformatics Programming
BINF 6308	Bioinformatics Computational Methods 1
BINF 6309	Bioinformatics Computational Methods 2
BIOT 5120	Foundations in Biotechnology
BIOT 5219	The Biotechnology Enterprise
BIOT 5400	Scientific Information Management for Biotechnology Managers
BIOT 5631	Cell Culture Processes for Biopharmaceutical Production
BIOT 6214	Experimental Design and Biostatistics
CS 5100	Foundations of Artificial Intelligence
CS 5200	Database Management Systems
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights
DS 5110	Introduction to Data Management and Processing
ECON 5140	Applied Econometrics
GE 5030	Iterative Product Prototyping for Engineers
GE 5100	Product Development for Engineers
GSND 5110	Game Design and Analysis
GSND 6320	Psychology of Play
GSND 6330	Player Experience
GSND 6340	Biometrics for Design
GSND 6350	Data-Driven Player Modeling
HINF 5101	Introduction to Health Informatics and Health Information Systems
HINF 5105	The American Healthcare System
HINF 6202	Business of Healthcare Informatics
HINF 6205	Creation and Application of Medical Knowledge
IE 5640	Data Mining for Engineering Applications
IE 6600	Computation and Visualization for Analytics
IE 7374	Special Topics in Industrial Engineering
INSH 5301	Introduction to Computational Statistics
INSH 5302	Information Design and Visual Analytics
JRNL 5311	Design for Storytelling
JRNL 5400	Media and Advocacy in Theory and Practice
JRNL 6305	Topics
JRNL 6340	Fundamentals of Digital Journalism
JRNL 6341	Telling Your Story with Data
ME 5645	Environmental Issues in Manufacturing and Product Use
PHIL 5001	Global Justice
PHIL 5005	Information Ethics
PHIL 5010	AI Ethics
PHTH 5232	Evaluating Healthcare Quality
PHTH 5234	Economic Perspectives on Health Policy
PPUA 6553	Nonprofit Financial Resource Development

Program Credit/GPA Requirements

67 semester hours required
Minimum 3.000 GPA required

Finance and Business Administration, MSFMBA—Part-Time

Today's rapidly changing business world is disrupting industries, and businesses need leaders highly skilled in both finance and business. D'Amore-McKim's Part-Time MS in Finance/MBA (https://damore-mckim.northeastern.edu/programs/part-time-ms-finance-mba/?utm_medium=website&utm_source=catalog&utm_campaign=part-time-ms-finance-mba) combined degree program is designed to integrate business knowledge with a deep understanding of finance, preparing students to be the leaders that today's business world demands.

Faculty thought leaders apply their unique practice-oriented approach to their curriculum, which gives students the opportunity to learn from true professors of practice.

This 72-semester-hour combined master's degree is offered for part-time study and is designed for working professionals. Classes start in September and January, and students can enroll in courses just one night a week or accelerate their program by enrolling in multiple classes at a time.

Program Requirements

Core Requirements

Code	Title	Hours
Accounting		
ACCT 6200	Financial Reporting and Managerial Decision Making 1	3
ACCT 6201	Financial Reporting and Managerial Decision Making 2	1.5
Management		
HRMG 6200	Managing People and Organizations	3
INTB 6200	Managing the Global Enterprise	3
MGSC 6200	Information Analysis	3
MGSC 6204	Managing Information Resources	1.5
SCHM 6201	Operations and Supply Chain Management	3
STRT 6200	Strategic Decision Making in a Changing Environment	3
Marketing		
MKTG 6200	Creating and Sustaining Customer Markets	3
MECN 6200	Global Competition and Market Dominance	3
Entrepreneurship		
ENTR 6200	Enterprise Growth and Innovation	3
Finance		
FINA 6200	Value Creation through Financial Decision Making	3
FINA 6203	Investment Analysis	3
FINA 6204	International Financial Management	3
FINA 6205	Financial Strategy	3
FINA 6206	Finance Seminar	3

Concentrations

Students in the part-time program may apply for up to two concentrations. Each concentration requires 9 semester hours of coursework except for the Business Management for Health Care concentration, which requires 12 semester hours, as outlined below.

- Analytics (p. 92)
- Brand Management (p. 92)
- Business Management for Healthcare (p. 92)
- Corporate Finance (p. 93)
- Corporate Innovation (p. 93)
- Corporate Renewal (p. 93)
- Entrepreneurship (p. 93)
- International Business (p. 93)
- Investments (p. 93)
- Leading People & Organizations (p. 94)
- Marketing (p. 94)
- Marketing Analytics (p. 94)
- Mutual Fund Management (p. 94)
- Operations and Supply Chain Management (p. 94)
- Sustainability and Business (p. 94)

CONCENTRATION IN ANALYTICS

Code	Title	Hours
Required Core		
MISM 6200	Introduction to Business Analytics	3
Electives		
Complete 6 semester hours from the following:		6
MISM 6202	Foundations of Data Analysis for Business	
MISM 6203	Business Analytics Methods	
MISM 6210	Information Visuals and Dashboards for Business	
MISM 6212	Data Mining and Machine Learning for Business	
MISM 6213	Business Information Design, Quality, and Strategy	
MISM 6214	Business Analytics Capstone	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	
MKTG 6234	Marketing Analytics	
SCHM 6215	Supply Chain Analytics	
STRT 6210	Workforce Metrics and Analytics	

CONCENTRATION IN BRAND MANAGEMENT

Code	Title	Hours
Required Core		
MKTG 6223	Brand and Advertising Management	3
Electives		
Complete 6 semester hours from the following:		6
MKTG 6210	Marketing Research	
MKTG 6214	New Product Development	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6226	Consumer Behavior	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	

CONCENTRATION IN BUSINESS MANAGEMENT FOR HEALTHCARE

Code	Title	Hours
Required Core		
HINF 5105	The American Healthcare System	3
HRMG 6220	Health Organization Management	3
STRT 6220	Strategic Management for Healthcare Organizations	3
Elective		
Complete 3 semester hours from the following:		3
ENTR 6214	Social Enterprise	
FINA 6220	Healthcare Finance	
HINF 5101	Introduction to Health Informatics and Health Information Systems	
HINF 6202	Business of Healthcare Informatics	
HINF 6205	Creation and Application of Medical Knowledge	
MGMT 6214	Negotiations	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6226	Consumer Behavior	
PHTH 5232	Evaluating Healthcare Quality	

PHTH 5234	Economic Perspectives on Health Policy
SCHM 6223	Managing Healthcare Supply Chain Operations

CONCENTRATION IN CORPORATE FINANCE

Code	Title	Hours
Required Core		
FINA 6205	Financial Strategy	3
Electives		
Complete 6 semester hours from the following:		6
FINA 6204	International Financial Management	
FINA 6207	Financial Modeling	
FINA 6211	Financial Risk Management	
FINA 6213	Investment Banking	
FINA 6214	Mergers and Acquisitions	
FINA 6215	Business Turnarounds	
FINA 6216	Valuation and Value Creation	
FINA 6217	Real Estate Finance and Investment	
FINA 6260	Entrepreneurial Finance and Venture Capital	

CONCENTRATION IN CORPORATE INNOVATION

Code	Title	Hours
Complete 9 semester hours from the following:		9
ARTG 5610	Design Systems	
ENTR 6200	Enterprise Growth and Innovation	
ENTR 6217	Lean Innovation	
ENTR 6222	Competing in Dynamic, Innovation-Driven Markets	
ENTR 6225	Acquisitions, Alliances, and Growth	
GE 5100	Product Development for Engineers	
HRMG 6212	Creating an Innovative Organization	
HRMG 6280	The Human Side of Innovation	
MGMT 6280	Innovation for Next-Generation Products and Systems	
TECE 6340	The Technical Entrepreneur as Leader	

CONCENTRATION IN CORPORATE RENEWAL

Code	Title	Hours
Complete 9 semester hours from the following:		9
ENTR 6214	Social Enterprise	
ENTR 6224	Intellectual Property and Other Legal Aspects of Business and Innovation	
FINA 6215	Business Turnarounds	
FINA 6216	Valuation and Value Creation	
HRMG 6212	Creating an Innovative Organization	
HRMG 6213	Leadership	
HRMG 6218	Great Companies	
HRMG 6223	Global Talent Management	
MGMT 6210	Law for Managers and Entrepreneurs	
MGMT 6214	Negotiations	
MKTG 6216	Market Focused Strategy	

CONCENTRATION IN ENTREPRENEURSHIP

Code	Title	Hours
Complete 9 semester hours from the following:		9
ENTR 6210	Managing Operations in Early Stage Ventures	
ENTR 6212	Business Planning for New Ventures	
ENTR 6214	Social Enterprise	
ENTR 6218	Business Model Design and Innovation	
ENTR 6219	Financing Ventures from Early Stage to Exit	
ENTR 6220	Family Business Leadership and Governance	
ENTR 6230	Platform Innovation	
FINA 6260	Entrepreneurial Finance and Venture Capital	
GE 5030	Iterative Product Prototyping for Engineers	
MKTG 6214	New Product Development	
TECE 6222	Emerging and Disruptive Technologies	
TECE 6230	Entrepreneurial Marketing and Selling	
TECE 6250	Lean Design and Development	
TECE 6300	Managing a Technology-Based Business	

CONCENTRATION IN INTERNATIONAL BUSINESS

Code	Title	Hours
Required Core		
INTB 6212	Cultural Aspects of International Business	3
Electives		
Complete 6 semester hours from the following:		6
ENTR 6225	Acquisitions, Alliances, and Growth	
FINA 6204	International Financial Management	
INTB 6217	Creating Sustainable Competitive Advantage through Global Innovation	
INTB 6226	Becoming a Global Leader	
INTB 6230	International Field Study	
INTB 6232	Doing Business in Emerging Markets	
INTB 6249	Digitization of International Business	
MKTG 6212	International Marketing	
SCHM 6213	Global Supply Chain Strategy	

CONCENTRATION IN INVESTMENTS

Code	Title	Hours
Required Core		
FINA 6203	Investment Analysis	3
Electives		
Complete 6 semester hours from the following:		6
FINA 6207	Financial Modeling	
FINA 6211	Financial Risk Management	
FINA 6212	Fixed Income Securities and Risk	
FINA 6213	Investment Banking	
FINA 6217	Real Estate Finance and Investment	
FINA 6219	Portfolio Management	
FINA 6292	Advanced Topics in Finance	

CONCENTRATION IN LEADING PEOPLE & ORGANIZATIONS

Code	Title	Hours
Complete 9 semester hours from the following:		9
HRMG 6212	Creating an Innovative Organization	
HRMG 6218	Great Companies	
HRMG 6221	Power and Influence	
HRMG 6223	Global Talent Management	
INTB 6226	Becoming a Global Leader	
MGMT 6214	Negotiations	
STRT 6210	Workforce Metrics and Analytics	

CONCENTRATION IN MARKETING

Code	Title	Hours
Complete 9 semester hours from the following:		9
MKTG 6210	Marketing Research	
MKTG 6212	International Marketing	
MKTG 6214	New Product Development	
MKTG 6216	Market Focused Strategy	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6222	Digital Marketing	
MKTG 6223	Brand and Advertising Management	
MKTG 6224	B2B and Strategic Sales	
MKTG 6226	Consumer Behavior	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	
MKTG 6234	Marketing Analytics	
MKTG 6260	Special Topics in Marketing	

CONCENTRATION IN MARKETING ANALYTICS

Code	Title	Hours
Required Core		
MKTG 6234	Marketing Analytics	3
Electives		
Complete 6 semester hours from the following:		6
MKTG 6210	Marketing Research	
MKTG 6216	Market Focused Strategy	
MKTG 6222	Digital Marketing	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	

CONCENTRATION IN MUTUAL FUND MANAGEMENT

Code	Title	Hours
Required Core		
FINA 6203	Investment Analysis	3
FINA 6219	Portfolio Management	3
Electives		
Complete 3 semster hours through our student-managed mutual fund. Each course is 1 semester hour and may be taken multiple times. At least 1 semster hour must be as a fund manager (FINA 6361).		3
FINA 6360	Fund Management for Analysts	
or FINA 6361	Fund Management for Managers	

CONCENTRATION IN OPERATIONS AND SUPPLY CHAIN MANAGEMENT

Code	Title	Hours
Required		
SCHM 6201	Operations and Supply Chain Management	3
Electives		
Complete 6 semester hours from the following:		6
SCHM 6211	Logistics and Transportation Management	
SCHM 6212	Executive Roundtable in Supply Chain Management	
SCHM 6213	Global Supply Chain Strategy	
SCHM 6214	Sourcing and Procurement	
SCHM 6215	Supply Chain Analytics	
SCHM 6221	Sustainability and Supply Chain Management	
SCHM 6223	Managing Healthcare Supply Chain Operations	
SCHM 6224	Demand Planning and Forecasting	

CONCENTRATION IN SUSTAINABILITY AND BUSINESS

Code	Title	Hours
Complete 9 semester hours from the following:		9
ENTR 6214	Social Enterprise	
ENTR 6216	Global Social Entrepreneurship and Innovation	
INTB 6217	Creating Sustainable Competitive Advantage through Global Innovation	
MECN 6205	Sustainability and the Economics of Markets	
MGMT 6225	Sustainability and Leadership	
MGMT 6226	Sustainability and the Business Environment	
SCHM 6221	Sustainability and Supply Chain Management	

Electives

Code	Title	Hours
Finance Electives		
Complete 12 semester hours of graduate-level FINA courses.		12
Business Electives		
Complete 15 semester hours of graduate-level courses from the following subject areas:		15
ACCT, ENTR, FINA, HRMG, INTB, MECN, MKTG, MGMT, SCHM, and STRT		
Note: Additional finance courses may be taken as electives.		

Program Credit/GPA Requirements

72 total semester hours required
Minimum 3.000 GPA required

Finance and Business Administration, MSFMBA—Online

Overview

Today's rapidly evolving business world is disrupting industries, and businesses need leaders highly skilled in both finance and business. D'Amore-McKim's Online Master of Science in Finance/Master of Business Administration (https://damore-

mckim.northeastern.edu/programs/online-ms-in-finance-mba/?utm_medium=website&utm_source=catalog&utm_campaign=online-ms-in-finance-mba) combined degree program is designed to integrate business knowledge with a deep understanding of finance, preparing students to be the leaders that today's business world demands.

This 62-semester-hour combined master's degree is offered for online study and is available to second-year online MBA students who have achieved a minimum of a 3.000 grade-point average and a B grade in core finance and accounting courses. Students initially enroll in the MBA program and may apply to move into the combined program at any point during their second year.

Program Requirements

Core Requirements

Code	Title	Hours
Accounting		
ACCT 6272	Financial Statement Preparation and Analysis	2.25
ACCT 6273	Identifying Strategic Implications in Accounting Data	2.25
Management		
HRMG 6200	Managing People and Organizations	3
INTB 6200	Managing the Global Enterprise	3
MGMT 6213	Managing Ethics in the Workplace and Marketplace	2
MGSC 6204	Managing Information Resources	1.5
SCHM 6201	Operations and Supply Chain Management	3
Marketing		
MKTG 6200	Creating and Sustaining Customer Markets	3
MECN 6200	Global Competition and Market Dominance	3
Analysis		
FINA 6200	Value Creation through Financial Decision Making	3
MGSC 6200	Information Analysis	3
STRT 6200	Strategic Decision Making in a Changing Environment	3
Entrepreneurship		
ENTR 6200	Enterprise Growth and Innovation	3
Additional Required Finance Courses		
FINA 6203	Investment Analysis	3
FINA 6204	International Financial Management	3
FINA 6205	Financial Strategy	3
FINA 6206	Finance Seminar	3

Electives

Code	Title	Hours
Finance Electives		
Complete 9 semester hours of finance electives.		9
Business Electives		
Complete 6 semester hours in the following subject areas: MGSC, ENTR, FINA, HRMG, MKTG, MGMT, SCHM, SUST, or INTB 6230		6

Note: Electives may include finance courses and an on-campus residency course.

Program Credit/GPA Requirements

62 semester hours required
Minimum 3.000 GPA required

Quantitative Finance and Business Administration, MSFMBA

Today's rapidly evolving business world is disrupting industries, and businesses need leaders highly skilled in both finance and business. The Full-Time Master of Science in Finance/Master of Business Administration (https://damore-mckim.northeastern.edu/programs/full-time-ms-finance-mba/?utm_source=neu-course-catalog&utm_medium=referral&utm_campaign=ftmsfmba-mofu) combined degree program is designed to integrate business knowledge with a deep understanding of finance, preparing students to be the leaders that today's business world demands.

Corporate Residency

The corporate residency will offer students an invaluable experience at the intersection of business and finance. Students work on real projects and make significant contributions to a team. They can choose a three-, six-month, or even two six-month residencies. Far removed from the typical internship, this will take their work experience to a whole new level—as a valued member of the team at a leading business, students will be fully integrated in company culture, working side-by-side with staff members to deliver on organizational goals.

Quantitative Finance Major

Students will develop skills that integrate economics, mathematics, and computer science with financial theory and application. The major is designed to help students develop the mathematically demanding quantitative skills and fintech expertise required in today's rapidly changing financial services industry. The Master of Science in Quantitative Finance portion of the combined degree curriculum fulfills the necessary quantitative finance major requirements.

Concentration

Students select one business concentration in either corporate finance or investments.

Program Requirements

Business Administration Core Requirements

Code	Title	Hours
Required Core		
Marketing		
MKTG 6318	Customer Value and the Enterprise	2
Strategic Decision Making		
ACCT 6318	Analyzing Accounting Data for Strategic Decision Making	2
STRT 6318	Strategic Planning for the Future	2
Management		
FINA 6318	Financial Management	2
HRMG 6318	Managing the Organization	2
SCHM 6318	Managing Operations and the Supply Chain	2
Innovation and Social Impact		
BUSN 6363	Social Impact of Business	2
ENTR 6318	Innovating and Creating Futures	2

Career Management		
BUSN 6200	Career Management	0
BUSN 6950	MBA Skills Workshop	0
Corporate Residency		
BUSN 6964	Co-op Work Experience	0

Three-month, six-month, or two six-month Corporate Residency placement options

Quantitative Finance Major Requirements

Code	Title	Hours
Required Core		
FINA 6203	Investment Analysis	3
FINA 6331	Corporate Finance	3
FINA 6332	Fundamentals of Financial Math and Financial Markets	3
FINA 6333	Data Analytics in Finance	3
FINA 6334	Empirical Methods in Finance	3
FINA 6335	Derivatives and Risk Analytics	3

Concentration Options

Complete one of the following concentrations:

- Corporate Finance (p. 96)
- Investments (p. 96)

CONCENTRATION IN CORPORATE FINANCE

Code	Title	Hours
Required Core		
FINA 6320	Advanced Financial Management	3
Complete 3 semester hours from the following:		3
FINA 6203	Investment Analysis	
FINA 6216	Valuation and Value Creation	
FINA 6260	Entrepreneurial Finance and Venture Capital	
Electives		
Complete 6 semester hours from the following:		6
FINA 6203	Investment Analysis	
FINA 6204	International Financial Management	
FINA 6205	Financial Strategy	
FINA 6207	Financial Modeling	
FINA 6211	Financial Risk Management	
FINA 6213	Investment Banking	
FINA 6214	Mergers and Acquisitions	
FINA 6215	Business Turnarounds	
FINA 6216	Valuation and Value Creation	
FINA 6217	Real Estate Finance and Investment	
FINA 6260	Entrepreneurial Finance and Venture Capital	
MECN 6200	Global Competition and Market Dominance	

CONCENTRATION IN INVESTMENTS

Code	Title	Hours
Required Core		
FINA 6203	Investment Analysis	3
FINA 6320	Advanced Financial Management	3
Electives		
Complete 6 semester hours from the following:		6
FINA 6204	International Financial Management	
FINA 6207	Financial Modeling	
FINA 6211	Financial Risk Management	
FINA 6212	Fixed Income Securities and Risk	
FINA 6213	Investment Banking	
FINA 6214	Mergers and Acquisitions	
FINA 6216	Valuation and Value Creation	
FINA 6217	Real Estate Finance and Investment	
FINA 6219	Portfolio Management	
FINA 6260	Entrepreneurial Finance and Venture Capital	
FINA 6360	Fund Management for Analysts	
FINA 6361	Fund Management for Managers	
MECN 6200	Global Competition and Market Dominance	

Electives

Code	Title	Hours
Experiential Requirement		
Complete 3 semester hours from the following:		3
BUSN 6351	Experiential Education	
BUSN 6945	Washington Campus Seminar	
INTB 6230	International Field Study	
INTB 6238	Global Project	
FINA 6360	Fund Management for Analysts	
FINA 6361	Fund Management for Managers	
Open Electives		
In consultation with advisor, complete 12 semester hours from the following:		12
ACCT, BUSN, ENTR, FINA, HRMG, INTB, MECN, MGMT, MKTG, SCHM, STRT, and TECE		
Interdisciplinary Requirement		
Complete 6 semester hours outside of D'Amore-Mckim School of Business; please consult program director for course options:		6
AACE 6000	Arts and Culture Organizational Leadership	
ARTG 5150	Information Visualization Principles and Practices	
ARTG 5151	Information Design Critique Seminar	
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 5600	Experience Design Studio 1: Principles	
ARTG 5610	Design Systems	
ARTG 5620	Notational Systems for Experience	
ARTG 5640	Prototyping for Experience Design	
ARTG 6110	Information Design Theory and Critical Thinking	
ARTG 6310	Design for Behavior and Experience	
ARTG 6330	Information Design Mapping Strategies	
BINF 6200	Bioinformatics Programming	
BINF 6308	Bioinformatics Computational Methods 1	
BINF 6309	Bioinformatics Computational Methods 2	

BIOT 5120	Foundations in Biotechnology
BIOT 5219	The Biotechnology Enterprise
BIOT 5400	Scientific Information Management for Biotechnology Managers
BIOT 5631	Cell Culture Processes for Biopharmaceutical Production
BIOT 6214	Experimental Design and Biostatistics
CS 5100	Foundations of Artificial Intelligence
CS 5200	Database Management Systems
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights
DS 5110	Introduction to Data Management and Processing
ECON 5140	Applied Econometrics
GE 5030	Iterative Product Prototyping for Engineers
GE 5100	Product Development for Engineers
GSND 5110	Game Design and Analysis
GSND 6320	Psychology of Play
GSND 6330	Player Experience
GSND 6340	Biometrics for Design
GSND 6350	Data-Driven Player Modeling
HINF 5101	Introduction to Health Informatics and Health Information Systems
HINF 5105	The American Healthcare System
HINF 6202	Business of Healthcare Informatics
HINF 6205	Creation and Application of Medical Knowledge
IE 5640	Data Mining for Engineering Applications
IE 6600	Computation and Visualization for Analytics
IE 7374	Special Topics in Industrial Engineering
JRNL 5311	Design for Storytelling
JRNL 5400	Media and Advocacy in Theory and Practice
JRNL 6305	Topics
JRNL 6340	Fundamentals of Digital Journalism
JRNL 6341	Telling Your Story with Data
INSH 5301	Introduction to Computational Statistics
INSH 5302	Information Design and Visual Analytics
ME 5645	Environmental Issues in Manufacturing and Product Use
PHIL 5001	Global Justice
PHIL 5005	Information Ethics
PHIL 5010	AI Ethics
PHTH 5232	Evaluating Healthcare Quality
PHTH 5234	Economic Perspectives on Health Policy
PPUA 6553	Nonprofit Financial Resource Development

Program Credit/GPA Requirements

67 total semester hours required

Minimum 3.000 GPA required

Dual Degrees

Northeastern University's D'Amore-McKim School of Business is known for its experience-powered educational model that fuses robust classroom education with real-world application. Our interdisciplinary dual-degree graduate programs are specifically designed for students whose interests and goals may span multiple academic disciplines or areas of expertise. Through our dual-degree programs, we develop leaders and thinkers by combining rigorous graduate coursework in business with a separate area of study that positions candidates to operate with equal facility in two different industries. Students will earn two degrees, one degree in business and one degree in another area.

Learn more about dual-degree programs on the D'Amore-McKim website (https://damore-mckim.northeastern.edu/programs/?s=&filters%5B%5D=program%7Ctype%7Ccombined-masters-degrees&filters%5B%5D=program%7Ctype%7Cdual-degrees&relation=OR).

Programs

- Law, JD / Accounting and Business Administration, MSAMBA (p. 97)
- Law, JD / Business Administration, MBA (p. 98)
- Law, LLM / Business Administration, MBA (p. 98)

Law, JD / Accounting and Business Administration, MSAMBA

The Northeastern University School of Law and the D'Amore-McKim School of Business offer a dual-degree pathway between the Juris Doctor and Master of Science in Accounting and Business Administration programs (https://www.northeastern.edu/graduate/program/jd-msa-mba-in-professional-accounting-14265/). Our robust program positions students without a previous accounting background to operate effectively in specialized fields such as taxation law, corporate finance, or mergers and acquisitions. Successful students will gain not only advanced legal expertise but the fundamental, yet future-forward accounting and business knowledge students need to succeed.

Our dual-degree program is a full-time, four-year course of study that includes multiple experience-driven learning opportunities, allowing students to gain valuable work experience in both legal and public accounting before they graduate. Students may have the opportunity to make a real impact during two co-ops in legal departments, law firms, government agencies, judges' chambers, or other legal settings. They'll also have the chance to perform independent work during the busy tax season as part of their corporate residency at a top accounting firm. Students will ordinarily complete two years of the law curriculum, followed by 15 months of the combined accounting and business administration curriculum, before returning to finish their studies in the law school.

Students pursuing the dual degree will be able to enroll in 12 semester hours from the accounting and business administration curriculum that will also count toward the law curriculum. The corporate residency at an accounting firm may fulfill the requirement for the third co-op required for the law curriculum. Students are encouraged to consult with their law advisor as they plan their course schedule.

All JD students, including FlexJD students, are ordinarily eligible to apply into dual degree pathways.

Law, JD / Business Administration, MBA

As new technologies disrupt industries and the availability and sophisticated use of data is shifting the business landscape, businesses need leaders equipped to guide corporate-level strategy. A partnership between the School of Law and the D'Amore-McKim School of Business, our JD/MBA (https://law.northeastern.edu/academics/programs/jd/dual-degrees/business-administration/) dual-degree program is a powerful combination that positions candidates to operate with equal facility in the increasingly interdependent legal and business spheres.

Our JD/MBA program is a full-time, four-year course of study that includes three semester-long co-op work experiences arranged through the law school co-op office. Starting in the fall term, you'll complete three years of law school, taking a break after either year one or year two to complete one year of business school.

Students will select two concentrations to complete their MBA coursework. Business concentrations include analytics, brand management, business management for healthcare, corporate finance, corporate innovation, entrepreneurship, international business, investments, leading people and organizations, marketing, marketing analytics, operations and supply chain management, and sustainability and business.

Students may also choose to develop a complementary skill set in a different industry area. Students may select one MBA concentration with courses offered through one of Northeastern University's other professional colleges, including Khoury College of Computer Sciences; College of Arts, Media and Design; College of Science; and College of Social Sciences and Humanities.

Students pursuing the two degrees concurrently will be able to count 9 semester hours from the JD curriculum toward the interdisciplinary and elective requirements of the MBA degree and up to 12 semester hours from the MBA curriculum toward the JD degree. Students should work with their MBA advisor in selecting JD courses that will fulfill MBA requirements and with their law advisor in selecting MBA courses that will fulfill JD requirements.

All JD students, including FlexJD students, are ordinarily eligible to apply into dual degree pathways.

Law, LLM / Business Administration, MBA

Law, LLM / MBA

In the global economy, lawyers increasingly need to harness both business and legal skills to serve their clients' needs. Through a partnership between the School of Law and the D'Amore-McKim School of Business, the LLM (Master of Laws)/MBA dual-degree program is designed to prepare students to assume leadership positions in which they will navigate complex legal issues, answering their clients' calls for legal expertise and engaging as partners to develop new models for businesses, nonprofit organizations, and governments worldwide.

The LLM/MBA program is a full-time, two-year course of study. Students will begin their studies fall semester in the business school, take law courses the following summer and fall, and finish with business courses.

Students will select two business concentrations to complete their MBA coursework. Business concentrations include analytics, brand management, business management for healthcare, corporate finance, corporate innovation, entrepreneurship, international business, investments, leading people and organizations, marketing, marketing analytics, operations and supply chain management, and sustainability and business.

Students may also choose to develop a complementary skill set in a different industry area. Students who pursue an MBA x concentration take courses from one of Northeastern University's other professional colleges, including Khoury College of Computer Sciences; the College of Arts, Media and Design; the College of Science; and the College of Social Sciences and Humanities.

By pursuing the two degrees concurrently, LLM/MBA students may be able to count up to 12 semester hours of coursework toward both degrees. Students should speak to their advisors in the MBA and LLM programs for more information.

Law, LLM—Experiential / MBA

In the global economy, lawyers increasingly need to harness both business and legal skills to serve their clients' needs. Through a partnership between the School of Law and the D'Amore-McKim School of Business, the LLM (Master of Laws)/MBA dual-degree program is designed to prepare students to assume leadership positions in which they will navigate complex legal issues, answering their clients' calls for legal expertise and engaging as partners to develop new models for businesses, nonprofit organizations, and governments worldwide.

The LLM/MBA program is a full-time, two-year course of study that includes one semester of co-op work experience at the intersection of law and business arranged through the law school. Students will begin their studies fall semester in the business school, take law courses the following summer and fall, complete their co-op, and finish with business courses the second summer.

Students will select two business concentrations to complete their MBA coursework. Business concentrations include analytics, brand management, business management for healthcare, corporate finance, corporate innovation, entrepreneurship, international business, investments, leading people and organizations, marketing, marketing analytics, operations and supply chain management, and sustainability and business.

Students may also choose to develop a complementary skill set in a different industry area. Students who pursue an MBA x concentration take courses from one of Northeastern University's other professional colleges, including Khoury College of Computer Sciences; the College of Arts, Media and Design; the College of Science; and the College of Social Sciences and Humanities.

By pursuing the two degrees concurrently, LLM/MBA students may be able to count up to 12 semester hours of coursework toward both degrees. Students should speak to their advisors in the MBA and LLM programs for more information.

Graduate Certificates

Business professionals are much like businesses themselves—as opportunities emerge and the marketplace evolves, their needs change. D'Amore-McKim's graduate certificates (https://damore-mckim.northeastern.edu/programs/?s=&filters%5B%5D=program%7Ctype%7Ccertificates) are a great way to quickly gain specialized business knowledge and a professional credential to help students meet their personal and career goals.

Pursuing a graduate certificate allows students to gain a small suite of skills in the desired focal area of business that best suits their interests.

In just four or five courses, they can develop the knowledge they need to help advance their current role or to pursue a new career opportunity.

Our graduate certificate programs require 12 to 15 semester hours for completion.

Programs

Accounting and Financial Decision Making, Graduate Certificate

Now more than ever, corporations need business leaders who can bring value to an organization through smart financial decisions. With a Graduate Certificate in Accounting and Financial Decision Making, (http://www.damore-mckim.northeastern.edu/academic-programs/certificates/accounting/?utm_medium=website&utm_source=catalog&utm_campaign=gcafdm) students have an opportunity to develop the skills they need to bring innovative solutions to complex business problems.

Program curriculum will cover essential business practices such as analyzing financial statements and identifying strategic implications in accounting data. From there, students will study how to utilize critical information in corporate financial reports to improve business decision making. The minimum required number of courses to earn a certificate is four; however, many students opt to take an additional elective in order to broaden their expertise.

The Graduate Certificate in Accounting and Financial Decision Making enrolls in January, May, and September. International students may enroll in May or September.

Program Requirements

Core Requirements

Code	Title	Hours
ACCT 6200 and ACCT 6201	Financial Reporting and Managerial Decision Making 1 and Financial Reporting and Managerial Decision Making 2	4.5
FINA 6219	Portfolio Management	3
MGSC 6200	Information Analysis	3

Elective

Code	Title	Hours
Complete one of the following:		1.5-3
MGSC 6204	Managing Information Resources	
Any MBA core course titled 6200 (see below):		
ENTR 6200	Enterprise Growth and Innovation	
HRMG 6200	Managing People and Organizations	
INTB 6200	Managing the Global Enterprise	
MKTG 6200	Creating and Sustaining Customer Markets	
MECN 6200	Global Competition and Market Dominance	
STRT 6200	Strategic Decision Making in a Changing Environment	

Program Credit/GPA Requirements

12 total semester hours required, may complete a maximum of 15 semester hours
Minimum 3.000 GPA required

Accounting and Financial Decision Making, Graduate Certificate—Online

Now more than ever, corporations need business leaders who can bring value to an organization through smart financial decisions. An Online Graduate Certificate in Accounting and Financial Decision Making (http://www.damore-mckim.northeastern.edu/academic-programs/certificates/accounting/?utm_medium=website&utm_source=catalog&utm_campaign=gcafdm) is designed to help students develop the skills they need to bring innovative solutions to complex business problems.

Students will take five courses (12 semester hours), which explore a range of topics such as financial risk management, value creation, and information analysis.

The Online Graduate Certificate in Accounting and Financial Decision Making enrolls six times throughout the year.

Program Requirements

Core Requirements

Code	Title	Hours
ACCT 6272	Financial Statement Preparation and Analysis	2.25
ACCT 6273	Identifying Strategic Implications in Accounting Data	2.25
FINA 6200	Value Creation through Financial Decision Making	3

MGSC 6200	Information Analysis	3
MGSC 6204	Managing Information Resources	1.5

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

Brand Management, Graduate Certificate

With a Graduate Certificate in Brand Management from the D'Amore-McKim School of Business, students will broaden their understanding of how to develop a successful branding and advertising strategy in today's digital economy. In just four or five courses, students will build strategic and creative thinking skills to help create, manage, and implement a cross-platform brand communication strategy focused on the consumer experience and driving customer retention.

In this program, students will focus on translating the analysis of customer needs and competitor capabilities into an integrated and differentiated communications plan targeted toward the company's key audience(s) and demographics. Elective coursework may explore best practices in brand management in a variety of topic areas, such as consumer behavior, advertising, new product development, marketing analytics, project management, demand planning and forecasting, and product innovation.

Students will take two required courses and either two or three elective courses. The minimum required number of courses to earn a certificate is four; however, many students opt to take an additional elective in order to broaden their expertise.

Our Graduate Certificate in Brand Management enrolls in January and September.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
MKTG 6200	Creating and Sustaining Customer Markets	3
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	3

Electives

Code	Title	Hours
Complete 6 semester hours from the following:		6
MKTG 6210	Marketing Research	
MKTG 6214	New Product Development	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6226	Consumer Behavior	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	

Program Credit/GPA Requirements

12 total semester hours required, may take a maximum of 15 semester hours

Minimum 3.000 GPA required

Business Administration, Graduate Certificate

To succeed in this time of corporate digital transformation, professionals need a redefined set of skills that fully meet the moment. D'Amore-McKim's Graduate Certificate in Business Administration (http://www.damore-mckim.northeastern.edu/academic-programs/certificates/business-administration/?utm_medium=website&utm_source=catalog&utm_campaign=gcba) is designed to prepare students to become strategic thinkers, managers, or leaders with the human-centered technology, data, and entrepreneurial skills needed for the future of work.

This program consists of four to six graduate-level courses (12–15 credits). Students can gain this specialized knowledge in one of four ways:

Part-time MBA Path

The Part-Time MBA path (https://damore-mckim.northeastern.edu/programs/business-administration-certificate/academic-details/part-time-mba-path-curriculum/) consists of six foundational courses (15 credits) from our Part-Time MBA curriculum. These master's-level courses focus on finance and management, laying a foundation of business knowledge that students can draw on right away. Students will build a fundamental base of quantitative skills while forging a clear path toward their long-term goals.

Build Your Own Curriculum

There are no required courses in this completely customizable format (https://damore-mckim.northeastern.edu/programs/business-administration-certificate/academic-details/build-your-own-curriculum/). Students can select four or five classes from our extensive list of graduate business courses, personalizing their program to get exactly the content they need. Among our list of course offerings, students will find courses that are most relevant to business professionals in any market. Dive deep into a particular topic area, such as marketing, supply chain, or entrepreneurship, or take an eclectic mix of courses from across disciplines.

Accelerated Four-Month Curriculum

Our four-month certificate (http://www.damore-mckim.northeastern.edu/academic-programs/certificates/business-administration/academics/accelerated/?utm_medium=website&utm_source=catalog&utm_campaign=gcba) offers a full-time intensive period of learning and a quick path to a valuable credential. Students can select any courses that are available during the semester, from accounting and management to entrepreneurship and innovation. International students returning to their home country may be able to transfer credits back to their degree programs.

Program Requirements

Part-Time MBA Path

Code	Title	Hours
ACCT 6200	Financial Reporting and Managerial Decision Making 1	3
ACCT 6201	Financial Reporting and Managerial Decision Making 2	1.5
FINA 6200	Value Creation through Financial Decision Making	3
HRMG 6200	Managing People and Organizations	3

MGSC 6200	Information Analysis	3
MGSC 6204	Managing Information Resources	1.5

Eight-Month International Student Cohort

Code	Title	Hours
ACCT 6200	Financial Reporting and Managerial Decision Making 1	3
ENTR 6200	Enterprise Growth and Innovation	3
HRMG 6200	Managing People and Organizations	3
INTB 6200	Managing the Global Enterprise	3
MKTG 6200	Creating and Sustaining Customer Markets	3

Build Your Own Curriculum

Code	Title	Hours
In consultation with advisor, complete 12–15 credits in the following subject areas:		
ACCT, BUSN, ENTR, FINA, HRMG, INTB, MECN, MGMT, MKTG, SCHM, STRT, and TECE		

Accelerated Four-Month Curriculum

Code	Title	Hours
In consultation with advisor, complete 12–15 credits in the following subject areas:		
ACCT, BUSN, ENTR, FINA, HRMG, INTB, MECN, MGMT, MKTG, SCHM, STRT, and TECE		

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

Business Administration, Graduate Certificate—Online

To succeed in this time of corporate digital transformation, professionals need a redefined set of skills that fully meet the moment. D'Amore-McKim's Online Graduate Certificate in Business Administration (http://www.damore-mckim.northeastern.edu/academic-programs/certificates/business-administration/?utm_medium=website&utm_source=catalog&utm_campaign=gcba) is designed to prepare students to become strategic thinkers, managers, or leaders with the human-centered technology, data, and entrepreneurial skills needed for the future of work.

In this program, students will complete a total of 12 semester hours, choosing the courses that best fit their interests and goals. Among our list of course offerings, students will find a diverse selection of foundational business courses, from accounting and finance to strategy and management.

Our Online Graduate Certificate in Business Administration enrolls six times throughout the year.

Program Requirements

Core Requirements

Code	Title	Hours
Complete 12 semester hours from the following:		12
ACCT 6272	Financial Statement Preparation and Analysis	
ACCT 6273	Identifying Strategic Implications in Accounting Data	
ENTR 6200	Enterprise Growth and Innovation	
ENTR 6210	Managing Operations in Early Stage Ventures	
ENTR 6211	Entrepreneurship: Services and Retail Business Creation	
ENTR 6212	Business Planning for New Ventures	
ENTR 6216	Global Social Entrepreneurship and Innovation	
FINA 6200	Value Creation through Financial Decision Making	
FINA 6203	Investment Analysis	
FINA 6204	International Financial Management	
FINA 6205	Financial Strategy	
FINA 6211	Financial Risk Management	
FINA 6213	Investment Banking	
FINA 6214	Mergers and Acquisitions	
FINA 6215	Business Turnarounds	
FINA 6216	Valuation and Value Creation	
FINA 6217	Real Estate Finance and Investment	
HRMG 6200	Managing People and Organizations	
HRMG 6217	Virtual, Vicious Teams: Building and Leading High-Performance Teams	
INTB 6200	Managing the Global Enterprise	
INTB 6212	Cultural Aspects of International Business	
INTB 6217	Creating Sustainable Competitive Advantage through Global Innovation	
MECN 6200	Global Competition and Market Dominance	
MECN 6205	Sustainability and the Economics of Markets	
MGMT 6222	Healthcare Industry	
MGMT 6223	Strategic Decision Making for Healthcare Professionals	
MGMT 6225	Sustainability and Leadership	
MGMT 6226	Sustainability and the Business Environment	
MGSC 6200	Information Analysis	
MGSC 6204	Managing Information Resources	
MGSC 6221	Introduction to Health Informatics and Health Information Systems	
MKTG 6200	Creating and Sustaining Customer Markets	
MKTG 6210	Marketing Research	
MKTG 6212	International Marketing	
MKTG 6214	New Product Development	
MKTG 6216	Market Focused Strategy	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6223	Brand and Advertising Management	
SCHM 6201	Operations and Supply Chain Management	
SCHM 6211	Logistics and Transportation Management	
MKTG 6212	International Marketing	
SCHM 6213	Global Supply Chain Strategy	

SCHM 6214	Sourcing and Procurement
SCHM 6221	Sustainability and Supply Chain Management

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

Business Analytics, Graduate Certificate

A Graduate Certificate in Business Analytics is designed to equip students to recognize and respond to potential challenges and make strategic decisions during times of uncertainty. In just four or five courses, students have an opportunity to build proficiencies in analytics and develop the skills to turn data into smart strategy.

Coursework will explore various data mining techniques and visual dashboards, as students analyze business applications of artificial intelligence and machine learning. Students will discuss these concepts with faculty and fellow students in the context of real business cases. Students will use analytics tools that may include Python, R programming, SPSS, SQL, and Tableau.

Students will take one required course and either three or four elective courses. The minimum required number of courses to earn a certificate is four; however, many students opt to take an additional elective in order to broaden their expertise.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
MISM 6200	Introduction to Business Analytics	3

Electives

Code	Title	Hours
Complete 9 semester hours from the following:		9
MISM 6202	Foundations of Data Analysis for Business	
MISM 6203	Business Analytics Methods	
MISM 6210	Information Visuals and Dashboards for Business	
MISM 6212	Data Mining and Machine Learning for Business	
MISM 6213	Business Information Design, Quality, and Strategy	
MISM 6214	Business Analytics Capstone	
SCHM 6215	Supply Chain Analytics	

Program Credit/GPA Requirements

12 total semester hours required, may take a maximum of 15 semester hours

Minimum 3.000 GPA required

Business Management for Healthcare, Graduate Certificate

Today's healthcare industry is particularly complex due to competing economic, ethical, and practical issues. With a Graduate Certificate in Business Management for Healthcare (http://www.damore-mckim.northeastern.edu/academic-programs/certificates/healthcare/?utm_medium=website&utm_source=catalog&utm_campaign=gchap) from D'Amore-McKim, successful students will enhance their business acumen as it relates to health organization management and develop the skills to confidently navigate an industry in flux.

In just four or five courses, students will gain industry know-how and agility, as well as the confidence to face uncertain and high-demanding environments with success. Coursework will look at the impact of global economics on the American healthcare system and may also dive deeper into evaluating the quality of provider care in today's economy.

Students will take three required courses and either one or two more elective courses. The minimum required number of courses to earn a graduate certificate is four; however, many students opt to take an additional elective in order to broaden their expertise.

Our Graduate Certificate in Business Management for Healthcare enrolls in January and September.

Program Requirements

Core Requirements

Code	Title	Hours
HINF 5105	The American Healthcare System	3
HRMG 6220	Health Organization Management	3
STRT 6220	Strategic Management for Healthcare Organizations	3

Electives

Code	Title	Hours
Complete 3 semester hours from the following:		3
HINF 5101	Introduction to Health Informatics and Health Information Systems	
PHTH 5232	Evaluating Healthcare Quality	
PHTH 5234	Economic Perspectives on Health Policy	
SCHM 6223	Managing Healthcare Supply Chain Operations	

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

Corporate Finance, Graduate Certificate

As corporations increasingly become more international, it is important to look at business with a global lens. With a Graduate Certificate in Corporate Finance (http://www.damore-mckim.northeastern.edu/academic-programs/certificates/corporate-finance/?utm_medium=website&utm_source=catalog&utm_campaign=gccf) from D'Amore-McKim, students will develop core financial knowledge through the study of global markets.

This program focuses on financial strategy as well as ethical and legal considerations of corporations. In just four or five courses, students will build their strategic understanding of how companies finance creation, growth, and the acquisition or disposal of businesses.

Students will take one required course and either three or four elective courses. The minimum required number of courses to earn your

certificate is four; however, many students take an additional elective in order to broaden their expertise.

The Graduate Certificate in Corporate Finance enrolls three times per year, in January, May, and September.

Program Requirements

Core Requirement

Code	Title	Hours
FINA 6205	Financial Strategy	3

Electives

Code	Title	Hours
Complete 9 semester hours from the following:		9
FINA 6204	International Financial Management	
FINA 6213	Investment Banking	
FINA 6214	Mergers and Acquisitions	
FINA 6215	Business Turnarounds	
FINA 6216	Valuation and Value Creation	
FINA 6260	Entrepreneurial Finance and Venture Capital	
Any MBA core course numbered 6200 (see below):		
ACCT 6200	Financial Reporting and Managerial Decision Making 1	
HRMG 6200	Managing People and Organizations	
INTB 6200	Managing the Global Enterprise	
MKTG 6200	Creating and Sustaining Customer Markets	
MECN 6200	Global Competition and Market Dominance	
STRT 6200	Strategic Decision Making in a Changing Environment	

Program Credit/GPA Requirements

12 semester hours required, may complete a maximum of 15 semester hours
Minimum 3.000 GPA required

Corporate Finance, Graduate Certificate—Online

As corporations increasingly become more international, it is important to look at business with a global lens. With an Online Graduate Certificate in Corporate Finance (https://damore-mckim.northeastern.edu/programs/corporate-finance-certificate/?utm_medium=website&utm_source=catalog&utm_campaign=gccf) from D'Amore-McKim, students have an opportunity to develop core financial knowledge through the study of global markets.

This program focuses on financial strategy as well as ethical and legal considerations of corporations. Students will build their strategic understanding of how companies finance creation, growth, and the acquisition or disposal of businesses.

Students will take two required courses (6 semester hours) and complete an additional 6 elective semester hours.

The Online Graduate Certificate in Corporate Finance enrolls six times throughout the year.

Program Requirements

Core Requirements

Code	Title	Hours
FINA 6200	Value Creation through Financial Decision Making	3
FINA 6205	Financial Strategy	3

Electives

Code	Title	Hours
Complete 6 semester hours from the following:		6
FINA 6204	International Financial Management	
FINA 6213	Investment Banking	
FINA 6214	Mergers and Acquisitions	
FINA 6215	Business Turnarounds	
FINA 6216	Valuation and Value Creation	

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

Corporate Innovation, Graduate Certificate

Now more than ever, employers are seeking individuals with an entrepreneurial mindset who can utilize critical thinking and seek continuous improvement by bringing new ideas to life. D'Amore-McKim's Graduate Certificate in Corporate Innovation (http://www.damore-mckim.northeastern.edu/academic-programs/certificates/innovation-management/?utm_medium=website&utm_source=catalog&utm_campaign=gcim) is designed to prepare students to become creative thought leaders who can introduce out-of-the-box thinking as a concrete strategy within a business.

In just four or five courses, students will discover how to expand boundaries through creative thinking and secure a seat at their organization's decision-making table. Through case studies and project work, this specialized program will help students build the foundational business knowledge required to commercialize theories or new products.

Students will take one required course and either three or four elective courses. The minimum required number of courses to earn your certificate is four; however, many students opt to take an additional elective in order to broaden their expertise.

The Graduate Certificate in Corporate Innovation enrolls in January, May, and September.

Program Requirements

Core Requirement

Code	Title	Hours
ENTR 6200	Enterprise Growth and Innovation	3

Electives

Code	Title	Hours
Complete 9 semester hours from the following:		9
ENTR 6212	Business Planning for New Ventures	
ENTR 6217	Lean Innovation	
ENTR 6220	Family Business Leadership and Governance	

ENTR 6222	Competing in Dynamic, Innovation-Driven Markets
ENTR 6224	Intellectual Property and Other Legal Aspects of Business and Innovation
ENTR 6225	Acquisitions, Alliances, and Growth
GE 5100	Product Development for Engineers
HRMG 6212	Creating an Innovative Organization
HRMG 6280	The Human Side of Innovation
MGMT 6210	Law for Managers and Entrepreneurs
MGMT 6280	Innovation for Next-Generation Products and Systems
MKTG 6214	New Product Development
TECE 6300	Managing a Technology-Based Business
TECE 6340	The Technical Entrepreneur as Leader

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

Corporate Renewal, Graduate Certificate

Understanding turnaround management is a unique skill set that is in high demand in this evolving business environment. With D'Amore-McKim's Graduate Certificate in Corporate Renewal (http://www.damore-mckim.northeastern.edu/academic-programs/certificates/corporate-renewal/?utm_medium=website&utm_source=catalog&utm_campaign=gccr), students will have an opportunity to learn the analysis and planning required to help struggling corporations transform their current setbacks into future success.

This program focuses on the approaches to turning around troubled companies: their workouts, bankruptcies, and liquidations. Through elective offerings, students may have the opportunity to explore the fundamentals of new product development and learn how to leverage corporate assets and equity to advance organizational infrastructures.

Students will take three required courses and either one or two elective courses. The minimum required number of courses to earn your certificate is four; however, many students opt to take an additional elective in order to broaden their expertise.

The Graduate Certificate in Corporate Renewal enrolls in January, May, and September. International students may enroll in May or September.

Program Requirements

Core Requirements

Code	Title	Hours
FINA 6200	Value Creation through Financial Decision Making	3
HRMG 6200	Managing People and Organizations	3
MKTG 6200	Creating and Sustaining Customer Markets	3

Electives

Code	Title	Hours
Complete 3 semester hours from the following:		3
ENTR 6214	Social Enterprise	
FINA 6216	Valuation and Value Creation	
HRMG 6212	Creating an Innovative Organization	
HRMG 6218	Great Companies	
HRMG 6223	Global Talent Management	
MGMT 6214	Negotiations	
MKTG 6214	New Product Development	
MKTG 6216	Market Focused Strategy	

Program Credit/GPA Requirements

12 total semester hours required, may complete a maximum of 15 semester hours
Minimum 3.000 GPA required

Corporate Renewal, Graduate Certificate—Online

Understanding turnaround management is a unique skill set that is in high demand in this evolving business environment. With D'Amore-McKim's Online Graduate Certificate in Corporate Renewal (http://www.damore-mckim.northeastern.edu/academic-programs/certificates/corporate-renewal/?utm_medium=website&utm_source=catalog&utm_campaign=gccr), successful students will learn the analysis and planning required to help struggling corporations transform their current setbacks into future success.

This program explores how to create value in a competitive, global environment through successful financial management. Through elective offerings, students may also explore the fundamentals of new product development or defining and managing product market strategy.

Students will complete two required courses and select an additional two electives (12 semester hours).

The Online Graduate Certificate in Corporate Renewal enrolls six times throughout the year.

Program Requirements

Core Requirements

Code	Title	Hours
Complete 6 semester hours from the following:		6
FINA 6200	Value Creation through Financial Decision Making	
MKTG 6200	Creating and Sustaining Customer Markets	
HRMG 6200	Managing People and Organizations	

Electives

Code	Title	Hours
Complete 6 semester hours from the following:		6
FINA 6215	Business Turnarounds	
FINA 6216	Valuation and Value Creation	
MKTG 6214	New Product Development	
MKTG 6216	Market Focused Strategy	

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

Entrepreneurship, Graduate Certificate

In today's evolving business world, professionals need the knowledge and skills to capitalize upon breakthrough opportunities. At the D'Amore-McKim School of Business, we encourage graduate students from all over the world to explore their drive for innovation and invention through a Graduate Certificate in Entrepreneurship (http://www.damore-mckim.northeastern.edu/academic-programs/certificates/technological-entrepreneurship/?utm_medium=website&utm_source=catalog&utm_campaign=gcte). In this program, students will have the opportunity to build the foundational business knowledge needed to bring their entrepreneurial ideas from concept to concrete.

In just four or five courses, students will explore how to bring their innovative ideas to the next level and become agents of change as part of the next generation of innovators. Coursework may explore a range of topics including technology-driven transformation, new product development processes, managing venture growth, new business models, and dynamic competition.

Students will take two required courses and either two or three elective courses. The minimum required number of courses to earn your certificate is four; however, many students opt to take an additional elective in order to broaden their expertise.

The Graduate Certificate in Entrepreneurship enrolls in January, May, and September.

Program Requirements

Core Requirement

Code	Title	Hours
ENTR 6200	Enterprise Growth and Innovation	3

Electives

Code	Title	Hours
Complete 9 semester hours from the following:		9
ENTR 6210	Managing Operations in Early Stage Ventures	
ENTR 6212	Business Planning for New Ventures	
ENTR 6214	Social Enterprise	
ENTR 6218	Business Model Design and Innovation	
ENTR 6219	Financing Ventures from Early Stage to Exit	
ENTR 6220	Family Business Leadership and Governance	
FINA 6260	Entrepreneurial Finance and Venture Capital	
GE 5030	Iterative Product Prototyping for Engineers	
TECE 6222	Emerging and Disruptive Technologies	
TECE 6230	Entrepreneurial Marketing and Selling	
TECE 6250	Lean Design and Development	
TECE 6300	Managing a Technology-Based Business	

Program Credit/GPA Requirements

12 total semester hours required but may take a maximum of 15 semester hours
Minimum 3.000 GPA required

International Business, Graduate Certificate

As globalization and technological advancement continue to affect organizations worldwide, it has never been more important to hire professionals who possess the cultural agility to operate effectively around the world. With a Graduate Certificate in International Business (http://www.damore-mckim.northeastern.edu/academic-programs/certificates/international-business/?utm_medium=website&utm_source=catalog&utm_campaign=gcib) from D'Amore-McKim School of Business, students have an opportunity to gain the skills to confidently and successfully work in cross-cultural and international environments.

In just four or five courses, students will encounter the fundamentals of making business decisions on a global scale. Coursework will delve into the driving forces behind today's global business landscape as students enhance their expertise in emerging markets. Electives may explore a range of topics such as finance, marketing, operations, economics, and strategy.

Students will take two required courses and select an additional two or three electives. The minimum required number of courses to earn a certificate is four; however, many students opt to take an additional elective in order to broaden their expertise.

The Graduate Certificate in International Business enrolls three times per year, in January, May, and September.

Program Requirements

Core Requirements

Code	Title	Hours
INTB 6200	Managing the Global Enterprise	3
INTB 6212	Cultural Aspects of International Business	3

Electives

Code	Title	Hours
Complete 6 semester hours from the following:		6
ENTR 6200	Enterprise Growth and Innovation	
FINA 6204	International Financial Management	
INTB 6226	Becoming a Global Leader	
INTB 6230	International Field Study	
INTB 6249	Digitization of International Business	
MECN 6200	Global Competition and Market Dominance	
MKTG 6212	International Marketing	
SCHM 6213	Global Supply Chain Strategy	

Program Credit/GPA Requirements

12 total semester hours required, may take a maximum of 15 semester hours
Minimum 3.000 GPA required

International Business, Graduate Certificate—Online

As globalization and technological advancement continue to affect organizations worldwide, it has never been more important to hire professionals who possess the cultural agility to operate

effectively around the world. With an Online Graduate Certificate in International Business (http://www.damore-mckim.northeastern.edu/academic-programs/certificates/international-business/?utm_medium=website&utm_source=catalog&utm_campaign=gcib) from D'Amore-McKim School of Business, students have an opportunity to gain the skills to confidently and successfully work in cross-cultural and international environments.

Course offerings explore a range of topics such as finance, marketing, operations, economics, and strategy, all through a global lens. Students will analyze why companies internationalize their operations as well as the strategies to do so, in addition to studying key areas of international business operations. They will take two required courses and select an additional two electives (12 semester hours).

Our Online Graduate Certificate in International Business enrolls six times throughout the year.

Program Requirements

Core Requirements

Code	Title	Hours
INTB 6200	Managing the Global Enterprise	3
INTB 6212	Cultural Aspects of International Business	3

Electives

Code	Title	Hours
Complete 6 semester hours from the following:		6
ENTR 6200	Enterprise Growth and Innovation	
FINA 6204	International Financial Management	
MECN 6200	Global Competition and Market Dominance	
MKTG 6212	International Marketing	
SCHM 6213	Global Supply Chain Strategy	

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

Investments, Graduate Certificate

Making sound investment decisions requires skilled individuals with investment knowledge and experience. With D'Amore-McKim's Graduate Certificate in Investments (http://www.damore-mckim.northeastern.edu/academic-programs/certificates/investments/?utm_medium=website&utm_source=catalog&utm_campaign=gci), successful students will develop sound strategies to tackle real-world financial challenges in both domestic and international markets.

In just four or five courses, students will enhance their acumen with cutting-edge theory and quantitative tools that drive today's global financial market. Students will analyze concepts such as market efficiency and intrinsic value and risk as they learn how to build unique valuation models to suit particular investment alternatives.

Students will take one required course and either three or four elective courses. The minimum required number of courses to earn a certificate is four; however, many students take an additional elective in order to broaden their expertise.

The Graduate Certificate in Investments enrolls in January, May, and September.

Program Requirements

Core Requirement

Code	Title	Hours
FINA 6203	Investment Analysis	3

Electives

Code	Title	Hours
Complete 9 semester hours from the following:		9
FINA 6211	Financial Risk Management	
FINA 6212	Fixed Income Securities and Risk	
FINA 6213	Investment Banking	
FINA 6217	Real Estate Finance and Investment	
FINA 6219	Portfolio Management	
Any MBA core course numbered 6200 (see below):		
ACCT 6200	Financial Reporting and Managerial Decision Making 1	
HRMG 6200	Managing People and Organizations	
INTB 6200	Managing the Global Enterprise	
MECN 6200	Global Competition and Market Dominance	
MKTG 6200	Creating and Sustaining Customer Markets	
STRT 6200	Strategic Decision Making in a Changing Environment	

Program Credit/GPA Requirements

12 total semester hours required, may take a maximum of 15 semester hours
Minimum 3.000 GPA required

Leading People and Organizations, Graduate Certificate

As our world continues to change and grow, new business leaders are emerging with the skills and insight to push the forefront of workforce management. With a Graduate Certificate in Leading People and Organizations (http://www.damore-mckim.northeastern.edu/academic-programs/certificates/leadership/?utm_medium=website&utm_source=catalog&utm_campaign=gclhc), students will enhance their ability to develop, manage, and lead high-performance teams within the context of a positive company culture.

In just four or five courses, students will broaden their understanding of key components to manage up, down, and across an organization and deepen relationships with clients, suppliers, and stakeholders. Curriculum will explore ways to improve managerial and leadership effectiveness through diagnosing and influencing workplace behavior.

Students will take one required course and either three or four elective courses. The minimum required number of courses to earn a certificate is four; however, many students opt to take an additional elective in order to broaden their expertise.

The Graduate Certificate in Leading People and Organizations enrolls in January, May, and September.

Program Requirements

Core Requirement

Code	Title	Hours
HRMG 6200	Managing People and Organizations	3

Electives

Code	Title	Hours
Complete 9 semester hours from the following:		9
HRMG 6212	Creating an Innovative Organization	
HRMG 6218	Great Companies	
HRMG 6220	Health Organization Management	
HRMG 6223	Global Talent Management	
MGMT 6214	Negotiations	
STRT 6210	Workforce Metrics and Analytics	

Program Credit/GPA Requirements

12 semester hours required, may take a maximum of 15 semester hours
Minimum 3.000 GPA required

Marketing, Graduate Certificate

Thanks to the rise of digital media, the dynamic field of marketing is constantly moving. To stay on top of trends and seize new opportunities, modern marketers need up-to-the-moment skills and knowledge. With a Graduate Certificate in Marketing (http://www.damore-mckim.northeastern.edu/academic-programs/certificates/marketing/?utm_medium=website&utm_source=catalog&utm_campaign=gcm) from the D'Amore-McKim School of Business, students will better understand how technology continues to transform the field of marketing and learn how to leverage those digital tools to effectively communicate with consumers.

In just four of five courses, students will learn how to build connections with customers and leverage digital marketing tools to deliver valuable content via an innovative consumer-centric marketing plan. Students will also gain the core knowledge and skills necessary to carry out essential marketing functions—from branding new products to advertising services and exploring new consumer audiences.

Students will take one required course and either three or four elective courses. The minimum required number of courses to earn a certificate is four; however, many students opt to take an additional elective in order to broaden their expertise.

The Graduate Certificate in Marketing enrolls in January, May, and September. International students may enroll in January.

Program Requirements

Core Requirement

Code	Title	Hours
MKTG 6200	Creating and Sustaining Customer Markets	3

Electives

Code	Title	Hours
Complete 9 semester hours from the following:		9
MKTG 6210	Marketing Research	
MKTG 6212	International Marketing	
MKTG 6214	New Product Development	
MKTG 6216	Market Focused Strategy	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6222	Digital Marketing	
MKTG 6223	Brand and Advertising Management	
MKTG 6224	B2B and Strategic Sales	
MKTG 6226	Consumer Behavior	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	
MKTG 6234	Marketing Analytics	
MKTG 6260	Special Topics in Marketing	

Program Credit/GPA Requirements

12 total semester hours required, may take a maximum of 15 semester hours
Minimum 3.000 GPA required

Marketing, Graduate Certificate—Online

Thanks to the rise of digital media, the dynamic field of marketing is constantly moving. To stay on top of trends and seize new opportunities, modern marketers need up-to-the-moment skills and knowledge. With an Online Graduate Certificate in Marketing (http://www.damore-mckim.northeastern.edu/academic-programs/certificates/marketing/?utm_medium=website&utm_source=catalog&utm_campaign=gcm) from the D'Amore-McKim School of Business, successful students will better understand how technology continues to transform the field of marketing and learn how to leverage those digital tools to effectively communicate with consumers.

In this program, students have an opportunity to learn how to build connections with customers and leverage digital marketing tools to deliver valuable content via an innovative consumer-centric marketing plan. Students will also gain the core knowledge and skills necessary to carry out essential marketing functions—from branding new products to advertising services and exploring new consumer audiences.

Students will take one required course (3 semester hours) and complete an additional 9 semester hours in their electives.

Our Online Graduate Certificate in Marketing enrolls six times throughout the year.

Program Requirements

Core Requirement

Code	Title	Hours
MKTG 6200	Creating and Sustaining Customer Markets	3

Electives

Code	Title	Hours
Complete 9 semester hours from the following:		9
MKTG 6212	International Marketing	
MKTG 6214	New Product Development	
MKTG 6216	Market Focused Strategy	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6223	Brand and Advertising Management	

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

Marketing Analytics, Graduate Certificate

A Graduate Certificate in Marketing Analytics (https://damore-mckim.northeastern.edu/programs/marketing-analytics-certificate/?utm_medium=website&utm_source=catalog&utm_campaign=gcma) is designed to prepare students to grow as modern marketers in today's techcentric business world. In just four or five courses, successful students will build proficiencies in predictive analytics and develop the skills to turn data into smart marketing strategy.

This program curriculum focuses on evidence-based marketing strategy and planning, highlighting the importance of using an analytical approach to support marketing decision making. Core coursework explores how companies capture, process, and analyze large amounts of data to make business decisions, to solve problems, and to improve marketing efforts. Elective offerings may examine the latest trends in technology and new media and how to deliver value to the customer using the latest technological innovations.

Students will take two required courses and either two or three elective courses. The minimum required number of courses to earn a certificate is four; however, many students take an additional elective in order to broaden their expertise.

Our Graduate Certificate in Marketing Analytics enrolls in January, May, and September.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
MKTG 6200	Creating and Sustaining Customer Markets	3
MKTG 6234	Marketing Analytics	3

Electives

Code	Title	Hours
Complete 6 semester hours from the following:		6
MKTG 6210	Marketing Research	
MKTG 6216	Market Focused Strategy	
MKTG 6222	Digital Marketing	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	

Program Credit/GPA Requirements

12 total semester hours required; may take a maximum of 15 semester hours

Minimum 3.000 GPA required

Mutual Fund Management, Graduate Certificate

Professionals with the knowledge and experience to build and maintain a portfolio of assets to accomplish the long-term aims of the mutual fund are highly valued across the globe. With a Graduate Certificate in Mutual Fund Management (http://www.damore-mckim.northeastern.edu/academic-programs/certificates/mutual-fund-management/?utm_medium=website&utm_source=catalog&utm_campaign=gcmfm) from the D'Amore-McKim School of Business, students will prepare to lead this field with the technical skills of an investor and the appreciation for how markets and organizations function across economies.

In just four or five courses, students will further their analytical knowledge and lay the groundwork to perform managerial tasks related to the management and operations of mutual funds. With a deep emphasis on analysis and quantitative methods, your coursework is designed to teach you how to use financial management to create value in a competitive and changing global environment.

Students will take one required course and either three or four elective courses. The minimum required number of courses to earn a certificate is four; however, many students opt to take an additional elective in order to broaden their expertise.

The Graduate Certificate in Mutual Fund Management enrolls in January, May, and September.

Program Requirements

Core Requirements

Code	Title	Hours
Complete 9 semester hours from the following:		9
FINA 6202	Analysis of Financial Institutions and Markets	
FINA 6203	Investment Analysis	
FINA 6212	Fixed Income Securities and Risk	
FINA 6219	Portfolio Management	
FINA 6360	Fund Management for Analysts (Complete 3 semester hours through our student managed mutual fund. Each course is 1 semester hour and may be taken multiple times.)	

Electives

Code	Title	Hours
Complete 3 semester hours from the following:		3
FINA 6202	Analysis of Financial Institutions and Markets	
FINA 6203	Investment Analysis	
FINA 6211	Financial Risk Management	
FINA 6212	Fixed Income Securities and Risk	
FINA 6213	Investment Banking	
FINA 6217	Real Estate Finance and Investment	
FINA 6219	Portfolio Management	
FINA 6360	Fund Management for Analysts (Complete 3 semester hours through our student managed mutual fund. Each course is 1 semester hour and may be taken multiple times.)	

Program Credit/GPA Requirements

12 total semester hours required, may take a maximum of 15 semester hours
Minimum 3.000 GPA required

Supply Chain Management, Graduate Certificate

As advances in information technology continue to reshape manufacturing, transportation, inventory control, and customer relationships, supply chain management has become more important in business than ever. A Graduate Certificate in Supply Chain Management (http://www.damore-mckim.northeastern.edu/academic-programs/certificates/supply-chain-management/?utm_medium=website&utm_source=catalog&utm_campaign=gcscm) from D'Amore-McKim is designed to prepare students for the future of work where companies achieve market differentiation through effective supply chain management.

In just four or five courses, students will gain valuable insights that will help you overcome real-world supply chain challenges and keep pace in a rapidly evolving field. Curriculum centers around forward-thinking business practices—understanding the most reliable, cost-effective ways to source materials, assemble products, manage inventory, and deliver products.

Students will take two required courses and either two or three elective courses. The minimum required number of courses to earn a certificate is four; however, many students opt to take an additional elective in order to broaden their expertise.

The Graduate Certificate in Supply Chain Management enrolls in January, May, and September.

Program Requirements

Core Requirements

Code	Title	Hours
SCHM 6201	Operations and Supply Chain Management	3
SCHM 6213	Global Supply Chain Strategy	3

Electives

Code	Title	Hours
Complete 6 semester hours from the following:		6
SCHM 6211	Logistics and Transportation Management	
SCHM 6212	Executive Roundtable in Supply Chain Management	
SCHM 6214	Sourcing and Procurement	
SCHM 6215	Supply Chain Analytics	
SCHM 6221	Sustainability and Supply Chain Management	
SCHM 6223	Managing Healthcare Supply Chain Operations	
SCHM 6224	Demand Planning and Forecasting	

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

Supply Chain Management, Graduate Certificate—Online

As advances in information technology continue to reshape manufacturing, transportation, inventory control, and customer relationships, supply chain management has become more important in business than ever. An Online Graduate Certificate in Supply Chain Management (http://www.damore-mckim.northeastern.edu/academic-programs/certificates/supply-chain-management/?utm_medium=website&utm_source=catalog&utm_campaign=gcscm) from D'Amore-McKim is designed to prepare students for the future of work where companies achieve market differentiation through effective supply chain management.

Students will take two required courses that cover all stages of the manufacturing and distribution process. They will also select an additional two electives that explore more focused topics such as materials sourcing, analytics, product assembly, inventory management, and product delivery.

Our Online Graduate Certificate in Supply Chain Management enrolls six times throughout the year.

Program Requirements

Core Requirements

Code	Title	Hours
SCHM 6201	Operations and Supply Chain Management	3
SCHM 6213	Global Supply Chain Strategy	3

Electives

Code	Title	Hours
Complete 6 semester hours from the following:		6
SCHM 6211	Logistics and Transportation Management	
SCHM 6214	Sourcing and Procurement	
SCHM 6221	Sustainability and Supply Chain Management	

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

Sustainability and Business, Graduate Certificate

A Graduate Certificate in Sustainability and Business is designed to provide students with the skills and knowledge needed to help organizations create long-term value through sustainable business strategy development. In just four or five courses, students will broaden their understanding of how successful companies invest in sustainability efforts to increase operational efficiency while also driving social and internal value.

Successful students will develop an understanding of global competition and market dominance and apply this to creating shareholder value in a sustainable environment. Elective offerings include social entrepreneurship or sustainable practices in fields including supply chain management, leadership, public policy, and the environment.

Students will take one required course and either three or four elective courses. The minimum required number of courses to earn a certificate is four; however, many students elect to take an additional elective in order to broaden their expertise.

Our Graduate Certificate in Sustainability and Business enrolls in January, May, and September.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
MECN 6200	Global Competition and Market Dominance	3

Electives

Code	Title	Hours
Complete 9 semester hours from the following:		9
ENTR 6214	Social Enterprise	
ENTR 6216	Global Social Entrepreneurship and Innovation	
INTB 6217	Creating Sustainable Competitive Advantage through Global Innovation	
MECN 6205	Sustainability and the Economics of Markets	
MGMT 6225	Sustainability and Leadership	
MGMT 6226	Sustainability and the Business Environment	
SCHM 6221	Sustainability and Supply Chain Management	

Program Credit/GPA Requirements

A total of 12 semester hours is required

Minimum 3.000 GPA required

Khoury College of Computer Sciences

Website (https://khoury.northeastern.edu)

Carla E. Brodley, PhD, Dean

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At the Khoury College of Computer Sciences, we are inspired by our information-driven world and strive to make it a better place. Our students engage in rigorous learning and real-world co-op experiences. Our renowned faculty shapes minds, sparks innovation, and inspires ideas. Our interdisciplinary research breaks new ground to solve everyday problems.

Khoury maintains a strong research program with significant funding from the major federal research agencies and private industry. With a substantial increase in faculty strength and research funding in recent years, we are actively seeking highly motivated, bright, hardworking students who are interested in pursuing a PhD degree in computer science or in the interdisciplinary field of cybersecurity, network science, or personal health informatics. Graduate students and faculty members are involved in exciting projects in a wide range of research areas, including programming languages, software engineering, distributed and parallel computing, cryptography, network security, health informatics, network science, databases, information retrieval, robotics, visualization, and artificial intelligence. Colloquia and weekly research seminars contribute to the vibrant research atmosphere in the college.

Our curriculum encompasses both the breadth and depth needed for graduate school. Specialized, advanced courses for PhD students in computer science, cybersecurity, and personal health informatics are designed to prepare all students for research early in their doctoral education.

The Master of Science in Computer Science curriculum combines the study of basic algorithms and theoretical computer science principles with advanced programming and software design methods. It offers students the opportunity to develop the analytical and problem-solving skills needed to pursue challenging professional careers.

Khoury also offers the Master of Science in Artificial Intelligence, which provides a comprehensive framework of theory and practice in this emerging field and incorporates elements of data science, robotics, and machine learning; and the Master of Science in Cybersecurity focuses on information technology and incorporates the understanding of the social sciences, law, criminology, and management needed to prevent and combat cyberattacks.

In addition, we offer four interdisciplinary master's degree programs: the Master of Science in Health Informatics with Bouvé College of Health Sciences, which seeks to prepare graduates to use information technology to improve healthcare delivery and outcomes; the Master of Science in Data Science with the College of Engineering, which is designed to give students a comprehensive framework for processing, modeling, analyzing, and reasoning about data; the Master of Science in Robotics with the College of Engineering, which offers students an opportunity to obtain a comprehensive understanding of the algorithms, sensors, control systems, and mechanisms used in robotics; and the Master of Science in Game Science and Design with the College of Arts, Media and Design, which seeks to provide students with a comprehensive understanding of how successful game products are created in a player-centric environment.

The Align program enables intellectually curious students to earn a Master of Science in Computer Science or Data Science without a background in the field. Regardless of undergraduate major or prior programming experience, Align's custom curricula is designed to prepare students for high-demand industries.

Khoury College is a tightly knit community, and the faculty, staff, and students interact regularly through town hall meetings, social gatherings, lectures, and seminars. A diverse, multicultural graduate student body and faculty encourage rich extracurricular interaction. The Masters Council organizes a number of social events to promote friendship and camaraderie within the Khoury community.

Academic Policies and Procedures

Absenteeism

Students are expected to attend all classes and lab sections for their registered courses. Any student who anticipates missing a class due to illness or emergency situations is expected to contact their professor as soon as possible.

While students are welcome to travel over winter and summer breaks, the Khoury College of Computer Sciences expects students to return to campus in a timely manner and to be present for the first week of classes each term. Students who do not arrive back to campus on time may be dropped from their classes until they return to campus. The Office of the Registrar posts current and future academic calendars (https://registrar.northeastern.edu/group/calendar/) on their website so travel plans can be made accordingly.

Students who are hired as teaching assistants are to be present and fulfill all expected employment responsibilities for the entirety of the semester. The scope of employment will include but not be limited to first class welcome/orientation through the grading of final examinations or final projects. Any violation or neglect of these requirements will be considered a violation of the Student Code of Conduct.

Academic Integrity

Violation Submission and Review Process

In the event a faculty member finds a student in violation of the Academic Integrity Policy, faculty will be asked to submit a report to the Khoury College Academic Integrity Committee. The Academic Integrity Committee will convene on a regular basis to review all proposals and appeals. Students will be notified of the determination made by the Academic Integrity Committee after the nearest meeting takes place. Students will have the opportunity to appeal all decisions made by the college.

Violations by Khoury College Master's Students

Students found in violation of the Academic Integrity Policy will be placed on deferred suspension by the college. A deferred suspension is the most serious formal warning for a violation of the Academic Integrity Policy and remains with the student for the remainder of their time in the program. Based on the severity of the violation, the Academic Integrity Committee may recommend one or more of the following sanctions:

- Removal of co-op privilege for the remainder of time in the MS program
- Suspension or deferral of co-op for one to two semesters
- Disqualification from paid graduate student positions within the college (i.e., graders, course assistants, TA/RA appointments)
- No further consequence beyond assignment of a deferred suspension

Students deemed to be in violation of the Academic Integrity Policy for a second instance may be terminated from their respective graduate program.

In accordance with university policy, the college maintains the right to override decisions issued by the Office of Student Conduct and Conflict Resolution in the area of academic performance.

Students will have the right to appeal any and all decisions issued by the Master's Academic Integrity Committee. The appeals process is outlined below.

Appeals Process

Students are entitled to appeal all decisions made by the college's Academic Integrity Appeals Committee. The appeals committee will be comprised of a graduate co-op faculty member, the associate director of graduate student services, and one Khoury faculty member. Cases submitted concerning students from interdisciplinary programs will be reviewed by an appeals committee that includes a member of the partner college administration at the associate dean or faculty level. Student appeals will first be heard by the committee itself and then by the college dean. In the event the appeal is denied at both college levels, the student will have the right to have their appeal heard by a provost review committee. Appeals will be heard on a monthly basis, in accordance with the Academic Integrity Committee meeting schedule.

Details regarding the university appeal process can be found in the graduate catalog here (p. 23).

Academic Probation and Dismissal

A student whose overall GPA falls below 3.000 will be automatically placed on academic probation and will be notified by the college. Once on probation, a student has one academic semester (summer excluded) to achieve a 3.000 GPA. If the GPA is still unsatisfactory at the end of that semester, the student will be eligible for dismissal from the graduate program. In programs that require prerequisite or Align bridge courses, these courses count toward the GPA for academic standing.

Students should refer to their program's requirements page regarding any applicable core GPA requirement.

Appeals Process

Students are entitled to appeal dismissal and dismissal override decisions made by the college's Academic Standing Committee. Appeals should be submitted within five business days of dismissal notification. All appeals to the college should be submitted in writing. The appeals committee will be comprised of the associate dean of graduate programs, the associate dean of graduate program administration, the director of graduate operations, and an academic advisor. Cases submitted concerning students from interdisciplinary programs will be reviewed by an appeals committee that includes a member of the partner college administration at the associate dean or faculty level. Student appeals will first be heard by the committee itself and then by the college dean. Appeals will be reviewed within five business days of submission by the Academic Standing Committee. In the event the appeal is denied at both college levels, the student will have the right to have their appeal heard by a provost review committee.

Details regarding the university appeal process can be found in the graduate catalog here (p. 23).

Certificates

Admission Requirements

INTERNAL APPLICANTS/CURRENT GRADUATE STUDENTS AT NORTHEASTERN

Current NU students will be required to submit an online application in order to have the certificate program added to their transcript. Please contact Khoury graduate admissions with any questions.

In order to be admitted to Khoury graduate certificate programs, current NU students must be in good academic standing. Students on academic probation will not be admitted into a graduate certificate program.

Students must apply for admission to a certificate program prior to their final term of study. Requests for admission in the final term will not be considered.

EXTERNAL APPLICANTS

To apply for admission to the Graduate Certificate in Data Analytics program, you must submit an online application that includes:

- PDF or scanned copies of unofficial undergraduate transcripts (you can submit official transcripts from colleges/universities attended at the time of admission)
- Statement of purpose including description of relevant work experience
- Three confidential letters of reference from individuals that know your academic record and/or potential for graduate study
- Official TOEFL examination scores (international students only)

Acceptance to Khoury is granted upon recommendation of the college graduate committee after a review of the completed application.

Visa Compliance

Please note that the data analytics certificate is not an F-1-eligible program. International students enrolled in MS programs at the university are required to comply with all enrollment visa regulations regarding online course enrollment. Please contact the Office of Global Services (OGS) if you have questions regarding your enrollment status.

Certificate Coursework Applied to Khoury Graduate Degrees

Certificate coursework completed by graduate students may be used in some cases toward a Khoury graduate degree.

- Graduate Certificate in Data Analytics: With approval from the health informatics program director, selected students can substitute one course from the Graduate Certificate in Data Analytics for a technical core requirement in the Master of Science in Health Informatics degree, and up to two more courses from the Graduate Certificate in Data Analytics can be counted as electives for the Master in Science in Health Informatics degree.
- Graduate Certificate in Computer Science: Object-Oriented Design (CS 5004) is only eligible to be counted toward the MSCS degree provided that the student is enrolled in the MSCS-Align program; it is not eligible for inclusion in the MSCS program as a stand-alone elective.
- Graduate Certificate in Cloud Software Development: All four courses (16 credits) of the Graduate Certificate in Cloud Software Development are eligible to count toward the eight-course (32-credit) MSCS degree requirement.

Academic Standing

In order to maintain good standing in the certificate programs, students must have a B average or better at the conclusion of each semester. A student whose overall grade-point average (GPA) falls below 3.000 will be automatically placed on academic probation and will be notified by the college. Once on probation, a student has one academic semester (summer excluded) to achieve a 3.000 GPA. If the GPA is still unsatisfactory at the end of that semester, the student will be eligible for dismissal from the graduate certificate program. In programs that require a prerequisite, these courses count toward the GPA for academic standing.

If a student receives an F grade in any of the certificate courses, the student will be required to retake and pass that course in order to qualify for completion of the program.

Graduation Requirements

Students must have an average GPA of 3.000 overall in the certificate course in order to complete the certificate program.

Co-op

Students in the certificate program are not eligible to participate in the Khoury graduate co-op program.

Pass / Fail Policy

Pass/Fail Policy

Khoury College of Computer Sciences does not allow Khoury graduate students to elect a pass/fail grading basis for courses normally letter graded.

Transfer of Credit

A maximum of 9 semester hours of credit obtained at another institution may be accepted toward the degree, provided the credits meet the following criteria:

- Work is completed at the graduate level for graduate credit
- Student received a grade of 3.000 or better
- Credits were earned at an accredited institution
- Credits have not been used toward any other degree

Transfer credit will be offered only for courses that match a course offered at Northeastern University and that have been approved by the graduate committee. However, no transfer credit will be given for courses listed as interdisciplinary courses.

Students can submit a request for transfer of credit after they have begun taking courses in the Khoury College of Computer Sciences. Please see your academic advisor for the procedure to submit a request.

Computer Science

At the Khoury College of Computer Sciences, we are inspired by an increasingly interconnected society, informed by a rapidly changing job market, and focused on addressing the challenges of a complex world. Our goal is to equip students with knowledge as diverse as it is deep. Our programs provide a strong technical foundation and an essential understanding of computing concepts while integrating computer and data sciences across disciplines and industries.

Our master's degrees are advanced programs that are designed to prepare students to be job ready through a rigorous curriculum, innovative research, experiential learning, and a collaborative environment rich in faculty expertise.

Our research-driven doctoral programs offer students an opportunity to engage in exciting projects, a vibrant community, and a challenging curriculum that offers breadth and depth in areas both within computer science and across disciplines throughout Northeastern.

Graduate education in computer science also features the top-ranked Northeastern co-op program, enabling students to supplement their classroom education with real-world experience in the field.

Doctor of Philosophy (PhD) in Computer Science

The PhD in Computer Science is designed to prepare students for careers in academia and industry—from conducting research to developing

systems to publishing and presenting papers. The rigorous curriculum provides a broad background in the fundamentals of computer science and advanced courses in a wide range of focus areas.

The past decade has witnessed a dramatic increase in Northeastern's international reputation for research and innovative educational programs. Since 2012, the Khoury College of Computer Sciences has hired 30 outstanding faculty members and plans to continue this strategic growth in the coming years, advancing its position (http://csrankings.org/) among the nation's top research universities. Today, the college has a diverse faculty (https://www.ccis.northeastern.edu/role/tenured-and-tenure-track-faculty/) of 62, working in a wide range of research areas (https://www.ccis.northeastern.edu/research/research-areas/). Seventeen faculty members have joint appointments with other colleges and schools, including engineering, science, business, social sciences and humanities, health sciences and arts, and media and design.

Master of Science (MS) in Artificial Intelligence

The Master of Science program in artificial intelligence (AI) is designed to give students a comprehensive framework for AI with specialization in one of five areas: vision, intelligent interaction, robotics and agent-based systems, machine learning, and knowledge management and reasoning. Students will engage in an extensive core intended to develop depth in all core concepts that build a foundation for AI theory and practice. Students will also be given the opportunity to build on the core knowledge of AI by taking a variety of elective courses selected from colleges throughout campus to explore key contextual areas or more complex technical applications. Program graduates will be well positioned to attain research and development positions in a rapidly growing field or to progress into doctoral-degree-related fields.

Master of Science (MS) in Data Science

Khoury College of Computer Sciences and the Department of Electrical and Computer Engineering (ECE) jointly offer an interdisciplinary Master of Science program in data science. This program is designed to give students a comprehensive framework for reasoning about data. Students will engage in extensive coursework intended to develop depth in data collection, storage, retrieval, manipulation, visualization, modeling, and interpretation. Students will also be able to choose elective courses from a variety of offerings in Khoury, the College of Engineering (COE), and throughout the campus to explore areas that generate data or specialized data science applications. Students in the MS in Data Science will complete a capstone course, working with real-world data and applying what they have learned during the program. Successful program graduates will be well positioned to attain data scientist and data engineer positions in a fast-growing field or to progress into doctoral degrees in related disciplines.

Align Master of Science (MS) in Data Science

Students in the Align MS-DS program come from a variety of backgrounds, where they merge their existing knowledge with data science skills. Students will learn theoretical foundations and gain extensive experience with practical problems in the discipline, including data acquisition, storage, analysis, probabilistic modeling, model deployment, and presentation.

Master of Science (MS) in Robotics

The Master of Science in Robotics program, offered jointly by the College of Engineering and the Khoury College of Computer Sciences at Northeastern, looks at this fundamentally interdisciplinary field from three connected angles: mechanical engineering, electrical engineering, and computer science.

Through a technically challenging curriculum, hands-on learning, and industry co-op placements, students have an opportunity to gain a comprehensive understanding of the algorithms, control systems, and mechanisms used in robotics to help them stand out in the field and make a transformative impact on society.

For more information on the program, please visit the College of Engineering program page here (p. 121).

Master of Science in Computer Science (MSCS)

Northeastern University's Master of Science in Computer Science is designed to prepare students for a variety of careers in computer science. The program combines both computing and important application domains—enabling students to increase their broad-based knowledge in the field while focusing on one curricular concentration selected from a range of options including artificial intelligence, computer-human interaction, graphics, programming languages, software engineering, data science, networks, theory, game design, systems, and information security.

Align Master of Science in Computer Science (MSCS)

MSCS-Align students come from a wide variety of backgrounds—with undergraduate majors ranging from math, biology, history, engineering, and classics. In this program, students have an opportunity to acquire both the knowledge needed to transition into a new career and the practical skills to build the next great app.

Graduate Certificate in Cloud Software Development

The Graduate Certificate in Cloud Software Development provides students of all backgrounds with the foundational skills needed to pursue a career in cloud computing. Through a four-course program that emphasizes hands-on, industry-facing experiential learning—via Khoury College's partnerships with leading cloud platform companies like AWS, Google, and Microsoft—you'll gain the technical ability, exposure, and experience to work on any cloud computing platform, as well as the career-building resources to put you on the fast track in this growing field

Graduate Certificate in Computer Science

The postbaccalaureate certificate is designed to give students a solid foundation in the mathematical and theoretical underpinnings of computer science, including the areas of discrete mathematics, basic programming, data structures, object-oriented programming, algorithms, and computer systems. The goal of the certificate is to provide foundational knowledge in computer science that is valuable in both the workplace for career advancement as well as to those looking to move into graduate programs within the discipline.

The Postbaccalaureate Certificate in Computer Science will serve as the foundational premaster's courses in the Align program.

Graduate Certificate in Data Analytics

The interdisciplinary Graduate Certificate in Data Analytics is offered through a collaboration between the Khoury College of Computer Sciences and the College of Social Sciences and Humanities. The certificate curriculum emphasizes the skills needed to bridge between emerging technological capacities and traditional policymaking processes. The program is designed to provide students with foundational knowledge in data science—including data management, machine learning, data mining, statistics, and visualizing and communicating data—that can be applied to data-driven decision making in any discipline.

Programs

Doctor of Philosophy (PhD)

- Computer Science (p. 114)

Master of Science (MS)

- Artificial Intelligence (p. 117)
- Data Science (p. 118)
- Data Science—Align (p. 119)
- Robotics (p. 121)

Master of Science in Computer Science (MSCS)

- Computer Science (p. 122)
- Computer Science—Align (p. 123)

Graduate Certificate

- Cloud Software Development (p. 124)
- Computer Science (p. 124)
- Data Analytics (p. 124)

Computer Science, PhD

The PhD in Computer Science is designed to prepare students for careers in academia and industry—from conducting research to developing systems to publishing and presenting papers. The rigorous curriculum provides a broad background in the fundamentals of computer science and advanced courses in a wide range of focus areas.

The past decade has witnessed a dramatic increase in Northeastern's international reputation for research and innovative educational programs. Since 2012, the Khoury College of Computer Sciences has hired 30 outstanding faculty members and plans to continue this strategic growth in the coming years, advancing its position among the nation's top research universities. Today, the college has a diverse faculty of 62 working in a wide range of research areas. Seventeen faculty members have joint appointments with other colleges and schools, including engineering, science, business, social sciences and humanities, health sciences, and Arts, Media and Design.

Northeastern University is located in the heart of Boston, a city with one of the richest research environments in the world, with over 10,000 researchers, 50,000 graduate students, and a top startup community. Every week there are numerous talks and lectures on cutting-edge research, either at Northeastern or at other universities and research labs easily accessible from Northeastern.

Coursework

A minimum of 48 semester hours of course work beyond the BS/BA degree is required of all students.

All students must demonstrate sufficient knowledge in the fundamentals of computer science, as well as the ability to carry out research in an area of computer science.

The student must maintain a minimum grade-point average (GPA) of 3.500 among the six core courses and receive a grade of B or better in each of these courses. Students who have taken equivalent courses in other institutions may petition to be exempted from the course(s) (subject to the approval of the PhD computer science curriculum committee). Each student may repeat a course once for no more than three out of the six courses if they do not receive a B or better in the course. Students with a Master of Science in Computer Science may petition to the PhD computer science curriculum committee for an exemption from these courses. Petition forms are available on the college website.

The fields listed do not necessarily represent areas of specialization or separate tracks within the PhD program. Rather, they attempt to delineate areas on which the student must be examined in order to measure his or her ability to complete the degree. Therefore, they may be adjusted in the future to reflect changes in the discipline of computer science and in faculty interests within the Khoury College of Computer Sciences. Similarly, these fields do not represent the only areas in which a student may write his or her dissertation. They are, however, intended to serve as a basis for performing fundamental research in computer science.

Paper Requirement

To demonstrate research ability, the student is required to submit to the PhD committee a research or a survey paper in an area of specialty under the supervision of a faculty advisor. A submitted paper from a student is considered to have fulfilled the paper requirement if:

1. The paper has been accepted by a selective conference.
2. The student has made a substantial contribution to the paper.
3. The advisor has endorsed the paper with a written statement indicating the student's contribution.
4. The PhD computer science curriculum committee has voted on a positive recommendation. The committee may require a presentation from the student before making a recommendation.

Admission to Candidacy

Upon completion of the course and the research paper requirements, the student is admitted to candidacy for the PhD degree. It is highly recommended that the student complete the candidacy requirement by the end of his or her second year but no later than the third year.

Residency

One year of continuous full-time study is required after admission to the PhD candidacy. It is expected that during this period the student will make substantial progress in preparing for the comprehensive examination.

Teaching Requirement

All computer science PhD students must satisfy the teaching requirement in order to graduate. This requirement is fulfilled when the student works as a teaching assistant (TA) or instructor of record (IoR) for one semester and during this semester:

- Teaches at least 3 hours of classes
- Prepares at least one assignment, or quiz, or equivalent

PhD students are expected to satisfy the teaching requirement some time after completing their first year and at least one semester prior to scheduling their PhD defense.

Comprehensive Examination/Dissertation Proposal

After the student has achieved sufficient depth in a field of study, they prepare a proposal for the PhD dissertation. This process should take place no later than the end of the fifth year in residence. The student prepares a dissertation proposal, which describes the proposed research, including the relevant background materials from the literature. The proposal should clearly specify the research problems to be attacked, the techniques to be used, and a schedule of milestones toward completion.

The dissertation proposal must be approved by the dissertation committee. With the help of the advisor, a student selects the committee, consisting of at least four members, to be approved by the PhD computer

science curriculum committee. The four members must include the advisor, two internal members, and an external member.

Upon approval of the written proposal, the student has to present the proposed work orally in a public forum, followed by a closed-door oral examination from the dissertation committee. The student may take the dissertation proposal examination twice, at most.

Doctoral Dissertation

Upon successful completion of solving the research proposed in the dissertation proposal, the candidate has an opportunity to prepare the dissertation for approval by the dissertation committee. The dissertation must contain results of extensive research and make an original contribution to the field of computer science. The work should give evidence of the candidate's ability to carry out independent research. It is expected that the dissertation should be of sufficient quality to merit publication in a reputable journal in computer science.

Doctoral Committee

With the help of the advisor, a student selects the committee, consisting of at least four members, to be approved by the PhD computer science curriculum committee. The four members must include the advisor, two internal members, and an external member.

Dissertation Defense

The dissertation defense is held in accordance with the regulations of the University Graduate Council. It consists of a lecture given by the candidate on the subject matter of the dissertation. This is followed by questions from the dissertation committee and others in attendance concerning the results of the dissertation as well as any related matters. The defense is chaired by the PhD advisor.

Time and Time Limitation

After the establishment of degree candidacy, a maximum of five years will be allowed for the completion of the degree requirements, unless an extension is granted by the college graduate committee.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Course work
Paper requirement
Admission to candidacy
Residency
Teaching requirement
Comprehensive examination/dissertation proposal
Doctoral dissertation
Doctoral committee
Dissertation defense

Core Requirements

A grade of B or higher is required in each course. A cumulative 3.500 GPA is required for the core requirement.

Students should refer to the course numbering table for graduate course leveling (p. 36).

Code	Title	Hours
Breadth Areas		
Complete one course from four of the five following breadth areas:		16
Artificial Intelligence and Data Science		
CS 6140	Machine Learning	
CS 7200	Statistical Methods for Computer Science	
CS 7240	Principles of Scalable Data Management: Theory, Algorithms, and Database Systems	
Human-Centered Computing		
CS 7340	Theory and Methods in Human Computer Interaction	
CS 7250	Information Visualization: Theory and Applications	
Software		
CS 6410	Compilers	
CS 7400	Intensive Principles of Programming Languages	
CS 7430	Formal Specification, Verification, and Synthesis	
Systems		
CS 7600	Intensive Computer Systems	
CS 7610	Foundations of Distributed Systems	
Theory		
CS 7800	Advanced Algorithms	
CS 7805	Complexity Theory	
Specialization Courses		
Complete 8 semester hours from the specialization course lists. (p. 115)		8

Electives

Code	Title	Hours
Complete 24 semester hours in the following:		24
Note: Consult faculty adviser for the other acceptable courses.		
CS 5100 to CS 5850, except CS 5340		
CS 6110 to CS 6810		
CS 7340	Theory and Methods in Human Computer Interaction	
CS 8982	Readings	

Dissertation

Code	Title	Hours
Upon achieving PhD candidacy, complete the following courses for two consecutive semesters:		
CS 9990	Dissertation Term 1	
CS 9991	Dissertation Term 2	
For remaining semester(s), complete the following (repeatable) course until graduation:		
CS 9996	Dissertation Continuation	

Specialization Course Lists

Code	Title	Hours
Artificial Intelligence		
CS 5100	Foundations of Artificial Intelligence	
CS 5335	Robotic Science and Systems	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	

CS 7140	Advanced Machine Learning
CS 7150	Deep Learning
CS 7180	Special Topics in Artificial Intelligence
Computer-Human Interface	
CS 5520	Mobile Application Development
CS 6350	Empirical Research Methods
CS 7260	Visualization for Network Science
CS 7295	Special Topics in Data Visualization
CS 7340	Theory and Methods in Human Computer Interaction
Data Science	
CS 5200	Database Management Systems
CS 6140	Machine Learning
CS 6200	Information Retrieval
CS 6220	Data Mining Techniques
CS 6240	Large-Scale Parallel Data Processing
CS 7140	Advanced Machine Learning
CS 7280	Special Topics in Database Management
CS 7290	Special Topics in Data Science
Graphics	
CS 5310	Computer Graphics
CS 5330	Pattern Recognition and Computer Vision
Information Security	
CS 6760	Privacy, Security, and Usability
CS 7580	Special Topics in Software Engineering
CY 5770	Software Vulnerabilities and Security
CY 6740	Network Security
CY 6750	Cryptography and Communications Security
Networks	
CS 5700	Fundamentals of Computer Networking
CS 6710	Wireless Network
CS 6760	Privacy, Security, and Usability
CS 7775	Seminar in Computer Security
CS 7780	Special Topics in Networks
CY 6740	Network Security
CY 6750	Cryptography and Communications Security
Programming Languages	
CS 5400	Principles of Programming Language
CS 6410	Compilers
CS 6510	Advanced Software Development
CS 7400	Intensive Principles of Programming Languages
CS 7480	Special Topics in Programming Language
CS 7485	Special Topics in Formal Methods
Software Engineering	
CS 5610	Web Development
CS 6510	Advanced Software Development
CS 7580	Special Topics in Software Engineering
Systems	
CS 6620	Fundamentals of Cloud Computing
CS 6650	Building Scalable Distributed Systems
CS 7600	Intensive Computer Systems
CS 7610	Foundations of Distributed Systems
CS 7680	Special Topics in Computer Systems
CY 6740	Network Security
Theory	
CS 7485	Special Topics in Formal Methods
CS 7800	Advanced Algorithms
CS 7805	Complexity Theory
CS 7880	Special Topics in Theoretical Computer Science
CY 6750	Cryptography and Communications Security
Game Design	
CS 5150	Game Artificial Intelligence
CS 5310	Computer Graphics
CS 5340	Computer/Human Interaction
CS 5850	Building Game Engines
CS 7140	Advanced Machine Learning

Program Credit/GPA Requirements

48 total semester hours required
Minimum overall 3.000 GPA required

Plan of Study

Sample Curriculum

Year 1

Fall	Hours	Spring	Hours
Breadth course	4	Breadth course	4
Core elective	4	Core elective	4
	8		8

Year 2

Fall	Hours	Spring	Hours
Breadth course	4	Breadth course	4
Open elective	4	Open elective	4
	8		8

Year 3

Fall	Hours	Spring	Hours
CS 9990	0	CS 9991	0
CS 8982	8	CS 8982	8
	8		8

Year 4

Fall	Hours	Spring	Hours
CS 9996	0	CS 9996	0
	0		0

Year 5

Fall	Hours	Spring	Hours
CS 9996	0	CS 9996	0
	0		0

Year 6			
Fall	**Hours**	**Spring**	**Hours**
CS 9996	0	CS 9996	0
	0		0

Total Hours: 48

Advanced Entry PhD Program Requirements

Coursework

Incoming PhD in Computer Science students who have already completed a Master of Science in Computer Science or an adjacent field may petition to the PhD in Computer Science program administration for advanced entry. Advanced entry petitions are reviewed by the program administration on a case-by-case basis. Please note that advanced standing does not waive by itself any part of the PhD coursework requirements.

As a degree conferral requirement, a minimum of 16 semester hours of coursework beyond the 32 semester hours of the master's degree is required of advanced entry PhD students (48 semester hours is required of standard entry PhD students). Students must maintain a minimum GPA of 3.500 as well as earn a grade of B or better in each course.

Paper Requirement

Refer to the Computer Science, PhD, overview (p. 114), for research/survey paper requirements.

Admission to Candidacy

Refer to the Computer Science, PhD, overview, (p. 114) for admission to candidacy requirements.

Residency

Refer to the Computer Science, PhD, overview, (p. 114) for residency requirements.

Teaching Requirement

Refer to the Computer Science, PhD, overview, (p. 114) for the teaching requirement.

Comprehensive Examination/Dissertation Proposal

Refer to the Computer Science, PhD, overview, (p. 114) for comprehensive examination requirements.

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review
Course requirements
Paper requirement
Comprehensive exam
Teaching requirement
Doctoral candidacy
Dissertation committee
Dissertation proposal
Dissertation defense

Core Requirements

Students must maintain a minimum GPA of 3.500 as well as earn a grade of B or better in each course.

Code	Title	Hours
Consult your faculty advisor for acceptable courses.		16

Dissertation

Code	Title	Hours
CS 9990	Dissertation Term 1	
CS 9991	Dissertation Term 2	
Upon achieving PhD candidacy, complete the following (repeatable) course for two consecutive semesters:		
CS 8982	Readings	
For any remaining semester(s), complete the following (repeatable) course until graduation:		
CS 9996	Dissertation Continuation	

Program Credit/GPA Requirements

16 total semester hours required
Minimum overall 3.500 GPA required

Artificial Intelligence, MS

The Master of Science in Artificial Intelligence (AI) program is designed to give students a comprehensive framework for AI with specialization in one of five areas: vision, intelligent interaction, robotics and agent-based systems, machine learning, and knowledge management and reasoning. Students will engage in an extensive core intended to develop depth in all core concepts that build a foundation for AI theory and practice. Students will also be given the opportunity to build on the core knowledge of AI by taking a variety of elective courses, selected from colleges throughout campus, to explore key contextual areas or more complex technical applications. Program graduates will be well positioned to attain research and development positions in a rapidly growing field or to progress into doctoral-degree-related fields.

The Master of Science in Artificial Intelligence is comprised of eight courses: five core courses, two electives to be chosen from one of five specialization areas, and one elective. The core courses are designed and developed by Khoury College faculty. Elective courses consist of graduate courses offered in Khoury and other partner colleges, including CAMD, COE, COS, and CSSH.

Prerequisites

The Master of Science in Artificial Intelligence curriculum is tailored toward technically or mathematically trained students. To ensure that all students have the foundation necessary to be successful in this program, each incoming student must either complete two introductory courses at Northeastern or complete two placement exams administered one week prior to the beginning of the semester. The two exams cover fundamentals of computer science and programming skills and basic statistics, probability, and linear algebra. This admission requirement can also be fulfilled by successful completion of Introduction to Programming for Data Science (DS 5010) and Introduction to Linear Algebra and Probability for Data Science (DS 5020). The introductory courses are not counted as credit toward the degree but are included in the student's cumulative grade-point average. Students are required to get a passing grade in each section of the placement exams in order to progress into the core courses in the degree program. If the student does not get a passing grade in a part of the placement exam, then the student must take the corresponding introductory course. Students that do not achieve a B or better in the introductory courses will be required to retake the courses.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A cumulative GPA of 3.000 or higher is required in the following core courses:

Code	Title	Hours
Intelligence		
CS 5100	Foundations of Artificial Intelligence	4
Programing and Algorithms		
CS 5010	Programming Design Paradigm	4
CS 5800	Algorithms	4
Machine Learning		
CS 6140	Machine Learning	4
Interaction		
CS 5170	Artificial Intelligence for Human-Computer Interaction	4

Electives

Code	Title	Hours
Specialization		
Complete two courses from one of the following specializations:		8
Vision		
CS 5330	Pattern Recognition and Computer Vision	
CS 7180	Special Topics in Artificial Intelligence	
EECE 5639	Computer Vision	
EECE 7370	Advanced Computer Vision	
Intelligent Interaction		
CS 5150	Game Artificial Intelligence	
CS 5340	Computer/Human Interaction	
CS 7340	Theory and Methods in Human Computer Interaction	
PSYC 5010	Human Cognitive Processes	
Robotics and Agent-Based Systems		
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5335	Robotic Science and Systems	
EECE 5550	Mobile Robotics	
EECE 5554	Robotics Sensing and Navigation	
Machine Learning		
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 6220	Data Mining Techniques	
CS 7140	Advanced Machine Learning	
or EECE 7397	Advanced Machine Learning	
CS 7150	Deep Learning	
DS 5230	Unsupervised Machine Learning and Data Mining	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
MATH 7340	Statistics for Bioinformatics	
Knowledge Management and Reasoning		
CS 6120	Natural Language Processing	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 7290	Special Topics in Data Science	
Additional Elective		
Complete one of the electives listed below or an additional course chosen from the specialization courses above, outside of the student's selected specialization area:		4
CS 7180	Special Topics in Artificial Intelligence	
CS 7990	Thesis	
CS 8674	Master's Project	
EECE 7337	Information Theory	
GSND 5110	Game Design and Analysis	
LING 5100	Introduction to Linguistics	
PHIL 5010	AI Ethics	

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

Data Science, MS

Khoury College of Computer Sciences and the Department of Electrical and Computer Engineering (ECE) jointly offer a new interdisciplinary master of science program in data science. This program is designed to give students a comprehensive framework for reasoning about data. Students will engage in extensive coursework intended to develop depth in data collection, storage, retrieval, manipulation, visualization, modeling, and interpretation. Students will also be able to choose elective courses from a variety of offerings in Khoury, the College of Engineering (COE), and throughout the campus to explore areas that generate data or specialized data science applications. Successful program graduates will be well positioned to attain data scientist and data engineer positions in a fast-growing field or to progress into doctoral degrees in related disciplines.

Prerequisite Courses

The Master of Science in Data Science curriculum is tailored toward technically or mathematically trained students. To ensure that all students have the foundation necessary to be successful in this program, each incoming student must either complete two introductory courses at Northeastern or complete two placement exams administered one week prior to the beginning of the semester. The two exams cover fundamentals of computer science and programming skills and basic statistics, probability, and linear algebra. This admission requirement can also be fulfilled by successful completion of Introduction to Programming for Data Science (DS 5010) and Introduction to Linear Algebra and Probability for Data Science (DS 5020). The introductory courses are not counted as credit toward the degree but are included in the student's cumulative grade-point average. Students are required to get a passing grade in each section of the placement exams in order to progress into the core courses in the degree program. If the student does not get a passing grade in a part of the placement exam, then the student must take the corresponding introductory course. Students that do not achieve a B or better in the introductory courses will be required to retake the courses.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Students should refer to the course numbering table for graduate course leveling (p. 36).

Core Requirements

A cumulative GPA of 3.000 or higher is required in the following core courses.

Code	Title	Hours
Complete 20 semester hours from the following:		
Data Management and Processing		
DS 5110	Introduction to Data Management and Processing	4
Algorithms		
Complete 4 semester hours from the following:		4
CS 5800	Algorithms	
EECE 7205	Fundamentals of Computer Engineering	
Machine Learning and Data Mining		
DS 5220	Supervised Machine Learning and Learning Theory	4
DS 5230	Unsupervised Machine Learning and Data Mining	4
Presentation and Visualization		
DS 5500	Capstone: Applications in Data Science	4

Electives

Code	Title	Hours
Complete 12 semester hours from the following: [1]		12
Khoury College of Computer Sciences		
CS 5100	Foundations of Artificial Intelligence	
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5200	Database Management Systems	
CS 5335	Robotic Science and Systems	
CS 5340	Computer/Human Interaction	
CS 5610	Web Development	
CS 6120	Natural Language Processing	
CS 6200	Information Retrieval	
CS 6240	Large-Scale Parallel Data Processing	
CS 6350	Empirical Research Methods	
CS 6620	Fundamentals of Cloud Computing	
CS 6650	Building Scalable Distributed Systems	
CS 7140	Advanced Machine Learning	
CS 7150	Deep Learning	
CS 7180	Special Topics in Artificial Intelligence	
CS 7200	Statistical Methods for Computer Science	
CS 7280	Special Topics in Database Management	
CS 7290	Special Topics in Data Science	
DS 7990	Thesis	
DS 7995	Project	
College of Engineering		
CIVE 7100	Time Series and Geospatial Data Sciences	
CIVE 7388	Special Topics in Civil Engineering	
EECE 5639	Computer Vision	
EECE 5640	High-Performance Computing	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7337	Information Theory	
EECE 7370	Advanced Computer Vision	
EECE 7397	Advanced Machine Learning	
IE 7275	Data Mining in Engineering	
IE 7280	Statistical Methods in Engineering	
College of Social Sciences and Humanities		
ECON 5140	Applied Econometrics	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5262	Big Data for Cities	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
PPUA 5266	Urban Theory and Science	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	
College of Science		
ENVR 5563	Advanced Spatial Analysis	
PHYS 5116	Complex Networks and Applications	
PHYS 7305	Statistical Physics	
PHYS 7321	Computational Physics	
PHYS 7331	Network Science Data	
Bouvé College of Health Sciences		
PHTH 5202	Introduction to Epidemiology	
PHTH 5210	Biostatistics in Public Health	
PHTH 6224	Social Epidemiology	
College of Arts, Media and Design		
GSND 5110	Game Design and Analysis	
GSND 6350	Data-Driven Player Modeling	

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

[1] Students taking electives worth less than 4 credits (i.e., Bouvé courses) should enroll for an accompanying data science project course in the same semester to bring the cumulative credits to 4. In order to earn this additional credit, students are expected to work with faculty to design an additional project in line with the curricular aims of their chosen elective and the data science core learning outcomes.

Data Science, MS—Align Program

Overview

The innovative Align bridge program to the Master of Science in Data Science is designed for students with a BS/BA degree from all backgrounds. During the first semester of year one, students are expected to take foundational courses in computer science fundamentals, as well as a course in data structures/discrete mathematics. During their second semester, students will take coursework in programming for data science, as well as linear algebra

and probability. Upon successful completion of the second semester, students in good standing will matriculate into the Master of Science in Data Science program.

The Master of Science in Data Science program is designed to give students a comprehensive framework for reasoning about data. Students will engage in extensive coursework intended to develop depth in data collection, storage, retrieval, manipulation, visualization, modeling, and interpretation. Students will also be able to choose elective courses from a variety of offerings in Khoury, the College of Engineering (COE), and throughout the campus to explore areas that generate data or specialized data science applications. Successful program graduates will be well-positioned to attain data scientist and data engineer positions in a fast-growing field or to progress into doctoral degrees in related disciplines.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Students should refer to the course numbering table for graduate course leveling (p. 36).

Align Bridge Coursework

Students are required to complete all bridge courses unless otherwise determined by the program.

A grade of B or higher is required in each course.

Code	Title	Hours
Fundamentals		
CS 5001 and CS 5003	Intensive Foundations of Computer Science and Recitation for CS 5001	4
Discrete Structures		
CS 5002	Discrete Structures	4
Programming for Data Science		
DS 5010	Introduction to Programming for Data Science	4
Additional Align Coursework		
DS 5020	Introduction to Linear Algebra and Probability for Data Science	4

Core Requirements

A cumulative GPA of 3.000 or higher is required in the following core courses:

Code	Title	Hours
Complete 20 semester hours from the following:		
Algorithms		
Complete 4 semester hours from the following:		4
CS 5800	Algorithms	
EECE 7205	Fundamentals of Computer Engineering	
Data Management and Processing		
DS 5110	Introduction to Data Management and Processing	4
Machine Learning and Data Mining		
DS 5220	Supervised Machine Learning and Learning Theory	4
DS 5230	Unsupervised Machine Learning and Data Mining	4
Presentation and Visualization		
DS 5500	Capstone: Applications in Data Science	4

Electives [1]

Code	Title	Hours
Complete 12 semester hours from the following:		12
College of Computer and Information Science		
CS 5100	Foundations of Artificial Intelligence	
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5200	Database Management Systems	
CS 5335	Robotic Science and Systems	
CS 5340	Computer/Human Interaction	
CS 5610	Web Development	
CS 6120	Natural Language Processing	
CS 6200	Information Retrieval	
CS 6240	Large-Scale Parallel Data Processing	
CS 6350	Empirical Research Methods	
CS 6620	Fundamentals of Cloud Computing	
CS 6650	Building Scalable Distributed Systems	
CS 7140	Advanced Machine Learning	
CS 7150	Deep Learning	
CS 7180	Special Topics in Artificial Intelligence	
CS 7200	Statistical Methods for Computer Science	
DS 7990	Thesis	
DS 7995	Project	
CS 7280	Special Topics in Database Management	
CS 7290	Special Topics in Data Science	
College of Engineering		
CIVE 7100	Time Series and Geospatial Data Sciences	
CIVE 7388	Special Topics in Civil Engineering	
EECE 5639	Computer Vision	
EECE 5640	High-Performance Computing	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7337	Information Theory	
EECE 7370	Advanced Computer Vision	
EECE 7397	Advanced Machine Learning	
IE 7275	Data Mining in Engineering	
IE 7280	Statistical Methods in Engineering	
College of Social Sciences and Humanities		
ECON 5140	Applied Econometrics	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5262	Big Data for Cities	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
PPUA 5266	Urban Theory and Science	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	
College of Science		
ENVR 5563	Advanced Spatial Analysis	

PHYS 5116	Complex Networks and Applications
PHYS 7305	Statistical Physics
PHYS 7321	Computational Physics
PHYS 7331	Network Science Data
Bouvé College of Health Sciences	
PHTH 5202	Introduction to Epidemiology
PHTH 5210	Biostatistics in Public Health
PHTH 6224	Social Epidemiology
College of Arts, Media and Design	
GSND 5110	Game Design and Analysis
GSND 6350	Data-Driven Player Modeling

Program Credit/GPA Requirements

40–48 total semester hours required
Minimum 3.000 GPA required

[1] Students taking electives worth less than 4 credits (i.e., Bouvé courses) should enroll for an accompanying data science project course in the same semester to bring the cumulative credits to 4. In order to earn this additional credit, students are expected to work with faculty to design an additional project in line with the curricular aims of their chosen elective and the data science core learning outcomes.

Robotics, MS

For program contact information, please visit this website (https://coe.northeastern.edu/academic-programs/ms-robo/).

MS Robotics is a multidisciplinary Master of Science program offered by the College of Engineering (COE) and the Khoury College of Computer Sciences. The program is designed to provide students comprehensive training in algorithms, sensors, control systems, and mechanisms used in robotics.

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Robotics with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Robotics in addition to earning a Graduate Certificate in Engineering Leadership (p. 245). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 40-semester-hour degree and certificate will require 24 semester hours of advisor-approved Robotics technical courses.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Mechanical Engineering		
Complete one of the following:		4
ME 5250	Robot Mechanics and Control	
ME 5659	Control Systems Engineering	
Electrical and Computer Engineering		
Complete one of the following:		4
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
Computer Science		
Complete one of the following:		4
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5335	Robotic Science and Systems	

Concentrations

Complete one of the following concentrations:

- Mechanical Engineering (p. 121)
- Electrical and Computer Engineering (p. 121)
- Computer Science (p. 122)

MECHANICAL ENGINEERING

Code	Title	Hours
Required Course		
Complete additional ME course not used to fulfill the core requirements:		4
ME 5250	Robot Mechanics and Control	
ME 5659	Control Systems Engineering	
Complete one of the following options:		
Course Work Option		
Complete 16SH of courses from the elective course list. (p.)		16
Project Option		
ME 7945	Master's Project	4
Complete 12SH of courses from the elective course list. (p.)		12
Thesis Option		
ME 7990	Thesis	8
Complete 8SH of courses from the elective course list. (p.)		8

ELECTRICAL AND COMPUTER ENGINEERING

Code	Title	Hours
Required Course		
Complete additional EECE course not used to fulfill the core requirements:		4
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
Complete one of the following options:		
Course Work Option		
Complete 16SH of courses from the elective course list. (p.)		16
Project Option		
EECE 7674	Master's Project	4
Complete 12SH of courses from the elective course list. (p.)		12
Thesis Option		
EECE 7990	Thesis	8
Complete 8SH of courses from the elective course list. (p.)		8

COMPUTER SCIENCE

Code	Title	Hours
Required Course		
Complete additional CS course not used to fulfill the core requirements:		4
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5335	Robotic Science and Systems	
Complete one of the following options:		
Course Work Option		
Complete 16SH of courses from the elective course list. (p.)		16
Project Option		
CS 8674	Master's Project	4
Complete 12SH of courses from the elective course list. (p.)		12
Thesis Option		
CS 7990	Thesis (complete twice for a total of 8 credits)	8
Complete 8SH of courses from the elective course list. (p.)		8

Elective Course List

Code	Title	Hours
Mechanical Engineering Course List		
IE 7280	Statistical Methods in Engineering	
IE 7315	Human Factors Engineering	
IE 7615	Neural Networks and Deep Learning	
ME 5240	Computer Aided Design and Manufacturing	
ME 5245	Mechatronic Systems	
ME 5250	Robot Mechanics and Control	
ME 5655	Dynamics and Mechanical Vibration	
ME 5659	Control Systems Engineering	
ME 5665	Musculoskeletal Biomechanics	
ME 6200	Mathematical Methods for Mechanical Engineers 1	
ME 6201	Mathematical Methods for Mechanical Engineers 2	
ME 7210	Elasticity and Plasticity	
ME 7247	Advanced Control Engineering	
Electrical and Computer Engineering Course List		
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
EECE 5580	Classical Control Systems	
EECE 5639	Computer Vision	
EECE 5642	Data Visualization	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7150	Autonomous Field Robotics	
EECE 7323	Numerical Optimization Methods	
EECE 7337	Information Theory	
EECE 7370	Advanced Computer Vision	
EECE 7397	Advanced Machine Learning	
Computer Science Course List		
CS 5006	Algorithms	
CS 5100	Foundations of Artificial Intelligence	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	
CS 6350	Empirical Research Methods	
CS 7140	Advanced Machine Learning	
CS 7150	Deep Learning	
CS 7180	Special Topics in Artificial Intelligence	
DS 5220	Supervised Machine Learning and Learning Theory	

PROGRAM CREDIT/GPA REQUIREMENTS

32 total semester hours required
Minimum 3.000 GPA required

Computer Science, MSCS

Northeastern University's Master of Science in Computer Science is designed to prepare students for a variety of careers in computer science. The program combines both computing and important application domains—enabling you to increase your broad-based knowledge in the field while allowing you to delve deeper in specific areas through elective courses.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Students should refer to the course numbering table for graduate course leveling (p. 36).

Core Requirements

Code	Title	Hours
Programming		
CS 5010	Programming Design Paradigm	4
Algorithms		
CS 5800	Algorithms	4

Breadth Areas

Code	Title	Hours
Complete three courses from two of the three following breadth areas:		12
Systems and Software		
CS 5400	Principles of Programming Language	
CS 5500	Foundations of Software Engineering	
CS 5520	Mobile Application Development	
CS 5600	Computer Systems	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 6410	Compilers	
CS 6510	Advanced Software Development	
CS 6650	Building Scalable Distributed Systems	
CS 6710	Wireless Network	
Theory and Security		
CS 6760	Privacy, Security, and Usability	

CS 7805	Complexity Theory
CY 5770	Software Vulnerabilities and Security
CY 6740	Network Security
CY 6750	Cryptography and Communications Security
Artificial Intelligence and Data Science	
CS 5100	Foundations of Artificial Intelligence
CS 5150	Game Artificial Intelligence
CS 5200	Database Management Systems
CS 6120	Natural Language Processing
CS 6140	Machine Learning
CS 6200	Information Retrieval
CS 6220	Data Mining Techniques
CS 6240	Large-Scale Parallel Data Processing
CS 7140	Advanced Machine Learning

Electives

Code	Title	Hours
Complete 12 semester hours from the following:		12
CS 5100 to CS 7880		
CS 8674	Master's Project	
CS 8982	Readings	
CS 7990	Thesis	
DS 5110	Introduction to Data Management and Processing	

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

Computer Science, MSCS—Align Program

MSCS—Align students come from a wide variety of backgrounds, with undergraduate majors including math, biology, history, engineering, and classics. In this program, students have an opportunity to acquire both the knowledge needed to transition into a new career and the practical skills to build the next great app.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Align Bridge Coursework

Students are required to take all bridge courses unless otherwise determined by the program.

A grade of B or higher is required in each course.

Code	Title	Hours
Fundamentals		
CS 5001 and CS 5003	Intensive Foundations of Computer Science and Recitation for CS 5001	4
Discrete Structures		
CS 5002	Discrete Structures	4
Object-Oriented Design		
CS 5004 and CS 5005	Object-Oriented Design and Recitation for CS 5004	4
Additional ALIGN courses		
CS 5008 and CS 5009	Data Structures, Algorithms, and Their Applications within Computer Systems and Recitation for CS 5008	4

Core Requirements

Code	Title	Hours
Algorithms		
CS 5800	Algorithms	4

Breadth Areas

Code	Title	Hours
Select three courses from two of the three following breadth areas:		12
Systems and Software		
CS 5400	Principles of Programming Language	
CS 5500	Foundations of Software Engineering	
CS 5520	Mobile Application Development	
CS 5600	Computer Systems	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 6410	Compilers	
CS 6510	Advanced Software Development	
CS 6650	Building Scalable Distributed Systems	
CS 6710	Wireless Network	
Theory and Security		
CS 6760	Privacy, Security, and Usability	
CS 7805	Complexity Theory	
CY 5770	Software Vulnerabilities and Security	
CY 6740	Network Security	
CY 6750	Cryptography and Communications Security	
Artificial Intelligence and Data Science		
CS 5100	Foundations of Artificial Intelligence	
CS 5150	Game Artificial Intelligence	
CS 5200	Database Management Systems	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 6240	Large-Scale Parallel Data Processing	
CS 7140	Advanced Machine Learning	

Electives

Code	Title	Hours
Complete 12 semester hours from the following.		12
CS 5100 to CS 7880		
CS 8674	Master's Project	
CS 8982	Readings	
CS 7990	Thesis	
DS 5110	Introduction to Data Management and Processing	

Program Credit/GPA Requirements

36-44 total semester hours required

Minimum 3.000 GPA required

Cloud Software Development, Graduate Certificate

The Graduate Certificate in Cloud Software Development is designed to give students a strong foundation for working with cloud computing platforms like Amazon Web Services, Google Cloud, and Microsoft Azure. Through coursework and project-based learning, students gain the exposure needed to work across these platforms and also in hybrid platform environments. Cloud skills are in higher demand than ever before. However, there is a significant lack of qualified, skilled professionals to support this growth, especially for deployment in non-tech-related industries—such as manufacturing, transportation, travel, entertainment, and education—that rely increasingly on cloud platforms as part of their day-to-day operations. This certificate is aimed at addressing this skills gap utilizing the Khoury Align program's innovative curriculum and student support model, as well as course-based experiential learning opportunities to train students for in-demand and high-paying jobs.

Prerequisite

To ensure that all students have the foundation necessary to be successful in this program, each incoming student must demonstrate that they have taken undergraduate or graduate coursework in computer science or that they have comparable professional experience. This admission requirement can also be fulfilled by successful completion of Intensive Foundations of Computer Science (CS 5001).

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
CS 5004	Object-Oriented Design	4
CS 5610	Web Development	4
CS 6510	Advanced Software Development	4
CS 6620	Fundamentals of Cloud Computing	4

Program Credit/GPA Requirements

16 total semester hours required
Minimum 3.000 GPA required

Computer Science, Graduate Certificate

The postbaccalaureate certificate is designed to give students a solid foundation in the mathematical and theoretical underpinnings of computer science, including the areas of discrete mathematics, basic programming, data structures, object-oriented programming, algorithms, and computer systems. The goal of the certificate is to provide foundational knowledge in computer science that is valuable in both the workplace for career advancement, as well as to those looking to move into graduate programs within the discipline.

The courses in the Postbaccalaureate Certificate in Computer Science will serve as the foundational premaster's courses in the ALIGN program. Students that successfully complete the five certificate courses with a B in each course or better will be eligible to matriculate into the Master of Science in Computer Science program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
CS 5001 and CS 5003	Intensive Foundations of Computer Science and Recitation for CS 5001	4
CS 5002	Discrete Structures	4
CS 5004 and CS 5005	Object-Oriented Design and Recitation for CS 5004	4
CS 5008 and CS 5009	Data Structures, Algorithms, and Their Applications within Computer Systems and Recitation for CS 5008	4

Program Credit/GPA Requirements

16 total semester hours required
Minimum 3.000 GPA required

Data Analytics, Graduate Certificate

The interdisciplinary Graduate Certificate in Data Analytics is offered through a collaboration between the Khoury College of Computer Sciences and the College of Social Sciences and Humanities. The certificate curriculum emphasizes the skills needed to bridge between emerging technological capacities and traditional policymaking processes. The program is designed to provide students with foundational knowledge in data science—including data management, machine learning, data mining, statistics, and visualizing and communicating data—that can be applied to data-driven decision making in any discipline.

For more information on the certificate, refer to the program's website (https://www.northeastern.edu/graduate/program/graduate-certificate-in-data-analytics-boston-14423/).

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
DA 5020	Collecting, Storing, and Retrieving Data	4
DA 5030	Introduction to Data Mining/Machine Learning	4
INSH 5301	Introduction to Computational Statistics	4
INSH 5302	Information Design and Visual Analytics	4

Program Credit/GPA Requirements

16 total semester hours required
Minimum 3.000 GPA required

Cybersecurity

Students can apply for admission to two distinct degree programs.

Doctor of Philosophy (PhD) in Cybersecurity

A research-based, interdisciplinary PhD in cybersecurity spans theory and systems, from hardware to software security, from cryptography to policy, and from malware to wireless security. It seeks to prepare graduates to advance the state of the art of security in systems, networks, and the internet in industry, academia, and government. The interdisciplinary nature of the program distinguishes it from traditional doctoral degree programs in computer science, engineering, or social sciences and makes it unique in the Boston area.

Master of Science (MS) in Cybersecurity

An industry-focused, interdisciplinary Master of Science in Cybersecurity combines knowledge of information security technology and cybersecurity hands-on tools with relevant knowledge from law, the social sciences, criminology, and management. The Master of Science in Cybersecurity is designed for students focused on cybersecurity careers in companies or government agencies, thus applying their knowledge to their workplaces to assess security threats and manage information security risks and technical and policy controls.

Northeastern University designations by the National Security Agency (NSA) and the Department of Homeland Security (DHS):

- NSA/DHS Center of Academic Excellence in Cybersecurity—Cyber Defense Education
- NSA/DHS Center of Academic Excellence in Cybersecurity—Research
- NSA/DHS Center of Academic Excellence in Cybersecurity—Cyber Operations

Align Master of Science (MS) in Cybersecurity

Without exception, every organization needs to protect their information system. Every day cyber risks are becoming more complex, and the sophistication and number of threats is growing continuously. For these reasons, cybersecurity professionals need to become more prepared, with a very solid background and with the capacity to evolve and adapt to the current and future information systems challenges.

Organizations are looking for well-rounded cyber professionals, who, beside their understanding of information technologies, can also comprehend the many other dimensions that contribute to effective and efficient information systems security. Professionals with diversified backgrounds are particularly interesting because they are able to provide different approaches to complex cybersecurity problems.

Align-MSCY students are perfect cybersecurity professionals, because they have proven their adaptability to the cybersecurity field and also because they bring an invaluable experience and knowledge from other areas to contribute to a global perspective of the organization cybersecurity posture.

Programs

Doctor of Philosophy (PhD)

- Cybersecurity (p. 125)

Master of Science

- Cybersecurity (p. 128)
- Cybersecurity—Align

Graduate Certificate

- Cybersecurity (p. 131)

Cybersecurity, PhD

A research-based, interdisciplinary Doctor of Philosophy (PhD) in Cybersecurity combines a strong security technical foundation with a security policy and social sciences perspective. It seeks to prepare graduates to advance the state of the art of security in systems, networks, and the internet in industry, academia, and government. The interdisciplinary nature of the program distinguishes it from traditional doctoral degree programs in computer science, engineering, or social sciences and makes it unique in the Boston area.

Students who choose the PhD in Cybersecurity program have a strong desire to pursue academic research solving critical cybersecurity challenges facing today's society. The PhD program is a natural path for students in the college's Master of Science in Cybersecurity (http://www.ccs.neu.edu/graduate/degree-programs/m-s-in-information-assurance/)program who want to pursue research and students with bachelor's degrees and an interest in research-focused careers. Students who pursue careers in advancing the state of the art of cybersecurity have an opportunity to gain:

- A strong technical foundation in cybersecurity and an interdisciplinary perspective based on policy and social science
- A path to a research-focused career coupled with depth in information assurance research at a leading institution, one of the earliest designees by NSA/DHS as a National Center of Academic Excellence in Information Assurance Research, Information Assurance/Cyber Defense, and Cyber Operations
- The opportunity to work with and learn from faculty who are recognized internationally for their expertise and contributions in information assurance from Northeastern's Khoury College of Computer Sciences, the Department of Electrical and Computer Engineering, and the College of Social Sciences and Humanities
- Access to research projects at Northeastern's research centers focused on security:
  - The Cybersecurity and Privacy Institute (https://cyber.ccis.northeastern.edu/about/): The mission of Northeastern's Cybersecurity and Privacy Institute (the Institute) is to safeguard critical technology. Forging partnerships with experts in industry, government, and academia worldwide, the Institute's faculty and students develop, protect, and enhance technologies on which the world relies—from mobile devices and "smart" IoT applications to tomorrow's self-driving cars and delivery drones. Their expertise spans algorithm auditing; cloud security; cryptography; differential privacy; embedded device security; internet-scale security measurements; machine learning; big data; security, malware, and advanced threats; network protocols and security; web and mobile security; and wireless network security.
  - The International Secure Systems Lab (http://www.iseclab.org/), affiliated with Northeastern, a collaborative effort of European and U.S. researchers focused on web security, malware, and vulnerability analysis; intrusion detection; and other computer security issues.
  - The ALERT Center (http://www.northeastern.edu/alert/), where Northeastern is the lead institution, a multiuniversity Department of Homeland Security Center of Excellence involved in research, education, and technology related to threats from explosives.

The benefits of the Boston area:

- World-renowned for academic and research excellence, the Boston area is also home to some of the nation's largest Department of Defense contractors and government and independent labs such as MIT Lincoln Lab, MITRE, and Draper Lab.

Degree Requirements

The PhD in Cybersecurity degree requires completion of at least 48 semester credit hours beyond a bachelor's degree. Students who enter with an undergraduate degree will typically need four to five years to complete the program, and they will be awarded a master's degree en route to the PhD.

Doctoral Degree Candidacy

A student is considered a PhD degree candidate after completing the core courses with at least a 3.500 grade-point average (GPA), with no grades lower than a B in the core courses, and either publishing a paper in a strong conference or journal or passing an oral exam that is conducted by a committee of three cybersecurity faculty members and based on paper(s) written by the student.

RESIDENCY

One year of continuous full-time study is required after admission to the PhD candidacy. During this period, the student will be expected to make substantial progress in preparing for the comprehensive examination.

TEACHING REQUIREMENT

All cybersecurity PhD students must satisfy the teaching requirement in order to graduate. This requirement is fulfilled when the student works as a teaching assistant (TA) or instructor of record (IoR) for one semester and during this semester:

- Teaches at least three hours of classes
- Prepares at least one assignment or quiz or equivalent

PhD students are expected to satisfy the teaching requirement some time after completing their first year and at least one semester prior to scheduling their PhD defense.

DISSERTATION ADVISING

The doctoral dissertation advising team for each student consists of two cybersecurity faculty members, one in a technical area. When appropriate, the second faculty advisor will be from the policy/social science area.

DISSERTATION COMMITTEE

A PhD student's dissertation committee consists of the two members of the dissertation advising team plus two others: One is a member of the cybersecurity faculty, and the other is an external examiner who is knowledgeable about the student's research topic.

COMPREHENSIVE EXAMINATION

A PhD student must submit a written dissertation proposal and present it to the dissertation committee. The proposal should identify the research problem, the research plan, and the potential impact of the research on the field. The presentation of the proposal will be made in an open forum, and the student must successfully defend it before the dissertation committee after the public presentation.

DISSERTATION DEFENSE

A PhD student must complete and defend a dissertation that involves original research in cybersecurity.

AWARDING OF MASTER'S DEGREES

Students who enter the PhD in Cybersecurity program with a bachelor's degree have the option of obtaining a master's degree from one of the departments participating in the program. To do so, they must meet all of the department's degree requirements.

Program Requirements

Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Qualifying exam and area exam
Annual review
Dissertation proposal
Dissertation committee
Dissertation defense

Core Requirements

A grade of B or higher is required in each core course. A cumulative 3.500 GPA is required for the core requirement.

Code	Title	Hours
Foundations		
CY 5770	Software Vulnerabilities and Security	4
or EECE 5641	Introduction to Software Security	
CY 6740	Network Security	4
or EECE 5699	Computer Hardware and System Security	
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	4

Electives and Tracks

Code	Title	Hours
Note: Consult faculty advisor for other acceptable courses.		
Select at least two courses from one track:		8
Hardware Security		
CS 6410	Compilers	
CS 6710	Wireless Network	
EECE 5666	Digital Signal Processing	
EECE 7352	Computer Architecture	
EECE 7364	Mobile and Wireless Networking	
EECE 7390	Computer Hardware Security	
Machine Learning		
CS 6140	Machine Learning	
CS 7150	Deep Learning	
CY 6720	Machine Learning in Cybersecurity and Privacy	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7397	Advanced Machine Learning	
Network Security		
CS 5700	Fundamentals of Computer Networking	
CS 6710	Wireless Network	
CS 7610	Foundations of Distributed Systems	
CY 5130	Computer System Security	
CY 6750	Cryptography and Communications Security	

EECE 5155	Wireless Sensor Networks and the Internet of Things
EECE 5576	Wireless Communication Systems
EECE 7336	Digital Communications
EECE 7364	Mobile and Wireless Networking
EECE 7374	Fundamentals of Computer Networks
EECE 7393	Analysis and Design of Data Networks
Systems Security	
CS 6410	Compilers
CS 7600	Intensive Computer Systems
CS 7610	Foundations of Distributed Systems
CY 5130	Computer System Security
EECE 7352	Computer Architecture
Theory	
CS 7800	Advanced Algorithms
CS 7805	Complexity Theory
EECE 7337	Information Theory
Usable Security and Privacy	
CS 6350	Empirical Research Methods
CS 6760	Privacy, Security, and Usability
CS 7260	Visualization for Network Science
CS 7340	Theory and Methods in Human Computer Interaction
INSH 6300	Research Methods in the Social Sciences
INSH 6302	Qualitative Methods
INSH 6500	Statistical Analysis
INSH 7400	Quantitative Analysis
Cybersecurity Policy	
CRIM 6200	Criminology
CRIM 6262	Evidence-Based Crime Policy
CY 5200	Security Risk Management and Assessment
CY 5210	Information System Forensics
CY 5250	Decision Making for Critical Infrastructure
POLS 7341	Security and Resilience Policy
POLS 7441	Cyberconflict
Electives	
Selected in consultation with advisor from the graduate-level CS, ECE, and CSSH courses.	20

Dissertation

Code	Title	Hours
CY 9990	Dissertation Term 1	
CY 9991	Dissertation Term 2	
Complete the following (repeatable) course until graduation:		
CY 9996	Dissertation Continuation	

Program Credit/GPA Requirements

48 total semester hours required
Minimum 3.000 GPA required

Advanced Entry PhD Program Requirements

Degree Requirements

Incoming PhD in cybersecurity students who have already completed a Master of Science in an adjacent field may petition to the graduate program administration for advanced entry. Advanced entry petitions are reviewed by the program administration on a case-by-case basis. Please note that advanced entry does not waive by itself any part of the PhD coursework requirements. As a degree conferral requirement, a minimum of 16 semester hours of coursework beyond the 32 semester hours of the master's degree is required of advanced entry PhD students (48 semester hours is required of standard entry PhD students). A grade of B or higher is required in each course. A cumulative 3.500 GPA is required for the core requirement.

Doctoral Degree Candidacy

Refer to the PhD Cybersecurity overview (p. 125) for admission to candidacy requirements.

Residency

Refer to the PhD Cybersecurity overview (p. 125) for residency requirements.

Teaching Requirement

Refer to the PhD Cybersecurity overview (p. 125) for teaching requirements.

Dissertation Advising

Refer to the PhD Cybersecurity overview (p. 125) for dissertation advising requirements.

Dissertation Committee

Refer to the PhD Cybersecurity overview (p. 125) for dissertation committee requirements.

Comprehensive Examination

Refer to the PhD Cybersecurity overview (p. 125) for comprehensive examination requirements.

Dissertation Defense

Refer to the PhD Cybersecurity overview (p. 125) for dissertation defense and completion requirements.

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Qualifying exam and area exam
Annual review
Dissertation proposal
Dissertation committee
Dissertation defense

Core Requirement

Students are required to take all core courses unless otherwise determined by the program. Students must maintain a minimum GPA of 3.500 as well as earn a grade of B or better in each core course.

Code	Title	Hours
Foundations		
CY 5770	Software Vulnerabilities and Security	4
or EECE 5641	Introduction to Software Security	

CY 6740	Network Security	4
or EECE 5699	Computer Hardware and System Security	
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	4

Electives and Tracks

Students are required to take all courses unless otherwise determined by the program.

Code	Title	Hours
Note: Consult faculty advisor for other acceptable courses.		
Select at least two courses from one track:		8
Hardware Security		
CS 6410	Compilers	
CS 6710	Wireless Network	
EECE 5666	Digital Signal Processing	
EECE 7352	Computer Architecture	
EECE 7364	Mobile and Wireless Networking	
EECE 7390	Computer Hardware Security	
Machine Learning		
CS 6140	Machine Learning	
CS 7150	Deep Learning	
CY 6720	Machine Learning in Cybersecurity and Privacy	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7397	Advanced Machine Learning	
Network Security		
CS 5700	Fundamentals of Computer Networking	
CS 6710	Wireless Network	
CS 7610	Foundations of Distributed Systems	
CY 5130	Computer System Security	
CY 6750	Cryptography and Communications Security	
EECE 5155	Wireless Sensor Networks and the Internet of Things	
EECE 5576	Wireless Communication Systems	
EECE 7336	Digital Communications	
EECE 7364	Mobile and Wireless Networking	
EECE 7374	Fundamentals of Computer Networks	
EECE 7393	Analysis and Design of Data Networks	
Systems Security		
CS 6410	Compilers	
CS 7600	Intensive Computer Systems	
CS 7610	Foundations of Distributed Systems	
CY 5130	Computer System Security	
EECE 7352	Computer Architecture	
Theory		
CS 7800	Advanced Algorithms	
CS 7805	Complexity Theory	
EECE 7337	Information Theory	
Usable Security and Privacy		
CS 6350	Empirical Research Methods	
CS 6760	Privacy, Security, and Usability	
CS 7260	Visualization for Network Science	
CS 7340	Theory and Methods in Human Computer Interaction	
INSH 6300	Research Methods in the Social Sciences	
INSH 6302	Qualitative Methods	
INSH 6500	Statistical Analysis	
INSH 7400	Quantitative Analysis	
Cybersecurity Policy		
CRIM 6200	Criminology	
CRIM 6262	Evidence-Based Crime Policy	
CY 5200	Security Risk Management and Assessment	
CY 5210	Information System Forensics	
CY 5250	Decision Making for Critical Infrastructure	
POLS 7341	Security and Resilience Policy	
POLS 7441	Cyberconflict	
Electives		
Selected in consultation with advisor from the graduate-level CS, ECE, and CSSH courses.		20

Dissertation

Code	Title	Hours
CY 9990	Dissertation Term 1	
CY 9991	Dissertation Term 2	
Complete the following (repeatable) course until graduation:		
CY 9996	Dissertation Continuation	

Program Credit/GPA Requirements

Minimum 16 semester hours required
Minimum 3.000 GPA required

Cybersecurity, MS

Our Master of Science in Cybersecurity combines a solid understanding of information security technology with relevant knowledge from law, the social sciences, criminology, and management. The MS program is designed for working professionals and also recent graduates who want knowledge they can apply in workplaces to assess and manage information security risks effectively.

CONCENTRATION IN CRIMINOLOGY

Cybercrime has evolved into more advanced techniques and sophisticated structures. Cybersecurity professionals are of vital importance in crime investigations, and for that reason they need to have a well-rounded background and knowledge. The Master of Science in Cybersecurity provides an interdisciplinary foundation that includes computer science technical courses, complemented with the contextual knowledge courses required for a proper holistic approach to cybercrime. The concentration in criminology and criminal justice will serve MSCY students to obtain the fundamental principles and the most important practices that criminal justice professionals use.

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Cybersecurity with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Cybersecurity in addition to earning a Graduate Certificate in Engineering Leadership. Students must apply and be admitted to the Gordon Engineering Leadership

Program in order to pursue this option. The certificate program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour master's degree and certificate require 24 hours from the Master of Science in Cybersecurity (MS required courses, technical track, and contextual track).

Engineering Leadership (p. 245)

Program Requirements

Core Requirement

Code	Title	Hours
Foundations		
CY 5010	Foundations of Information Assurance	4
Technical Track		
Complete 8 semester hours from the following:		8
CY 5120	Applied Cryptography	
CY 5130	Computer System Security	
CY 5150	Network Security Practices	
CY 5770	Software Vulnerabilities and Security	
CY 6120	Software Security Practices	
CY 6740	Network Security	
Contextual Track		
Complete 8 semester hours from the following:		8
CY 5200	Security Risk Management and Assessment	
CY 5210	Information System Forensics	
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
CY 5250	Decision Making for Critical Infrastructure	
CY 6200	Special Topics in IT Security Governance, Risk, and Compliance	
CY 6240	Special Topics in Privacy Law	
Capstone		
CY 7900	Capstone Project	4

Electives

Code	Title	Hours
Complete 8 semester hours from the following:		8
CS 5200	Database Management Systems	
CS 5500	Foundations of Software Engineering	
CS 5600	Computer Systems	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 6710	Wireless Network	
CS 7580	Special Topics in Software Engineering	
CS 7805	Complexity Theory	
CY 5040	Introduction to Cyberspace Programming 2	
CY 5120	Applied Cryptography	
CY 5130	Computer System Security	
CY 5150	Network Security Practices	
CY 5200	Security Risk Management and Assessment	
CY 5210	Information System Forensics	
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
CY 5770	Software Vulnerabilities and Security	
CY 6120	Software Security Practices	
CY 6200	Special Topics in IT Security Governance, Risk, and Compliance	
CY 6240	Special Topics in Privacy Law	
CY 6720	Machine Learning in Cybersecurity and Privacy	
CY 6740	Network Security	
CY 6750	Cryptography and Communications Security	
CY 7790	Special Topics in Security and Privacy	
CRIM 6200	Criminology	
CRIM 6202	The Criminal Justice Process	
CRIM 6262	Evidence-Based Crime Policy	
PPUA 6503	Managing People in Public and Nonprofit Sectors	
PPUA 6505	Public Budgeting and Financial Management	
PPUA 6507	Institutional Leadership and the Public Manager	
POLS 7341	Security and Resilience Policy	
POLS 7441	Cyberconflict	

Concentration in Criminology

This concentration's required courses may count toward the contextual track, and its elective may count toward the major's elective area.

Code	Title	Hours
Required		**8**
CRIM 6200	Criminology	
CRIM 6202	The Criminal Justice Process	
Complete one of the following:		4
CRIM 6262	Evidence-Based Crime Policy	
CY 5250	Decision Making for Critical Infrastructure	
CRIM elective [1]		

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

[1] CRIM elective to be approved by Director/Associate Director of MSCY.

Cybersecurity, MS—Align Program

The innovative Align bridge program to the interdisciplinary Master of Science in Cybersecurity is designed for students with a BS/BA degree from all backgrounds. During the first semester of year one, students are expected to take foundational courses in computer science fundamentals, as well as a course in data structures/discrete mathematics. During their second semester, students will take coursework in object-oriented design, as well as introductions to algorithms and computer systems.

The Master of Science in Cybersecurity combines computer systems and network security training with knowledge from the social sciences, law,

criminology, and management, giving you an opportunity to obtain skills that are in high demand.

Concentration in Criminology

Cybercrime has evolved into more advanced techniques and sophisticated structures. Cybersecurity professionals are of vital importance in crime investigations, and for that reason they need to have a well-rounded background and knowledge. The Master of Science in Cybersecurity provides an interdisciplinary foundation that includes computer science technical courses, complemented with the contextual knowledge courses required for a proper holistic approach to cybercrime. The concentration in criminology and criminal justice will serve MSCY students to obtain the fundamental principles and the most important practices that criminal justice professionals use.

Gordon Institute of Engineering Leadership

Master's Degree in Cybersecurity with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Cybersecurity in addition to earning a Graduate Certificate in Engineering Leadership. Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The certificate program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour master's degree and certificate require 24 hours from the Master of Science in Cybersecurity (MS required courses, technical track, and contextual track).

Engineering Leadership (p. 245)

Program Requirements

Align Bridge Coursework

Students will be required to complete two or more of the following bridge courses to be determined by faculty mentor.

A grade of B or higher is required in each course.

Code	Title	Hours
Fundamentals		
CS 5001 and CS 5003	Intensive Foundations of Computer Science and Recitation for CS 5001	4
Discrete Structures		
CS 5002	Discrete Structures	4
Object-Oriented Design		
CS 5004 and CS 5005	Object-Oriented Design and Recitation for CS 5004	4
Additional Align Courses		
CS 5006	Algorithms	2
CS 5007	Computer Systems	2

Core Requirements

Code	Title	Hours
Foundations		
CY 5010	Foundations of Information Assurance	4
Technical Track		
Complete 8 semester hours from the following:		8
CY 5120	Applied Cryptography	
CY 5130	Computer System Security	
CY 5150	Network Security Practices	
CY 5770	Software Vulnerabilities and Security	
CY 6120	Software Security Practices	
CY 6740	Network Security	
Contextual Track		
Complete 8 semester hours from the following:		8
CY 5200	Security Risk Management and Assessment	
CY 5210	Information System Forensics	
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
CY 5250	Decision Making for Critical Infrastructure	
CY 6200	Special Topics in IT Security Governance, Risk, and Compliance	
CY 6240	Special Topics in Privacy Law	
Capstone		
CY 7900	Capstone Project	4

Electives

Code	Title	Hours
Complete 4 semester hours from the following:		4
CRIM 6200	Criminology	
CRIM 6202	The Criminal Justice Process	
CRIM 6262	Evidence-Based Crime Policy	
CS 5200	Database Management Systems	
CS 5500	Foundations of Software Engineering	
CS 5600	Computer Systems	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 6710	Wireless Network	
CS 7580	Special Topics in Software Engineering	
CS 7805	Complexity Theory	
CY 5040	Introduction to Cyberspace Programming 2	
CY 5120	Applied Cryptography	
CY 5130	Computer System Security	
CY 5150	Network Security Practices	
CY 5200	Security Risk Management and Assessment	
CY 5210	Information System Forensics	
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
CY 5770	Software Vulnerabilities and Security	
CY 6120	Software Security Practices	
CY 6200	Special Topics in IT Security Governance, Risk, and Compliance	
CY 6240	Special Topics in Privacy Law	
CY 6720	Machine Learning in Cybersecurity and Privacy	
CY 6740	Network Security	
CY 6750	Cryptography and Communications Security	
POLS 7341	Security and Resilience Policy	
POLS 7441	Cyberconflict	

PPUA 6503	Managing People in Public and Nonprofit Sectors
PPUA 6505	Public Budgeting and Financial Management
PPUA 6507	Institutional Leadership and the Public Manager

Concentration in Criminology

This concentration's required courses may count toward the contextual track, and its elective may count toward the major's elective area.

Code	Title	Hours
Required		**8**
CRIM 6200	Criminology	
CRIM 6202	The Criminal Justice Process	
Complete one of the following:		4
CRIM 6262	Evidence-Based Crime Policy	
CY 5250	Decision Making for Critical Infrastructure	
CRIM elective [1]		

Program Credit/GPA Requirements

36–44 total semester hours required
Minimum 3.000 GPA required

[1] CRIM elective to be approved by director/associate director of MSCY.

Cybersecurity, Graduate Certificate

The certificate is designed to give students a solid foundation in cybersecurity. In the course work, students have the opportunity to be exposed to fundamental cybersecurity principles and information security concepts related to information systems, to explore issues involved in the security of computer systems, and to explore the techniques used in computer forensic examination. The goal of the certificate is to provide prospective cybersecurity professionals with an entry point to industry positions within eight months from admission and with reduced financial investment.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
CY 5010	Foundations of Information Assurance	4
CY 5130	Computer System Security	4
CY 5210	Information System Forensics	4

Elective

Code	Title	Hours
Complete one of the following:		4
CY 5150	Network Security Practices	
CY 5200	Security Risk Management and Assessment	
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	

Program Credit/GPA Requirements

16 total semester hours required
Minimum 3.000 GPA required

Health Informatics

Meet the demand for health informatics professionals and researchers.

Professionals and researchers who understand the relationship between information technology, people, health, and the healthcare system are in short supply. With Northeastern University's interdisciplinary graduate programs in health informatics, you have an opportunity to gain the knowledge and skills needed to use information technology to improve healthcare delivery and outcomes—and to advance your career in this growing field.

Each of Northeastern's health informatics degree and certificate programs seek to provide:

- The expertise of both the Khoury College of Computer Sciences (http://www.ccs.neu.edu/about/) and Bouvé College of Health Sciences (http://www.northeastern.edu/bouve/)
- Faculty (http://www.ccs.neu.edu/graduate/degree-programs/m-s-in-health-informatics/faculty/) who are senior leaders in the field
- The ability to communicate effectively with clinicians, administrators, and IT professionals and to understand each of their needs and constraints
- Strong industry connections
- The opportunity to learn from students with backgrounds in healthcare or technology—nurses, pharmacists, physicians, programmers, project managers, analysts, and others
- Flexible course schedules and formats designed to meet the needs of both working professionals and full-time students
- Research opportunities and an academic lead-in to the PhD in Personal Health Informatics (http://phi.ccs.neu.edu/)

Northeastern's master's degree and certificate programs additionally also seek to provide:

- The ability to communicate effectively with clinicians, administrators, IT professionals, and patients and to understand each of their needs and constraints
- Flexible course schedules and formats designed to meet the needs of both working professionals and full-time students

Northeastern's doctoral program in personal health informatics provides students training for research-based careers in a cutting-edge new field within health, focused on the use of technology to help support health and wellness throughout the life span.

Whether you want to take on new responsibilities in your current workplace or to launch a new career, Northeastern's graduate degree and certificate programs in health informatics are designed to prepare you for leadership and specialist roles in a variety of health-related organizations. And you're ready to make an immediate impact on healthcare.

Doctor of Philosophy (PhD) in Personal Health Informatics

Northeastern's Doctor of Philosophy (PhD) in Personal Health Informatics (PHI) is an interdisciplinary doctoral program focused on educating top researchers in the theoretical underpinnings, design, evaluation, and dissemination of consumer- and patient-focused health systems. Personal health technologies are those that non–health professionals

interact with *directly,* both in and out of a clinical setting and in various life stages of illness and wellness.

Examples include:

- Assistive technologies that aid persons with disabilities
- Consumer wellness promotion technologies
- Patient education and counseling systems
- Interfaces for using and reviewing personal health records
- Advanced ambulatory monitoring for supporting health
- Automated elder care systems that monitor health and support independent living
- Social networking systems connecting families and their social and medical support networks

Students study the fundamentals of personal health informatics, ranging from theory to system development, as well as research methods that enable them to conduct transformative research. Students learn how to conduct research studies with patients and consumers with a wide range of backgrounds in different contexts using a variety of media, while ensuring that fielded technologies are effective, reliable, and responsive to the needs of at-risk and patient populations. Critical skills and knowledge covered in coursework include needs assessment, theories of interface design and health behavior, rapid prototyping and implementation, experimental design with human subjects in challenging settings, advanced research methods for evaluating interventions, and statistical data analysis and validation. Students conduct research working with, or leading, transdisciplinary teams.

The interdisciplinary nature of the program targets students who are interested in improving health and wellness using novel technologies that directly impact the lives of consumers and patients. This is a program for students who are not only technically strong but also socially conscious, design oriented, and interested in rigorously evaluating the technologies they imagine and build. The program provides a path for technical students to acquire more experience in the deployment and evaluation of health technologies in the field but also a path for students with health backgrounds to develop the technical skills needed to prototype and assess creative ideas they envision for improving care. The expected length of study is five years after the bachelor's degree.

Master of Science (MS) in Health Informatics

Northeastern's interdisciplinary Master of Science in Health Informatics was the first MS in the field. The program seeks to prepare students to address the combined clinical, technical, and business needs of health-related professionals. Successful students graduate with the knowledge of how technology, people, health, and the healthcare system interrelate; the ability to use technology and information management to improve healthcare delivery and outcomes; and the skills to communicate effectively among healthcare practitioners, administrators, and information technology professionals.

Programs

Doctor of Philosophy (PhD)

- Personal Health Informatics (p. 132)

Master of Science (MS)

- Health Informatics (p. 134)

Graduate Certificate

- Health Informatics Management and Exchange (p. 265)
- Health Informatics Privacy and Security (p. 266)
- Health Informatics Software Engineering (p. 266)

Personal Health Informatics, PhD

Northeastern's Doctor of Philosophy (PhD) in Personal Health Informatics (PHI) is a transdisciplinary doctoral program focused on educating top researchers in the theoretical underpinnings, design, evaluation, and dissemination of consumer- and patient-focused health systems. Personal health technologies are those that non–health professionals interact with *directly*, both in and out of a clinical setting and in various life stages of illness and wellness.

Examples include:

- Assistive technologies that aid persons with disabilities
- Consumer wellness promotion technologies
- Patient education and counseling systems
- Interfaces for reviewing personal health records
- Advanced ambulatory monitoring for supporting health
- Automated elder care systems that monitor health and support independent living
- Social networking systems connecting families and their social and medical support networks

Developing personal health interface technologies requires that professionals have skills and experience designing systems for individual patients and consumers with a wide range of backgrounds in different contexts using a variety of media, while ensuring that fielded technologies are effective, reliable, and responsive to the needs of at-risk and patient populations. Critical skills and knowledge include needs assessment, theories of interface design and health behavior, rapid prototyping and implementation, experimental design with human subjects in challenging settings, and statistical data analysis and validation. Moreover, these skills must be deployed while working with, or leading, transdisciplinary teams.

The interdisciplinary nature of the program targets students who are interested in improving health and wellness using novel technologies that directly impact the lives of consumers and patients. This is a program for students who are not only technically strong but also socially conscious, design oriented, and interested in rigorously evaluating the technologies they imagine and build. The program provides a path for technical students to acquire more experience in the deployment and evaluation of health technologies in the field but also a path for students with health backgrounds to develop the technical skills needed to prototype and assess creative ideas they envision for improving care. The expected length of study is five years after the bachelor's degree.

Admission Requirements

Students will be accepted with either of the following:

- A bachelor's or higher degree in a technical discipline (e.g., computer science or information science, computer systems engineering) with either academic or work experience demonstrating a commitment to working in health.
- A bachelor's or higher degree in a health science discipline (e.g., nursing, medicine, physical therapy, pharmacy, public health) with either some academic coursework in technology, such as a course in programming or design, or work experience where the

applicant participated in the development, adaptation, or evaluation of consumer- or patient-facing health technology. (Otherwise outstanding applicants without programming skills may be advised to take an introductory programming course prior to entry, and otherwise outstanding applicants without any formal experience working in health settings may be advised to spend some time volunteering in a medical or community health setting prior to entry.)

Applicants will be expected to have:

- A minimum 3.000 undergraduate grade-point average (GPA)
- A minimum total GRE score of 300 or equivalent
- A minimum GRE academic writing score of 3.5
- For international applicants, a minimum TOEFL score of 105

Minimum Academic Standards and Requirements

RESIDENCY REQUIREMENT

The residency requirement will follow the University Graduate Council By-Law policy.

TEACHING REQUIREMENT

All personal health informatics PhD students must satisfy the teaching requirement in order to graduate. This requirement is fulfilled when the student works as a teaching assistant (TA) or instructor of record (IoR) for one semester and during this semester:

- Teaches at least three hours of classes
- Prepares at least one assignment, or quiz, or equivalent

PhD students are expected to satisfy the teaching requirement some time after completing their first year and at least one semester prior to scheduling their PhD defense.

DISSERTATION ADVISING

Each student will have one primary adviser from the personal health informatics doctoral program faculty.

DISSERTATION COMMITTEE

The committee will consist of at least three members: the dissertation adviser, one additional personal health informatics doctoral program faculty member, and one member external to Northeastern who is an expert in the specific personal health informatics topic of research. The dissertation committee shall include experts with both health and technology backgrounds. The dissertation adviser must be a full-time member of the Northeastern University faculty.

QUALIFYING EXAMINATION

The qualifying examination consists of a three-part exam conducted by a committee of three personal health informatics doctoral program faculty members, each overseeing one part of the exam. The research core of the exam is fulfilled with submission of a high-quality paper to a strong peer-reviewed conference or journal. The health component of the exam is fulfilled when the student passes a written exam developed by a faculty member with a health sciences background, and the technical component of the exam is fulfilled when the student passes an exam developed by a faculty member with a technical background. The content of the written exams and the paper topic are developed in consultation with each faculty member.

DEGREE CANDIDACY

A student is considered a PhD degree candidate upon meeting these conditions:

- Completion of core courses with a minimum GPA of 3.000 overall on the core courses
- Completion of the qualifying examination

COMPREHENSIVE EXAM

A PhD student must submit a written dissertation proposal to the dissertation committee. The proposal should identify the research problem, the research plan, and its potential impact on the field. A presentation of the proposal will be made in an open forum, and the student must successfully defend it before the dissertation committee.

DISSERTATION DEFENSE

A PhD student must complete and defend a dissertation that involves original research in personal health informatics.

Curriculum Requirements

REQUIRED AND ELECTIVE COURSES

The curriculum is designed to provide all PhD students with a strong foundation in principles critical to the design and evaluation of personal health interfaces. All students take six core courses (24 semester hours) and the user-interface practicum (1 semester hour).The student must maintain a minimum GPA of 3.500 among the six core courses and receive a grade of B or better in each of these courses. All students must also fulfill the programming fundamentals requirement (4 semester hours) and the statistics fundamentals requirement (4 semester hours), where some flexibility in course selection allows tailoring based on background and experience. Two additional research electives (8 semester hours) are selected based on research interests from the personal health informatics electives list. Students are also expected to participate in the personal health informatics seminar series each semester.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Qualifying examinations (3)
Annual review
Dissertation proposal
Dissertation committee
Dissertation defense

Core Requirements

A grade of B or higher is required in each course. A cumulative 3.500 GPA is required for the core requirement.

Code	Title	Hours
Foundations		
HINF 5200	Theoretical Foundations in Personal Health Informatics	4
Program Design and Development		
CS 5010	Programming Design Paradigm (or another programming course)	4
CS 7340	Theory and Methods in Human Computer Interaction	4
HINF 5300	Personal Health Interface Design and Development	4
Methods and Statistics		
CS 6350	Empirical Research Methods	4
Choose one:		*3-4*

CAEP 7712	Intermediate Statistical Data Analysis Techniques	
CS 7200	Statistical Methods for Computer Science	
PHTH 5210	Biostatistics in Public Health	
PHTH 6440	Advanced Methods in Biostatistics	
Evaluation		
HINF 5301	Evaluating Health Technologies	4
HINF 8982	Readings	1-8

Electives

Code	Title	Hours
Complete 12-17 semester hours in the following subject areas to fulfill the minimum program hours:		12-17
(Note: Please see faculty advisor for other acceptable elective courses.)		
CAEP		
CS		
HINF		
PHTH		

Dissertation

Code	Title	Hours
CS 9990	Dissertation Term 1	
CS 9991	Dissertation Term 2	

Program Credit/GPA Requirements

48 total semester hours required
Minimum 3.000 GPA required

Plan of Study
Sample Curriculum

Year 1

Fall	Hours	Spring	Hours
HINF 5200	4	CS 5010 or 5520	4
CS 7340	4	CS 6350	4
		Additionally, students should participate in the Personal Health Informatics Usability Evaluation Practicum	1
	8		9

Year 2

Fall	Hours	Spring	Hours
HINF 5300	4	HINF 5301	4
PHTH 5210, 6440, CAEP 7712, or CS 7200	3-4	PHI elective	3-4
	7-8		7-8

Year 3

Fall	Hours	Spring	Hours
CS 9990	0	CS 9991	0
HINF 8982	1-8	PHI electives	7-8
	1-8		7-8

Year 4

Fall	Hours	Spring	Hours
HINF 9996	0	HINF 9996	0
	0		0

Year 5

Fall	Hours	Spring	Hours
HINF 9996	0	HINF 9996	0
	0		0

Total Hours: 39-49

Health Informatics, MS

Northeastern's interdisciplinary Master of Science in Health Informatics was the first MS in the field. The program seeks to prepare students to address the combined clinical, technical, and business needs of health-related professionals. Successful students graduate with the knowledge of how technology, people, health, and the healthcare system interrelate; the ability to use technology and information management to improve healthcare delivery and outcomes; and the skills to communicate effectively among healthcare practitioners, administrators, and information technology professionals.

With approval from the health informatics program director, selected students can substitute one course from the Graduate Certificate in Data Analytics for a technical core requirement in the MS in Health Informatics degree, and up to two more courses from the Graduate Certificate in Data Analytics can be counted as electives for the MS in Health Informatics degree.

Northeastern also offers graduate certificate programs in health informatics. Three certificate programs enable you to choose the one that addresses your specific goals. These programs are listed separately in this catalog:

- Graduate Certificate in Health Informatics Management and Exchange
- Graduate Certificate in Health Informatics Privacy and Security
- Graduate Certificate in Health Informatics Software Engineering

Courses in the certificate program also apply toward master's degree requirements. This gives you the flexibility to complete a certificate and be well on your way to earning a degree if you decide later to continue your education.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of B– or higher is required in each course.

Code	Title	Hours
Required Core		
HINF 5101	Introduction to Health Informatics and Health Information Systems	3
HINF 5105	The American Healthcare System	3
HINF 7701	Health Informatics Capstone Project	3
Business Management		
Complete two courses from the following:		6

HINF 6201	Organizational Behavior, Work Flow Design, and Change Management
HINF 6202	Business of Healthcare Informatics
HINF 6215	Project Management
HINF 6335	Management Issues in Healthcare Information Technology
HINF 6240	Improving the Patient Experience through Informatics
PHTH 5226	Strategic Management and Leadership in Healthcare

Health Informatics

Complete two courses from the following:	6
HINF 5102	Data Management in Healthcare
HINF 5110	Global Health Information Management
HINF 5200	Theoretical Foundations in Personal Health Informatics
HINF 5300	Personal Health Interface Design and Development
HINF 5301	Evaluating Health Technologies
HINF 6205	Creation and Application of Medical Knowledge
HINF 6350	Public Health Surveillance and Informatics
HINF 6404	Patient Engagement Informatics and Analytics
HINF 6405	Quantifying the Value of Informatics
PHTH 5232	Evaluating Healthcare Quality

Technical

Complete two courses from the following:	6
HINF 6220	Database Design, Access, Modeling, and Security
HINF 6355	Interoperability Key Standards in Health Informatics
HINF 6400	Introduction to Health Data Analytics
PHTH 5202	Introduction to Epidemiology
PHTH 5210	Biostatistics in Public Health
PHTH 6210	Applied Regression Analysis
PHTH 6400	Principles of Population Health 1
PHTH 6440	Advanced Methods in Biostatistics
One course from the following may count toward the technical core requirement:	
DA 5020	Collecting, Storing, and Retrieving Data
DA 5030	Introduction to Data Mining/Machine Learning
INSH 5301	Introduction to Computational Statistics
INSH 5302	Information Design and Visual Analytics

Electives

Code	Title	Hours
Complete two courses from the following. Any course not taken to complete a core requirement may be taken as an elective.		6
HINF 6345	Design for Usability in Healthcare	
DA 5020	Collecting, Storing, and Retrieving Data	
DA 5030	Introduction to Data Mining/Machine Learning	
INSH 5301	Introduction to Computational Statistics	
INSH 5302	Information Design and Visual Analytics	

Program Credit/GPA Requirements

Minimum 33 total semester hours required
Minimum 3.000 GPA required

Interdisciplinary

Doctor of Philosophy

- Network Science (p. 135)

Master of Science

- Data Science (p. 118)
- Game Science and Design (p. 53)
- Health Informatics (p. 134)
- Robotics (p. 121)

Graduate Certificate

- Data Analytics (p. 124)

Network Science, PhD

Website (http://www.networkscienceinstitute.org)

The PhD program in network science aims to enhance our understanding of networks arising from the interplay of human behavior, sociotechnical infrastructures, information diffusion, and biological agents. This is an intrinsically multidisciplinary activity, with members of the network science community representing a wide range of fields including computer science, information science, complexity, physics, sociology, communication, organizational behavior, political science, and epidemiology. This is an interdisciplinary doctoral program focused on training students in network science across several colleges—including the College of Social Sciences and Humanities, the College of Science, the Khoury College of Computer Sciences, and Bouvé College of Health Sciences—with several research areas, including computational sciences, information sciences, health and life sciences, social sciences, and theoretical physics. See other collaborating colleges' catalog sections for possible elective courses.

Coursework is dependent on a student's area of research and subject to prior approval by their faculty advisor. Required coursework includes 20 semester hours of core courses in network science, plus an additional 20 semester hours of courses relevant to the students' area of research. A minimum of 40 credit hours of coursework is required, though the graduate program committee may recommend additional coursework based on student research interests.

Satisfactory progress in the program will be ongoing and formally evaluated at the end of both the first and second years of the program. Students are expected to maintain a cumulative GPA of 3.000 or better in all coursework. Students are not allowed to retake courses. A student who does not maintain the 3.000 GPA, or is not making satisfactory progress on their dissertation research, may be recommended for termination by the graduate program committee.

Each student will have one primary research advisor from the network science doctoral program faculty.

Students will be expected to select their research advisor by the end of the spring semester of their second year in the program.

The dissertation committee consists of at least four members: the dissertation advisor, one additional network science doctoral program faculty member, one member expert in the specific topic of research (can be from outside the university), and one additional tenured/tenure-track faculty member from the concentration department/conferring college. The dissertation advisor must be a full-time tenured or tenure-track member of the Northeastern University faculty. Students may repeat the comprehensive examination once if they are unsuccessful.

Degree Candidacy

A student is considered a PhD candidate upon completion of all required coursework with a minimum cumulative GPA of 3.000, satisfactory completion of the qualification exam, and satisfactory completion of the comprehensive exam.

Qualifying Examination

The qualification exam will be an oral examination of the material during the students' coursework. The exam will be an hour in length and consist of questions selected by network science faculty who comprise the qualifying examination and dissertation committee. Students will receive 50 to 80 potential questions, which they must be prepared to answer, one month before the exam. The exam will consist of a subset of these questions. The qualifying exam will be offered twice annually, in the fall and spring term. All students are required to initially sit for the exam in the fall, typically in their third year of the PhD program. Students who do not pass the qualifying exam on their first attempt are expected to retake the exam in the spring term. Students may sit for the qualifying exam no more than twice.

Students who fail to complete the qualifying examination but who have completed all the PhD program's required coursework with a cumulative GPA of 3.000 or better will be awarded a terminal Master of Science in Network Science degree. Note that no students will be admitted directly into the network science program for receipt of a master's degree.

Comprehensive Examination

Students must submit a written dissertation proposal to the Dissertation Committee. The proposal (with the aid and approval of their dissertation advisor) will outline a plan to carry out new and original research. The proposal should identify relevant literature, the research problem, the research plan, and the potential impact on the field. An oral presentation of the proposal will be made in an open forum before a public audience and the Dissertation Committee, followed by questions from non-committee members. The written proposal must be given to committee member at least two weeks prior to the oral presentation. After the presentation,the student will meet with the dissertation committee to address any concerns raised in either the written proposal or the presentation.The Comprehensive Exam must precede the final dissertation defense by at least one year.

Dissertation Defense

A PhD student must complete and defend a dissertation that involves original research in network science. The dissertation defense must adhere to Northeastern University academic policies.

Students who do not qualify for the doctoral degree, but who have completed required coursework with a cumulative GPA of 3.000 or better, may be eligible to receive a terminal MS Network Science (p. 523)*degree. Note that no students will be admitted directly into the Network Science program to pursue a master's degree.*

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review
Qualifying exam
Dissertation committee
Dissertation proposal
Dissertation defense

Core Requirements

Code	Title	Hours
PHYS 5116	Complex Networks and Applications	4
NETS 6116	Complex Networks and Applications 2	4
PHYS 7332	Network Science Data 2	4
or NETS 7332	Machine Learning with Graphs	
POLS 7334	Social Networks (NETS)	4
PHYS 7335	Dynamical Processes in Complex Networks	4

Specializations

Choose one of the following specializations or 20 semester hours of elective coursework from the electives course list:

- Computer Science (p.)
- Social Science (p.)
- Epidemiology (p. 136)
- Physics/Theory (p. 137)
- Math (p. 137)
- Coursework (p.)

COMPUTER SCIENCE

Code	Title	Hours
CS 5800	Algorithms	4
CS 6140	Machine Learning	4
or CS 6220	Data Mining Techniques	
Complete 12 semester hours of elective courses from the elective list below. Students who wish to take courses outside of the electives list below must do so in consultation with their adviser.		12

SOCIAL SCIENCE

Code	Title	Hours
NETS 7350	Bayesian and Network Statistics	4
NETS 7360	Research Design for Social Networks	4
Complete 12 semester hours of elective courses from the elective list below. Students who wish to take courses outside of the electives list below must do so in consultation with their adviser.		12

EPIDEMIOLOGY

Code	Title	Hours
PHTH 5202	Introduction to Epidemiology	3
PHTH 6202	Intermediate Epidemiology	3

Complete 14 semester hours of elective courses from the elective list below. Students who wish to take courses outside of the electives list below must do so in consultation with their adviser.		14

PHYSICS/THEORY

Code	Title	Hours
MATH 7233	Graph Theory	4
PHYS 7337	Statistical Physics of Complex Networks	4
Complete 12 semester hours of elective courses from the elective list below. Students who wish to take courses outside of the electives list below must do so in consultation with their adviser.		12

MATH

Code	Title	Hours
CS 5800	Algorithms	4
MATH 7233	Graph Theory	4
Complete 12 semester hours of elective courses from the elective list below. Students who wish to take courses outside of the electives list below must do so in consultation with their adviser.		12

COURSEWORK

Code	Title	Hours
Complete 20 semester hours of elective courses from the elective list below. Students who wish to take courses outside of the electives list below must do so in consultation with their adviser.		20

ELECTIVES LIST

Common electives include the following:

Code	Title	Hours
CS 5800	Algorithms	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	
CS 6220	Data Mining Techniques	
CS 7180	Special Topics in Artificial Intelligence	
CS 7260	Visualization for Network Science	
CS 7295	Special Topics in Data Visualization	
NETS 7341	Network Economics	
NETS 7350	Bayesian and Network Statistics	
NETS 7976	Directed Study	
NETS 7983	Topics	
MATH 7233	Graph Theory	
MATH 7243	Machine Learning and Statistical Learning Theory	
PHYS 7305	Statistical Physics	
PHYS 7321	Computational Physics	
PHYS 7337	Statistical Physics of Complex Networks	

Dissertation

Code	Title	Hours
NETS 9990	Dissertation Term 1	
NETS 9991	Dissertation Term 2	

Program Credit/GPA Requirements

40 total semester hours required
Minimum 3.000 GPA required

Plan of Study

Year 1

Fall	Hours	Spring	Hours
PHYS 5116	4	PHYS 7332	4
PHYS 7331 or INSH 5301 (If required, may be substituted with an elective)	4	NETS 6116	4
		POLS 7334	4
	8		12

Year 2

Fall	Hours	Spring	Hours
PHYS 7335	4	Two Elective Courses	8
Two Elective Courses	8		
	12		8

Year 3

Fall	Hours	Spring	Hours
NETS 9990	0	NETS 9991	0
	0		0

Year 4

Fall	Hours
NETS 9996	0
	0

Total Hours: 40

Data Science, MS

Khoury College of Computer Sciences and the Department of Electrical and Computer Engineering (ECE) jointly offer a new interdisciplinary master of science program in data science. This program is designed to give students a comprehensive framework for reasoning about data. Students will engage in extensive coursework intended to develop depth in data collection, storage, retrieval, manipulation, visualization, modeling, and interpretation. Students will also be able to choose elective courses from a variety of offerings in Khoury, the College of Engineering (COE), and throughout the campus to explore areas that generate data or specialized data science applications. Successful program graduates will be well positioned to attain data scientist and data engineer positions in a fast-growing field or to progress into doctoral degrees in related disciplines.

Prerequisite Courses

The Master of Science in Data Science curriculum is tailored toward technically or mathematically trained students. To ensure that all students have the foundation necessary to be successful in this program, each incoming student must either complete two introductory courses at Northeastern or complete two placement exams administered one week prior to the beginning of the semester. The two exams cover fundamentals of computer science and programming skills and basic statistics, probability, and linear algebra. This admission requirement can also be fulfilled by successful completion of Introduction to Programming for Data Science (DS 5010) and Introduction to Linear Algebra and

Probability for Data Science (DS 5020). The introductory courses are not counted as credit toward the degree but are included in the student's cumulative grade-point average. Students are required to get a passing grade in each section of the placement exams in order to progress into the core courses in the degree program. If the student does not get a passing grade in a part of the placement exam, then the student must take the corresponding introductory course. Students that do not achieve a B or better in the introductory courses will be required to retake the courses.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Students should refer to the course numbering table for graduate course leveling (p. 36).

Core Requirements

A cumulative GPA of 3.000 or higher is required in the following core courses.

Code	Title	Hours
Complete 20 semester hours from the following:		
Data Management and Processing		
DS 5110	Introduction to Data Management and Processing	4
Algorithms		
Complete 4 semester hours from the following:		4
CS 5800	Algorithms	
EECE 7205	Fundamentals of Computer Engineering	
Machine Learning and Data Mining		
DS 5220	Supervised Machine Learning and Learning Theory	4
DS 5230	Unsupervised Machine Learning and Data Mining	4
Presentation and Visualization		
DS 5500	Capstone: Applications in Data Science	4

Electives

Code	Title	Hours
Complete 12 semester hours from the following: [1]		12
Khoury College of Computer Sciences		
CS 5100	Foundations of Artificial Intelligence	
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5200	Database Management Systems	
CS 5335	Robotic Science and Systems	
CS 5340	Computer/Human Interaction	
CS 5610	Web Development	
CS 6120	Natural Language Processing	
CS 6200	Information Retrieval	
CS 6240	Large-Scale Parallel Data Processing	
CS 6350	Empirical Research Methods	
CS 6620	Fundamentals of Cloud Computing	
CS 6650	Building Scalable Distributed Systems	
CS 7140	Advanced Machine Learning	
CS 7150	Deep Learning	
CS 7180	Special Topics in Artificial Intelligence	
CS 7200	Statistical Methods for Computer Science	
CS 7280	Special Topics in Database Management	
CS 7290	Special Topics in Data Science	
DS 7990	Thesis	
DS 7995	Project	
College of Engineering		
CIVE 7100	Time Series and Geospatial Data Sciences	
CIVE 7388	Special Topics in Civil Engineering	
EECE 5639	Computer Vision	
EECE 5640	High-Performance Computing	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7337	Information Theory	
EECE 7370	Advanced Computer Vision	
EECE 7397	Advanced Machine Learning	
IE 7275	Data Mining in Engineering	
IE 7280	Statistical Methods in Engineering	
College of Social Sciences and Humanities		
ECON 5140	Applied Econometrics	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5262	Big Data for Cities	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
PPUA 5266	Urban Theory and Science	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	
College of Science		
ENVR 5563	Advanced Spatial Analysis	
PHYS 5116	Complex Networks and Applications	
PHYS 7305	Statistical Physics	
PHYS 7321	Computational Physics	
PHYS 7331	Network Science Data	
Bouvé College of Health Sciences		
PHTH 5202	Introduction to Epidemiology	
PHTH 5210	Biostatistics in Public Health	
PHTH 6224	Social Epidemiology	
College of Arts, Media and Design		
GSND 5110	Game Design and Analysis	
GSND 6350	Data-Driven Player Modeling	

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

[1] Students taking electives worth less than 4 credits (i.e., Bouvé courses) should enroll for an accompanying data science project course in the same semester to bring the cumulative credits to 4. In order to earn this additional credit, students are expected to work with faculty to design an additional project in line with the curricular aims of their chosen elective and the data science core learning outcomes.

Game Science and Design, MS

The **Master of Science (MS) in Game Science and Design** is a program that seeks to give students a comprehensive understanding of how successful game products are created in a player-centric environment. Successful graduates who wish to become professional game developers or game user research experts should be able to collaborate effectively in this dynamic and burgeoning field of practice and research. Focusing on the science of game development, students have an opportunity to learn the design and technological skills needed to build a game and develop a deep understanding of playability and analytics that makes products successful in an increasingly competitive marketplace.

The game industry has expanded to include social and mobile gaming; augmented and virtual reality; as well as games in health, education, and training. Rapid innovations are happening in player psychology, middleware, graphics and authoring tools, game mechanics, and artificial intelligence and narrative techniques. It has become an increasingly competitive space.

The selectiveness of the industry and the diversity of the skills required mean that students seeking entry need both broad and deep skills. As an emergent industry using diverse technology and collaborative practices, the game industry needs professionals with interdisciplinary skill sets who can blend knowledge about development with knowledge about evaluation methods and players' behavior and psychology.

Jointly offered by Northeastern's College of Arts, Media and Design and Khoury College of Computer Sciences (https://www.khoury.northeastern.edu/), the **Master of Science in Game Science and Design** is a one-of-a-kind interdisciplinary program that seeks to prepare students to meet this need by weaving together science and design. This is a two-year, 34-credit-hour program.

All admitted students will be assigned to an advisor who will help them select a pathway with a coherent set of electives depending on their career goals. The advisor will also monitor their progress through the master's degree.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Required Core		
GSND 5110 and GSND 5111 and GSND 5112	Game Design and Analysis and Seminar for GSND 5110 and Recitation for GSND 5110	5
GSND 5122	Business Models in the Game Industry	1
GSND 5130	Mixed Research Methods for Games	4
Thesis		
GSND 6330	Player Experience	4
GSND 7990	Thesis	4

Electives

Code	Title	Hours
Game Design or Development		
Complete one of the following:		4
CS 5150	Game Artificial Intelligence	
CS 5850	Building Game Engines	
GSND 6240	Exploratory Concept Design	
GSND 6250	Spatial and Temporal Design	
Game User Research or Analytics		
Complete one of the following:		4
CS 5340	Computer/Human Interaction	
GSND 6320	Psychology of Play	
GSND 6340	Biometrics for Design	
GSND 6350	Data-Driven Player Modeling	

Code	Title	Hours
Other Electives List		
Complete any two of the previously listed courses or from the following (courses not listed below may be completed in consultation with your faculty advisor):		8
ARTG 5130	Visual Communication for Information Design	
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 5610	Design Systems	
ARTG 5640	Prototyping for Experience Design	
ARTG 6310	Design for Behavior and Experience	
CS 5520	Mobile Application Development	
CS 5610	Web Development	
DA 5020	Collecting, Storing, and Retrieving Data	
DA 5030	Introduction to Data Mining/Machine Learning	
INSH 5302	Information Design and Visual Analytics	
JRNL 6341	Telling Your Story with Data	

Program Credit/GPA Requirements

34 total semester hours required
Minimum 3.000 GPA required

Plan of Study

Sample Two Years, One Co-op (Optional) Plan of Study

Year 1

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
GSND 5110 and GSND 5111 and GSND 5112	5	Elective	4	Co-op (optional)	0
GSND 5130	4	Elective	4		
	9		8		0

Year 2

Fall	Hours	Spring	Hours
GSND 5122	1	Elective	4
GSND 6330	4	GSND 7990	4
Elective	4		
	9		8

Total Hours: 34

Note: Co-op or Thesis Co-op is optional in consultation with faculty advisor.

Robotics, MS

For program contact information, please visit this website (https://coe.northeastern.edu/academic-programs/ms-robo/).

MS Robotics is a multidisciplinary Master of Science program offered by the College of Engineering (COE) and the Khoury College of Computer Sciences. The program is designed to provide students comprehensive training in algorithms, sensors, control systems, and mechanisms used in robotics.

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Robotics with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Robotics in addition to earning a Graduate Certificate in Engineering Leadership (p. 245). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 40-semester-hour degree and certificate will require 24 semester hours of advisor-approved Robotics technical courses.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Mechanical Engineering		
Complete one of the following:		4
ME 5250	Robot Mechanics and Control	
ME 5659	Control Systems Engineering	
Electrical and Computer Engineering		
Complete one of the following:		4
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
Computer Science		
Complete one of the following:		4
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5335	Robotic Science and Systems	

Concentrations

Complete one of the following concentrations:

- Mechanical Engineering (p. 121)
- Electrical and Computer Engineering (p. 121)
- Computer Science (p. 122)

MECHANICAL ENGINEERING

Code	Title	Hours
Required Course		
Complete additional ME course not used to fulfill the core requirements:		4
ME 5250	Robot Mechanics and Control	
ME 5659	Control Systems Engineering	
Complete one of the following options:		
Course Work Option		
Complete 16SH of courses from the elective course list. (p.)		16
Project Option		
ME 7945	Master's Project	4
Complete 12SH of courses from the elective course list. (p.)		12
Thesis Option		
ME 7990	Thesis	8
Complete 8SH of courses from the elective course list. (p.)		8

ELECTRICAL AND COMPUTER ENGINEERING

Code	Title	Hours
Required Course		
Complete additional EECE course not used to fulfill the core requirements:		4
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
Complete one of the following options:		
Course Work Option		
Complete 16SH of courses from the elective course list. (p.)		16
Project Option		
EECE 7674	Master's Project	4
Complete 12SH of courses from the elective course list. (p.)		12
Thesis Option		
EECE 7990	Thesis	8
Complete 8SH of courses from the elective course list. (p.)		8

COMPUTER SCIENCE

Code	Title	Hours
Required Course		
Complete additional CS course not used to fulfill the core requirements:		4
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5335	Robotic Science and Systems	
Complete one of the following options:		
Course Work Option		
Complete 16SH of courses from the elective course list. (p.)		16
Project Option		
CS 8674	Master's Project	4
Complete 12SH of courses from the elective course list. (p.)		12
Thesis Option		
CS 7990	Thesis (complete twice for a total of 8 credits)	8
Complete 8SH of courses from the elective course list. (p.)		8

Elective Course List

Code	Title	Hours
Mechanical Engineering Course List		
IE 7280	Statistical Methods in Engineering	
IE 7315	Human Factors Engineering	
IE 7615	Neural Networks and Deep Learning	
ME 5240	Computer Aided Design and Manufacturing	
ME 5245	Mechatronic Systems	
ME 5250	Robot Mechanics and Control	
ME 5655	Dynamics and Mechanical Vibration	
ME 5659	Control Systems Engineering	
ME 5665	Musculoskeletal Biomechanics	
ME 6200	Mathematical Methods for Mechanical Engineers 1	
ME 6201	Mathematical Methods for Mechanical Engineers 2	
ME 7210	Elasticity and Plasticity	
ME 7247	Advanced Control Engineering	
Electrical and Computer Engineering Course List		
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
EECE 5580	Classical Control Systems	
EECE 5639	Computer Vision	
EECE 5642	Data Visualization	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7150	Autonomous Field Robotics	
EECE 7323	Numerical Optimization Methods	
EECE 7337	Information Theory	
EECE 7370	Advanced Computer Vision	
EECE 7397	Advanced Machine Learning	
Computer Science Course List		
CS 5006	Algorithms	
CS 5100	Foundations of Artificial Intelligence	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	
CS 6350	Empirical Research Methods	
CS 7140	Advanced Machine Learning	
CS 7150	Deep Learning	
CS 7180	Special Topics in Artificial Intelligence	
DS 5220	Supervised Machine Learning and Learning Theory	

PROGRAM CREDIT/GPA REQUIREMENTS
32 total semester hours required
Minimum 3.000 GPA required

Data Analytics, Graduate Certificate

The interdisciplinary Graduate Certificate in Data Analytics is offered through a collaboration between the Khoury College of Computer Sciences and the College of Social Sciences and Humanities. The certificate curriculum emphasizes the skills needed to bridge between emerging technological capacities and traditional policymaking processes. The program is designed to provide students with foundational knowledge in data science—including data management, machine learning, data mining, statistics, and visualizing and communicating data—that can be applied to data-driven decision making in any discipline.

For more information on the certificate, refer to the program's website (https://www.northeastern.edu/graduate/program/graduate-certificate-in-data-analytics-boston-14423/).

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
DA 5020	Collecting, Storing, and Retrieving Data	4
DA 5030	Introduction to Data Mining/Machine Learning	4
INSH 5301	Introduction to Computational Statistics	4
INSH 5302	Information Design and Visual Analytics	4

Program Credit/GPA Requirements

16 total semester hours required
Minimum 3.000 GPA required

College of Engineering

Website (http://www.coe.neu.edu/academics/graduate-school-engineering/)

Gregory D. Abowd, PhD, Dean

Akram Alshawabkeh, PhD, Senior Associate Dean for Research and Graduate Education

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The Graduate School of Engineering (GSE) offers research and professional degree programs organized around a core curriculum that equips students with a solid foundation for technical and leadership positions in industry organizations, government laboratories, research laboratories, and educational institutions. By involving students in many levels of research, encouraging collaboration across departments, and partnering with outside institutions and organizations globally, Northeastern engineering graduate students have the opportunity to gain a rich and experiential education in their chosen discipline.

Master of Science and doctoral degree programs are offered, as well as numerous graduate certificate programs that can be applied toward master's degree programs for lifelong learning. GSE offers traditional full-time day and part-time evening master's and doctoral degree programs and part-time evening certificate programs. Programs are offered in Boston and at regional campuses. A number of courses and degree programs are also available in a flexible online or hybrid format, which are well suited for distance learners. Innovative programs, such as

interdisciplinary degrees, business/entrepreneurship pathways, and the Academic Link (AL) program for students without an undergraduate engineering degree (or who need additional preparatory coursework), enable students to personalize their learning experience.

Academic Policies

Academic Dismissal Policy

A student placed on academic probation for a cumulative GPA of less than 3.000 will have one academic term to raise the cumulative GPA greater than or equal to 3.000. Students whose cumulative GPA is below 3.000 for two consecutive terms in which they took courses for credit (excluding Career Management for Engineers (ENCP 6000) or Introduction to Cooperative Education (ENCP 6100), if taken) will automatically be dismissed from their degree program at the end of the second term. Students in this situation may submit an Academic Dismissal Appeal Form to the graduate school, *to be reviewed by the student's academic department,* to request a final one-term extension. Students whose cumulative GPA is below 3.000 for three consecutive terms will automatically be dismissed from their degree program.

A student will also be dismissed from their degree program if they do not meet the requirements of their program.

A student who is dismissed from their program may submit an appeal through the college's graduate appeals process.

Students dismissed from their program will receive a written notification from the Graduate School of Engineering.

Academic Integrity Policy

Graduate students are expected to abide by the university's Academic Integrity Policy, as described in the Code of Student Conduct.

A faculty member who suspects that a graduate student in a class, or working under their direction, has violated the university's Academic Integrity Policy must offer to meet with the student to discuss the suspected violation. The faculty member may ask the student to provide supporting documentation and may gather information from other students involved in the incident.

If the faculty member finds that the student has violated the Academic Integrity Policy, the faculty member may adjust the student's grade and/or require additional academic work as the faculty member considers appropriate. In this case, the faculty member is encouraged to submit an information-only report about the incident to the university Office of Student Conduct and Conflict Resolution (OSCCR), which handles suspected violations of the Academic Integrity Policy. Any penalties must be imposed by the faculty member within three weeks of the suspected violation.

If the student is not satisfied with the faculty member's decision, the student may appeal to the department by contacting the department head (or designee) who should apply the department's procedures to review the case. If the suspected violation took place in a course offered by a department, the appeal should be submitted to that department. Otherwise, the appeal should be submitted directly to the college. The student should appeal within one week of the imposition of penalties.

The department will either affirm the faculty member's decision or substitute an alternative decision. The department's decision should be made within two weeks of receiving the appeal.

The student may appeal the department decision using the college's academic appeal process. The college will either affirm the department's decision or substitute an alternative decision.

The student may appeal the college decision using the university's academic appeal process.

The faculty member may appeal the department or college decision by submitting a complaint to OSCCR, which will determine whether the student is responsible for the suspected violation. OSCCR will make a recommendation to the senior vice provost for student affairs who will make a final decision.

If the student is found to be responsible for a violation by OSCCR, the faculty member may readjust the student's grades and/or require additional academic work as the faculty member considers appropriate. If the student is found to be not responsible for a violation, the faculty member cannot take these actions.

The dean (or designee) of the involved college shall take whatever action is necessary to implement the resolution of the case, including reporting a change of grade to the registrar.

Academic Standing Policy

Academic standing at Northeastern University is determined by a student's cumulative GPA.

Academic probation is a period of time when a student must address and remediate academic deficiencies.

Full-time Students

Full-time graduate students are expected to maintain a cumulative GPA of 3.000 or higher each term to remain in good academic standing and to progress toward graduation.

Students falling below a cumulative GPA of 3.000 are placed on academic probation for each academic term in which the cumulative GPA is below 3.000 after the completion of at least 8 semester hours. Full-time students must raise the cumulative GPA to 3.000 or higher after completion of at least 8 additional semester hours to regain good academic standing status.

Part-time Students

Graduate students in official part-time status with the university are expected to maintain a cumulative GPA of 3.000 or higher each term to remain in good academic standing and to progress toward graduation.

Students falling below a cumulative GPA of 3.000 after at least 8 semester hours are completed are placed on academic probation. Part-time students must raise the cumulative GPA to 3.000 or higher after completion of at least 8 additional semester hours to regain good academic standing status.

Summer Term

There are three semesters during the summer session: Summer 1, Summer 2, and Full Summer.

Academic standing for the summer terms will be reviewed and evaluated for all students at the end of the Summer 2 term. If students complete fewer than 8 semester hours during any of the summer semesters combined, their academic standing is evaluated after the completion of at least 8 semester hours.

Appeals Policy

To initiate an appeal, a student may submit a written request to the associate dean responsible for the Graduate School of Engineering (or other dean of engineering designee providing oversight of the graduate school) detailing the reasons for the appeal of the academic dismissal decision, grade, reentry after graduate student academic dismissal, or other academic dispute involving graduate students that cannot be resolved by the academic unit with which the student is affiliated. This request should include relevant facts related to the case and any supporting documentation and shall be submitted at least three business days prior to the committee meeting in which the appeal is to be considered.

The student shall be offered the opportunity to meet with the committee to make a statement, present relevant facts of the case, and respond to clarifying questions the committee may have regarding the case. The chair of the committee reserves the right to end this meeting after 10 minutes if no further relevant facts are forthcoming.

Upon approval of the committee's decision by the associate dean (or their designee), the decision shall be binding unless the student chooses to continue the appeal process beyond the college level.

Attendance Policy

In each term, students enrolled in on-ground sections are expected to be on campus and attending class beginning with the first day of classes. Students in online sections are expected to log in and participate in class beginning with the first day of classes.

Students who join a class after the first day of class during the university add period, or who are approved for late registration by the instructor and the Graduate School of Engineering, are responsible for all coursework missed prior to enrolling. Enrolled students who do not attend class during the first week of a semester risk being dropped from the course.

In the interest of students' success, the college does not support the arrival of students to class after the university add deadline. Students should not expect to be added to a class after the university add deadline and will be held responsible for the academic, financial, or immigration consequences due to their late or nonattendance without prior approval.

In cases where an enrolled student cannot arrive to campus by the first day of class due to circumstances beyond their control, it is the student's responsibility to contact the instructor for approval and notify the Graduate School of Engineering.

Course Registration

Full-time students (domestic and international) in the Graduate School of Engineering must register for classes on an ongoing basis and carry a minimum of 8 semester hours of coursework per semester. Any student who is appointed to a stipended graduate assistantship (SGA) is considered full-time for the term(s) of appointment if enrolled for a minimum of 6 semester hours.

All graduate students who are registered for Dissertation, Dissertation Continuation, PhD Candidacy Preparation, PhD Exam Preparation, or a 0-semester-hour Research course are considered full-time. Registration in these courses is restricted to students who qualify for registration in these courses.

The graduate school does not require part-time students to be enrolled for a certain minimum number of semester hours in any term. However, part-time students who are not enrolled for more than one term (excluding summer terms) should take a leave of absence from the university to maintain active student status to keep their student account active.

The maximum number of semester hours approved for a student in each term varies by the degree program. However, a student can petition his or her faculty advisor to request permission to register for more than the allowed maximum number of semester hours for a given term. Normally, no more than 12 semester hours (inclusive of transfer credits and advanced standing for MS programs) may be taken outside the College of Engineering, unless otherwise specified in the program requirements.

Registration in classes is mandatory to maintain an active status with the university. Students must be registered in all courses for a given term prior to the university course add deadline. Students should not register for an excessive number of courses or for multiple sections of the same course with the intention of dropping half or more of the courses during the first week of classes.

Students must be registered in their last semester of study. Students finishing their requirements in the summer semester must be registered either in the full summer, summer 1, or summer 2 term.

Any student who is financially withdrawn by Student Accounts prior to the start of any given semester will not be permitted to register for that semester until he or she rectifies the outstanding financial obligation.

The Graduate School of Engineering will correct registration errors. Corrections may generate a new tuition bill.

Due to last-minute scheduling changes, the Graduate School of Engineering must occasionally substitute faculty or change class schedules after the registration period has begun. Any student registered for the original course will automatically be registered for the updated section should no major schedule conflicts be apparent. Otherwise, the graduate school or the department will contact all affected students for alternatives.

Northeastern University reserves the right to cancel, postpone, combine, or modify any class.

The Graduate School of Engineering does not allow College of Engineering (COE) graduate students to elect a pass/fail grading scheme for courses normally letter graded.

Course Repeat / Course Substitution Policy

Students in Good Academic Standing

Students who are in good academic standing may repeat up to 8 semester hours of coursework in order to earn a better grade. A course may only be repeated once.

In all cases, the most recent grade earned in a course is the one used in calculating the overall GPA; however, previous grades remain on the transcript with a note that the grade is "excluded." This means that the course is excluded from the GPA and earned credit calculation. Students must obtain approval from their department and the Graduate School of Engineering prior to repeating a course. Students are required to pay normal tuition charges for all repeated coursework.

Students on Academic Probation

The Graduate School of Engineering allows students to repeat (or substitute) a total of up to 8 semester hours of coursework beyond stated minimum degree requirements in order to attain the required cumulative 3.000 GPA for good academic standing.

Course Repeat

When the appropriate course is available, courses may be repeated once in order to earn a better grade. In all cases, the most recent grade earned in a course is the one used in calculating the overall GPA; however, previous grades remain on the transcript with a note that the grade is "excluded." This means that the course is excluded from the GPA and earned credit calculation. Students must obtain approval from their academic advisor and the Graduate School of Engineering prior to repeating a course. Students are required to pay normal tuition charges for all repeated coursework.

Within the above limitations for extra or repeated courses, a student must repeat any required core course in which he or she earns a grade below C. Individual programs may have additional requirements.

Course Substitution

In cases where repeating a course is not possible, a student may petition to substitute one course for another they have already taken, as long as the course content is significantly similar and is not a core required course.

The student's department and graduate school in conjunction with the Office of the University Registrar must approve of the substitution. If approved, the grade in the new course taken will be included in the GPA calculation, and the first course taken will remain on the transcript with a note that the grade is "excluded" from the GPA and earned credit calculation. Students are required to pay normal tuition charges for all substituted coursework.

Course substitution is not an option for students in good academic standing.

Course Selection

Students should formulate a program of study in consultation with their assigned faculty advisor at the beginning of their program, during fall or spring orientation. Students should preselect courses whenever possible and plan to take them when offered, maintaining flexibility with alternate courses in mind. Courses other than the required courses are offered based on demand and are subject to faculty availability. Not all courses are offered every year; however, the graduate school will do everything possible to assure continuity of programs and permit students to make continuous progress toward earning their degrees.

Prerequisite Courses/Undergraduate Courses

Students are not awarded credit toward graduate degree requirements for prerequisite courses unless expressly stated by the student's academic department. Students may occasionally be permitted by their advisor to take undergraduate courses. However, undergraduate courses do not count toward a graduate degree and may affect a student's eligibility to receive federal financial aid. Undergraduate courses do not count toward the graduate-level course load requirement for full-time students.

Dissertation and Dissertation Continuation

Once program requirements are met for the PhD candidacy, PhD candidates must register for Dissertation Term 1 (XXXX 9990) and Dissertation Term 2 (XXXX 9991). Candidates must then register for Dissertation Continuation in each subsequent semester (excluding the summer term) until the dissertation is complete and approved by the Graduate School of Engineering. Students completing their dissertation in the summer term must register for Dissertation Continuation. There is a 1-credit-hour tuition charge for Dissertation Continuation.

MS Thesis and Thesis Continuation

Master's degree students who are completing a thesis must register for a total of 8 semester hours of Thesis. Students who have not completed their thesis but have already registered for the required number of thesis hours, and have no remaining coursework to complete the degree, may register for Thesis Continuation in their last semester (including summer term) . There is a 1-credit-hour tuition charge for Thesis Continuation. Thesis Continuation may be taken only once.

Petitions

Petitions are required in all cases where a student is requesting a change or exception to their current program or student status for the Graduate School of Engineering to maintain a complete and accurate record for all students.

Dissertation Committee

A dissertation committee shall include at least three faculty members. At least three committee members should hold a PhD and at least two shall be Northeastern University faculty. The chair of the dissertation committee shall be a full-time tenured or tenure-track member of the faculty of Northeastern University and will hold a PhD or an appropriate terminal degree for the discipline. Exceptions to this policy will be considered and, if appropriate, approved by the Provost or their designee.

PhD Student Progress and Review

The formal requirements for the PhD degree include the following milestones:

1. Completing required coursework.
2. Achieving candidacy, as determined by degree program. May be achieved through qualifying examinations, comprehensive examination(s), and/or an oral defense of the dissertation proposal.
3. Identifying a faculty research advisor.
4. Forming a dissertation committee.
5. Writing and completing a successful oral defense of the dissertation proposal before the PhD committee.

6. Completing a successful oral defense of dissertation before the PhD committee.
7. Approval of written dissertation by dissertation committee and Graduate School of Engineering.

Departments shall define standards for satisfactory performance progress for PhD students that include the following time limits:

Direct entry PhD students:

1. Candidacy must be achieved within three years of entering the PhD program.
2. The degree must be completed within seven years of entering the PhD program.

Advanced entry PhD students:

1. Candidacy must be achieved within three years of entering the PhD program.
2. The degree must be completed within five years of entering the PhD program.

Departments shall establish a review process by which the performance progress of every PhD student is evaluated not more than once per semester and at least annually. As part of this review, students should submit information **that must include achievement of milestones** and could include descriptions of their plans, achievements, progress toward goals, transcripts, CV, publications, conferences attended, recognition they have received, and awards. The review process must include feedback from the student's faculty advisor.

If a department finds that a PhD student is not making satisfactory progress, the student shall be placed on performance probation. Members of the department shall work with the student to develop a performance improvement plan that includes specific actions the student should take to return to satisfactory progress. The performance progress of each PhD student on performance probation shall be reviewed by their department no earlier than one semester and no later than one year after being placed on probation. If a student on performance probation is again found to be not making satisfactory progress, the student shall be dismissed from their degree program. If a student on performance probation is found to be making satisfactory progress, the student shall leave performance probation status.

A copy of the performance progress review and performance improvement plan, if applicable, shall be submitted to the student. For all students, the result of the performance progress review shall be submitted to the Graduate School of Engineering. For all students who receive an unsatisfactory review, a summary of the performance progress review and performance improvement plan shall be submitted to the Graduate School of Engineering. Students dismissed from their program will be notified by the Graduate School of Engineering. A student who is dismissed from their program may submit an appeal through the college's graduate appeals process.

For the purposes of determining the timing of performance reviews specified by this policy, the Summer 1 and Summer 2 semesters shall collectively be considered one semester.

Program Completion

In order to earn a degree in the graduate program in which a student is enrolled, a student must complete all program and departmental requirements in a satisfactory manner.

A student must attain a cumulative grade-point average (GPA) of 3.000 or higher in all courses applied toward that degree and exclusive of any prerequisite courses required of students admitted provisionally to their program. A student must also earn a grade of C or higher in all required core courses. Please note that individual programs may have additional requirements.

Reenrollment Policy for Full-time Students

Students who enroll and complete at least one graduate engineering course can apply to their academic department to take an official leave of absence from the time they complete said course(s) and be automatically readmitted without department review. Automatic readmission applies only to the original program and concentration (if applicable), and only for students who took an official approved leave of absence. Catalog year of entry does not change and students must complete the curriculum requirements outlined in the University Graduate Catalog for their original academic year of admission.

If a student without official leave of absence approval does not enroll in classes for two consecutive fall/spring semesters, they will be declared inactive. To return from inactive status, a student must submit an updated application to refresh their student record, and this application will be approved provided the student was in good standing at the time their absence started.

If a student without official leave of absence approval does not enroll in classes for three consecutive fall/spring semesters, or does not indicate their intent in writing to the Graduate School of Engineering by the end of the third consecutive semester, they will be withdrawn from the program. In the case of withdrawal, a student will be required to submit a new admission application for graduate studies without guarantee of readmission. If the student is admitted after being withdrawn, they will be admitted into the current catalog year and must meet the curriculum requirements in the current University Graduate Catalog.

In cases where the student has seven or more years of nonenrollment, the student's previous coursework completed at the university will first undergo departmental review for technical content and relevance to current degree, followed by institutional review mapping courses completed to the current degree program requirements. The institutional review will determine how many credits, if any, completed more than seven years prior will be applied to the current degree.

Bioengineering

Website (http://www.bioe.neu.edu)

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The Department of Bioengineering is driven by the conviction that the interface of engineering and medicine will be one of the great intellectual adventures of the 21st century. To prepare students for this adventure, the department strives to create an atmosphere of innovation and creativity that fosters excellence in instruction and research and provides a foundation for programs that drive forward the cutting edge of knowledge while establishing translational collaborations with clinical and industrial researchers.

Bioengineering is a relatively new field built on the recognition that engineering of biological systems or systems that interface with living systems requires a multidisciplinary approach that takes into account the mechanical, electrical, chemical, and materials properties of the biological system. Students with backgrounds from biochemistry to computer science and many fields in between are attracted to bioengineering as a field with the potential to make a great impact on human health. The MS and PhD programs are designed to integrate students with very different backgrounds and provide them with the coursework and research experience that will take advantage of their unique backgrounds and, where appropriate, fill in gaps in their backgrounds to help them grow into a more broadly informed student.

Recognizing the breadth of disciplines that contribute to bioengineering projects, the MS program allows students to choose one of four concentrations (bioimaging and signal processing, cell and tissue engineering, biomechanics, or biomedical devices) to develop deep expertise in an area of particular interest and encourages individual research through a one-semester master's project or two-semester master's thesis.

The PhD program spans four core research areas for which the department has particular strengths: imaging, instrumentation and signal processing; biomechanics, biotransport, and mechanobiology; molecular, cell, and tissue engineering; and computational and systems biology. Coursework is designed to strengthen student backgrounds in those areas most relevant to the interests of each student.

Mission of the Department

The mission of the Department of Bioengineering is the education of students in the fundamental principles and practice of bioengineering and, through basic and applied research, the creation of new knowledge at the interface of engineering and medicine to support development of new technologies for improvement of human health and healthcare.

Overview of Programs Offered

The Department of Bioengineering offers a Master of Science (MS) and a Doctor of Philosophy (PhD) in Bioengineering. The MS and PhD degree programs are only offered as full-time programs.

Candidates pursuing an MS or PhD are able to select thesis topics from a diverse range of faculty research. New graduate students may learn about ongoing research topics from individual faculty members, faculty websites, and bioengineering seminars.

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 251).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP OPTION

Students have the opportunity to pursue the Gordon Engineering Leadership Program (p. 527) in combination with the MS degree.

Programs

Doctor of Philosophy (PhD)

- Bioengineering (p. 146)

Master of Science in Bioengineering (MSBioE)

- Bioengineering (p. 150)

Bioengineering, PhD

The interdisciplinary Bioengineering Doctor of Philosophy program reflects departmental research strengths in multiple areas. Students accepted to the bioengineering program will undertake a rigorous core curriculum in basic bioengineering science, followed by a flexible selection of electives tailored to their dissertation research. There are four key areas of research strength in our department.

Area 1—Imaging, Instrumentation, and Signal Processing

Area 2—Biomechanics, Biotransport, and Mechanobiology

Area 3—Molecular, Cell, and Tissue Engineering

Area 4—Computational and Systems Biology

Biology can inspire engineering. Increasingly, discoveries in the life sciences reveal processes, complexity, and control without analogy in the world of traditional engineering. Current methods of producing nanoscale control over molecules cannot reproduce the organization found in even the simplest organisms. Energy capture, robust control, remediation, and self-assembly are all employed by biosystems with efficiency unparalleled by anything in today's laboratories. At the same time, traditional engineering disciplines struggle to find new approaches to the complex challenges of 21st-century technology. The last 50 years of basic life science research have gradually revealed the layers of complexity intrinsic to biological processes, unmasking the fundamental underpinnings on which biological systems are constructed. Bioinspired engineering has the potential to transform the technological landscape of the 21st century. Astonishingly, it represents merely one of the myriad opportunities presented at the interface of biology and engineering.

The field of bioengineering is broad and includes all research at the interface of engineering and biology—this includes bioprocesses, environmental microbiology, biomaterials and tissue engineering, bioelectricity, biomechanics, biomedical and biological imaging, nanotechnology in medicine and the environment, and engineering design for human interfacing. At Northeastern, bioengineering PhD students have an opportunity to be trained to appreciate advances in bioengineering across a wide range of disciplines while they perform highly focused and cutting-edge bioengineering research with one of our faculty members.

Degree Requirements

Completion of the PhD degree requires students to successfully complete the following requirements:

- Curriculum: The curriculum comprises a strong core of fundamental courses that is coupled with a flexible choice of restricted and unrestricted technical electives to provide depth in a particular field of study. The detailed course requirements are outlined below.
- Qualifying exam (written and oral): To qualify to continue in the PhD program, students must pass the bioengineering comprehensive qualifying examination in the most relevant of the four department research areas. Students will prepare a six-page written document that will be distributed to the committee no later than 14 calendar days before the oral examination. Details of the formal qualification exam procedure and timing are available in the bioengineering office and may be requested electronically from the graduate director. In addition, satisfactory research progress and satisfactory academic standing is required to pass the exam. The qualifying exam is normally taken in the fall semester of the student's second year. Students who fail the qualifying exam on the first attempt may retake

the exam once in the following spring semester. Students may not take the qualifying exam more than twice.

- Qualifying exam committee:The qualifying examination committee is composed of three members of the Department of Bioengineering faculty. At least two of three committee members will be from the student's research area. The student's primary research advisor may not sit on the qualifying exam committee.
- PhD dissertation committee: Students normally form their dissertation committee within two years of joining the PhD program. The dissertation committee is composed of a minimum of three members, two of whom must be core faculty from the Department of Bioengineering. The student's primary advisor will be a member of and chair the dissertation committee. This advisor must be a member of the core bioengineering faculty or a faculty member from another department who has an affiliation with the bioengineering department. Students are required to meet annually with their PhD dissertation committee to ensure satisfactory research progress.
- Annual committee meetings and dissertation proposals: PhD students must hold their first committee meeting no later than their third year. The first committee meeting requires the student to write a dissertation proposal in the form of an NIH-style R21 proposal research plan that will be distributed to their dissertation committee at least one week prior to the meeting. Thereafter, students are expected to hold annual progress updates with their committee. At the penultimate committee meeting (which must be held at least four months prior to the dissertation defense), the student will prepare and present a final proposal document to the committee. Successful defense of this proposal will allow the student to progress to the PhD dissertation defense.
- PhD dissertation defense: PhD candidates must satisfactorily complete and defend a dissertation describing original research in bioengineering in an open presentation to the Northeastern bioengineering community, followed by a closed meeting with their dissertation committee in which they are expected to defend their work and answer all relevant questions regarding that work, its significance, and its relationship to ongoing work across the broader research community.
- Dissertation course requirements: After achieving PhD candidacy by passing the qualifying exam, the doctoral candidate, in consultation with his or her research advisor, must register in two consecutive semesters (may include full summer term) for Dissertation Term 1 (BIOE 9990) and Dissertation Term 2 (BIOE 9991). Upon completion of this sequence, the student must then register for Dissertation Continuation (BIOE 9996) in every semester (in each fall and spring term and also in the summer term if summer is the student's last semester) until the dissertation is completed. Students may not register for Dissertation Continuation (BIOE 9996) until they fulfill the two-semester sequence of Dissertation Term 1 (BIOE 9990) and Dissertation Term 2 (BIOE 9991).

To meet the full-time registration requirement for PhD students who have completed the majority of their course work and not yet reached PhD candidacy, a zero-credit course, Exam Preparation—Doctoral (BIOE 8960), can be taken if needed to fulfill the full-time course registration requirement. Exam Preparation—Doctoral (BIOE 8960) is an individual instruction course, billed at 1 semester hour, and graded S or U. Exam Preparation—Doctoral (BIOE 8960) does not have any course content, and students must register in a section for which their research advisor is listed as the instructor.

For students possessing a baccalaureate in a suitable quantitative or technical field, the required course distribution is shown in the table below.

Requirements	Credits
Required core courses	12
Restricted technical electives	8
Unrestricted technical electives	12
Advanced seminar (four semesters)	
Dissertation	
Minimum semester hours required	32

The curriculum for PhD students with advanced standing will be selected from the available core and elective courses under the guidance of the program director and the student's primary advisor. The advanced standing PhD degree requires a minimum of 16 semester hours of course work to be approved by the graduate director and a completed PhD dissertation. Advanced standing constitutes receipt of a relevant and accepted master's degree at a qualified institution.

Requirements	Credits
Advisor-approved course work	16
Advanced seminar (four semesters)	
Dissertation	
Minimum semester hours required	16

The core department research areas are as follows. More details, associated core, and affiliated faculty can be found on the bioengineering department website.

Area 1—Imaging, Instrumentation, and Signal Processing

The Imaging, Instrumentation, and Signal Processing track reflects Northeastern University's outstanding research profile in developing new technologies for visualizing biological processes and disease. Our department has active federally funded research spanning a broad spectrum of relevant areas in instrument design, contrast agent development, and advanced computational modeling and reconstruction methods. Example research centers include the Chemical Imaging of Living Systems Institute, the Translational Biophotonics Cluster, and the B-SPIRAL signal processing group.

Area 2—Biomechanics, Biotransport, and Mechanobiology

Motion, deformation, and flow of biological systems in response to applied loads elicit biological responses at the molecular and cellular levels that support the physiological function of tissues and organs and drive their adaptation and remodeling. To study these complex interactions, principles of solid, fluid, and transport mechanics must be combined with measures of biological function. The Biomechanics, Biotransport, and Mechanobiology track embraces this approach and leverages the strong expertise of Northeastern faculty attempting to tie applied loads to biological responses at multiple length and time scales.

Area 3—Molecular, Cell, and Tissue Engineering

Principles for engineering living cells and tissues are essential to address many of the most significant biomedical challenges facing our society today. These application areas include engineering biomaterials to coax and enable stem cells to form functional tissue or to heal damaged tissue; designing vehicles for delivering genes and therapeutics to reach specific target cells to treat a disease; and uncovering therapeutic strategies to curb pathological cell behaviors and tissue phenotypes. At a more fundamental level, the field is at the nascent stages of

understanding how cells make decisions in complex microenvironments and how cells interact with each other and their surrounding environment to organize into complex three-dimensional tissues. Advances will require multiscale experimental, computational, and theoretical approaches spanning molecular-cellular-tissue levels and integration of molecular and physical mechanisms, including the role of mechanical forces.

Area 4—Computational and Systems Biology

We aim to understand the rules governing emergent systems-level behavior and to use these rules to rationally engineer biological systems. We make quantitative measurements, often at the single-cell level, to test different conceptual frameworks and discriminate among different classes of models. Our faculty are leaders in developing and applying both theoretical methods, e.g., control theory, and experimental methods, e.g., single-cell proteomics by mass-spec, to biological systems. At the organ and tissue levels, 3D scans acquired through medical imaging methods (e.g., US, CT, MRI, etc.) may be used to reconstruct virtual models of targeted systems. Noninvasive measures of the physiological function can then inform numerical simulations to predict the behavior of biological systems over time, with the goal of estimating the progression toward pathological endpoints or to test the efficacy of targeted surgical procedures and pharmaceutical treatments (e.g., drug delivery).

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review
Qualifying examination (within two years of entry)
Dissertation committee
Area examination (dissertation prospectus/proposal)
Dissertation defense

Core Requirements

Code	Title	Hours
Seminar		
BIOE 7390	Seminar (Register and complete two semesters)	0
BIOE 7391	Student Seminar (Register and complete once in second year and once in fourth year)	0
Required Core		
BIOE 6100	Medical Physiology	4
BIOE 6200	Mathematical Methods in Bioengineering	4
BIOE 7000	Principles of Bioengineering	4
Restricted Bioengineering Technical Electives		
Complete 8 semester hours from the following:		8
BIOE 5235	Biomedical Imaging	
BIOE 5410	Molecular Bioengineering	
BIOE 5420	Cellular Engineering	
BIOE 5430	Principles and Applications of Tissue Engineering	
BIOE 5440	The Cell as a Machine	
BIOE 5630	Physiological Fluid Mechanics	
BIOE 5648	Biomedical Optics	
BIOE 5650	Multiscale Biomechanics	
BIOE 5656	Fields, Forces, and Flows in Biological Systems	
BIOE 5810	Design of Biomedical Instrumentation	
BIOE 5820	Biomaterials	
ME 5665	Musculoskeletal Biomechanics	
Technical Electives		
Complete 12 semester hours from the Elective Course List.		12

Elective Course List

Code	Title	Hours
BIOE 5235	Biomedical Imaging	
BIOE 5250	Design, Manufacture, and Evaluation of Medical Devices	
BIOE 5410	Molecular Bioengineering	
BIOE 5420	Cellular Engineering	
BIOE 5430	Principles and Applications of Tissue Engineering	
BIOE 5440	The Cell as a Machine	
BIOE 5450	Stem Cell Engineering	
BIOE 5630	Physiological Fluid Mechanics	
BIOE 5640	Computational Biomechanics	
BIOE 5648	Biomedical Optics	
BIOE 5650	Multiscale Biomechanics	
BIOE 5656	Fields, Forces, and Flows in Biological Systems	
BIOE 5810	Design of Biomedical Instrumentation	
BIOE 5820	Biomaterials	
BIOE 7200	Special Topics in Cell and Tissue Engineering	
BIOL 5307	Biological Electron Microscopy	
BIOL 5543	Stem Cells and Regeneration	
BIOL 5601	Multidisciplinary Approaches in Motor Control	
BIOL 6300	Biochemistry	
BIOL 6301	Molecular Cell Biology	
BIOL 6401	Research Methods and Critical Analysis in Molecular Cell Biology	
CAEP 6202	Research, Evaluation, and Data Analysis	
CHEM 5612	Principles of Mass Spectrometry	
CHEM 5620	Protein Chemistry	
CHEM 5621	Principles of Chemical Biology for Chemists	
CHEM 5638	Molecular Modeling	
CHEM 7247	Advances in Nanomaterials	
CHEM 7317	Analytical Biotechnology	
CHME 5630	Biochemical Engineering	
CS 5100	Foundations of Artificial Intelligence	
CS 5200	Database Management Systems	
CS 5310	Computer Graphics	
CS 5330	Pattern Recognition and Computer Vision	
CS 5335	Robotic Science and Systems	
CS 5400	Principles of Programming Language	
CS 5600	Computer Systems	
CS 5800	Algorithms	

CS 6140	Machine Learning
CS 6200	Information Retrieval
CS 6410	Compilers
EECE 5606	Micro- and Nanofabrication
EECE 5642	Data Visualization
EECE 7200	Linear Systems Analysis
EECE 7202	Electromagnetic Theory 1
EECE 7203	Complex Variable Theory and Differential Equations
EECE 7204	Applied Probability and Stochastic Processes
EECE 7205	Fundamentals of Computer Engineering
EECE 7211	Nonlinear Control
EECE 7213	System Identification and Adaptive Control
EECE 7214	Optimal and Robust Control
EECE 7271	Computational Methods in Electromagnetics
EECE 7310	Modern Signal Processing
EECE 7323	Numerical Optimization Methods
EECE 7337	Information Theory
EECE 7352	Computer Architecture
EECE 7353	VLSI Design
EECE 7364	Mobile and Wireless Networking
EECE 7368	High-Level Design of Hardware-Software Systems
IE 7315	Human Factors Engineering
ME 5650	Advanced Mechanics of Materials
ME 5655	Dynamics and Mechanical Vibration
ME 5657	Finite Element Method
ME 5659	Control Systems Engineering
ME 5665	Musculoskeletal Biomechanics
ME 6200	Mathematical Methods for Mechanical Engineers 1
ME 6260	Introduction to Microelectromechanical Systems (MEMS)
ME 7210	Elasticity and Plasticity
ME 7238	Advanced Finite Element Method
ME 7255	Continuum Mechanics and Nonlinear FEM
ME 7275	Essentials of Fluid Dynamics
NNMD 5470	Nano/Biomedical Commercialization: Concept to Market
OR 6205	Deterministic Operations Research
PHSC 5100	Concepts in Pharmaceutical Science
PHSC 6218	Biomedical Chemical Analysis
PHSC 6290	Biophysical Methods in Drug Discovery
PHYS 7301	Classical Mechanics/Math Methods
PHYS 7321	Computational Physics
PHYS 7741	Biological Physics 2
PMST 6250	Advanced Physical Pharmacy
PMST 6252	Pharmacokinetics and Drug Metabolism
PMST 6254	Advanced Drug Delivery Systems
PT 5138	Neuroscience
PT 5139	Lab for PT 5138
PT 5150	Motor Control, Development, and Learning
PT 5151	Lab for PT 5150
SLPA 6301	Speech Science

Dissertation

Code	Title	Hours
Complete the following two courses:		
BIOE 9990	Dissertation Term 1	
BIOE 9991	Dissertation Term 2	

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

Advanced Entry PhD Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review
Qualifying examination (within two years of entry)
Dissertation committee
Area examination (dissertation prospectus/proposal)
Dissertation defense

Core Requirements

Code	Title	Hours
Seminar		
BIOE 7390	Seminar (Register and complete two semesters)	0
BIOE 7391	Student Seminar (Register and complete once in second year and once in fourth year)	0
Approved Course Work		
Complete 16 semester hours from the Elective Course List.		16

Elective Course List

Code	Title	Hours
BIOE 5235	Biomedical Imaging	
BIOE 5250	Design, Manufacture, and Evaluation of Medical Devices	
BIOE 5410	Molecular Bioengineering	
BIOE 5420	Cellular Engineering	
BIOE 5430	Principles and Applications of Tissue Engineering	
BIOE 5440	The Cell as a Machine	
BIOE 5450	Stem Cell Engineering	
BIOE 5630	Physiological Fluid Mechanics	
BIOE 5640	Computational Biomechanics	
BIOE 5648	Biomedical Optics	
BIOE 5650	Multiscale Biomechanics	
BIOE 5656	Fields, Forces, and Flows in Biological Systems	
BIOE 5810	Design of Biomedical Instrumentation	
BIOE 5820	Biomaterials	

BIOE 7200	Special Topics in Cell and Tissue Engineering
BIOL 5307	Biological Electron Microscopy
BIOL 5543	Stem Cells and Regeneration
BIOL 5601	Multidisciplinary Approaches in Motor Control
BIOL 6300	Biochemistry
BIOL 6301	Molecular Cell Biology
BIOL 6401	Research Methods and Critical Analysis in Molecular Cell Biology
CAEP 6202	Research, Evaluation, and Data Analysis
CHEM 5620	Protein Chemistry
CHEM 5621	Principles of Chemical Biology for Chemists
CHEM 5638	Molecular Modeling
CHEM 7247	Advances in Nanomaterials
CHEM 7317	Analytical Biotechnology
CHME 5630	Biochemical Engineering
CS 5100	Foundations of Artificial Intelligence
CS 5200	Database Management Systems
CS 5310	Computer Graphics
CS 5330	Pattern Recognition and Computer Vision
CS 5335	Robotic Science and Systems
CS 5400	Principles of Programming Language
CS 5600	Computer Systems
CS 5800	Algorithms
CS 6140	Machine Learning
CS 6200	Information Retrieval
CS 6410	Compilers
EECE 5606	Micro- and Nanofabrication
EECE 5642	Data Visualization
EECE 7200	Linear Systems Analysis
EECE 7202	Electromagnetic Theory 1
EECE 7203	Complex Variable Theory and Differential Equations
EECE 7204	Applied Probability and Stochastic Processes
EECE 7205	Fundamentals of Computer Engineering
EECE 7211	Nonlinear Control
EECE 7213	System Identification and Adaptive Control
EECE 7214	Optimal and Robust Control
EECE 7271	Computational Methods in Electromagnetics
EECE 7310	Modern Signal Processing
EECE 7323	Numerical Optimization Methods
EECE 7337	Information Theory
EECE 7352	Computer Architecture
EECE 7353	VLSI Design
EECE 7364	Mobile and Wireless Networking
EECE 7368	High-Level Design of Hardware-Software Systems
IE 7315	Human Factors Engineering
ME 5650	Advanced Mechanics of Materials
ME 5655	Dynamics and Mechanical Vibration
ME 5657	Finite Element Method
ME 5659	Control Systems Engineering
ME 5665	Musculoskeletal Biomechanics
ME 6200	Mathematical Methods for Mechanical Engineers 1
ME 6260	Introduction to Microelectromechanical Systems (MEMS)
ME 7210	Elasticity and Plasticity
ME 7238	Advanced Finite Element Method
ME 7255	Continuum Mechanics and Nonlinear FEM
ME 7275	Essentials of Fluid Dynamics
NNMD 5470	Nano/Biomedical Commercialization: Concept to Market
OR 6205	Deterministic Operations Research
PHSC 5100	Concepts in Pharmaceutical Science
PHSC 6218	Biomedical Chemical Analysis
PHSC 6290	Biophysical Methods in Drug Discovery
PHYS 7301	Classical Mechanics/Math Methods
PHYS 7321	Computational Physics
PHYS 7741	Biological Physics 2
PMST 6250	Advanced Physical Pharmacy
PMST 6252	Pharmacokinetics and Drug Metabolism
PMST 6254	Advanced Drug Delivery Systems
PT 5138	Neuroscience
PT 5139	Lab for PT 5138
PT 5150	Motor Control, Development, and Learning
PT 5151	Lab for PT 5150
SLPA 6301	Speech Science

Dissertation

Code	Title	Hours
Complete the following two courses:		
BIOE 9990	Dissertation Term 1	
BIOE 9991	Dissertation Term 2	

Program Credit/GPA Requirements

16 total semester hours required
Minimum 3.000 GPA required

Bioengineering, MSBioE

Students accepted to the Master of Science in Bioengineering (https://bioe.northeastern.edu/academics/graduate-studies/ms-bion/) program have three concentrations from which to choose:

- Concentration 1: Biomedical Devices and Bioimaging
- Concentration 2: Cell and Tissue Engineering
- Concentration 3: Biomechanics

Concentrations

A concentration is required. Each concentration has between two and three required courses and a list of technical electives. Students should select two to five courses, depending on the concentration and whether

he or she selects the thesis option, project option, or course-only option (please consult the detailed requirements for each concentration).

CONCENTRATION IN BIOMEDICAL DEVICES AND BIOIMAGING

The biomedical devices and bioimaging concentration is appropriate for students interested in the design of biomedical devices, as well as biomedical imaging and signal processing. Three courses are required for all students in this concentration, Design of Biomedical Instrumentation (BIOE 5810), Design, Manufacture, and Evaluation of Medical Devices (BIOE 5250), and Biomedical Imaging (BIOE 5235).

CONCENTRATION IN CELL AND TISSUE ENGINEERING

The cell and tissue engineering concentration is appropriate for students interested in molecular, cell, and tissue engineering. Two courses Molecular Bioengineering (BIOE 5410) and Cellular Engineering (BIOE 5420) are required of all cell and tissue engineering students. There is an extensive list of approved technical electives to choose from to complete the degree.

CONCENTRATION IN BIOMECHANICS

Students who join the biomechanics concentration will cover multiscale mechanics, including whole-body movement, mechanical properties of biomaterials, and fluid mechanics of physiological fluids.

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 251).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Bioengineering with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Bioengineering in addition to earning a Graduate Certificate in Engineering Leadership (p. 245). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour-curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 33-semester-hour degree and certificate will require 17 hours of advisor-approved bioengineering technical courses.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated. Note: This major requires a concentration: biomedical devices and bioimaging, cell and tissue engineering, or biomechanics. Consult your college administrator.

Core Requirements

Code	Title	Hours
Seminar		
BIOE 7390	Seminar [1]	0
Required Core		
A grade of C or higher is required in each course:		
BIOE 6100	Medical Physiology	4
BIOE 6000	Principles of Bioengineering [1]	1

Concentrations

Complete one of the following three concentrations:

- Biomedical Devices and Bioimaging (p. 151)
- Cell and Tissue Engineering (p. 151)
- Biomechanics (p. 152)

BIOMEDICAL DEVICES AND BIOIMAGING CONCENTRATION

Code	Title	Hours
Required Coursework		
A grade of C or higher is required.		
BIOE 5235	Biomedical Imaging	4
BIOE 5250	Design, Manufacture, and Evaluation of Medical Devices	4
BIOE 5810	Design of Biomedical Instrumentation	4
Coursework Option		
Complete 16 semester hours from the course list.		16
Project Option		
BIOE 7890	Master's Project	4
Complete 12 semester hours from the course list.		12
Thesis Option		
Complete the following (repeatable) course twice:		8
BIOE 7990	Thesis	
Complete 8 semester hours from the course list.		8
Course List		
BIOE 5115	Dynamical Systems in Biological Engineering	
BIOE 5648	Biomedical Optics	
BIOE 5820	Biomaterials	
BIOE 5850	Design of Implants	
EECE 5606	Micro- and Nanofabrication	
EECE 7105	Optics for Engineers	
EECE 7200	Linear Systems Analysis	
EECE 7203	Complex Variable Theory and Differential Equations	
EECE 7204	Applied Probability and Stochastic Processes	
ME 5657	Finite Element Method	
NNMD 5370	Nanomedicine Research Techniques	

CELL AND TISSUE ENGINEERING CONCENTRATION

Code	Title	Hours
Required Coursework		
A grade of C or higher is required.		
BIOE 5410	Molecular Bioengineering	4
BIOE 5420	Cellular Engineering	4
Coursework Option		
Complete 19-20 semester hours from the course list.		19-20
Project Option		
BIOE 7890	Master's Project	4
Complete 15-16 semester hours from the course list.		15-16
Thesis Option		
Complete the following (repeatable) course twice:		8
BIOE 7990	Thesis	
Complete 11-12 semester hours from the course list.		11-12
Course List		
BIOE 5115	Dynamical Systems in Biological Engineering	

BIOE 5250	Design, Manufacture, and Evaluation of Medical Devices
BIOE 5430	Principles and Applications of Tissue Engineering
BIOE 5440	The Cell as a Machine
BIOE 5450	Stem Cell Engineering
BIOE 5820	Biomaterials
BIOL 5543	Stem Cells and Regeneration
BIOL 6301	Molecular Cell Biology
NNMD 5370	Nanomedicine Research Techniques
NNMD 5470	Nano/Biomedical Commercialization: Concept to Market

BIOMECHANICS CONCENTRATION

Code	Title	Hours
Required Coursework		
A grade of C or higher is required.		
Complete two of the following courses:		8
BIOE 5630	Physiological Fluid Mechanics	
BIOE 5640	Computational Biomechanics	
BIOE 5650	Multiscale Biomechanics	
ME 5665	Musculoskeletal Biomechanics	
Coursework Option		
Complete 20 semester hours from the course list.		20
Project Option		
BIOE 7890	Master's Project	4
Complete 16 semester hours from the course list.		16
Thesis Option		
Complete the following (repeatable) course twice:		8
BIOE 7990	Thesis	
Complete 12 semester hours from the course list.		12
Course List		
BIOE 5115	Dynamical Systems in Biological Engineering	
BIOE 5440	The Cell as a Machine	
BIOL 5601	Multidisciplinary Approaches in Motor Control	
BIOE 5630	Physiological Fluid Mechanics	
BIOE 5640	Computational Biomechanics	
BIOE 5650	Multiscale Biomechanics	
BIOE 5820	Biomaterials	
EECE 7200	Linear Systems Analysis	
EECE 7203	Complex Variable Theory and Differential Equations	
ME 5650	Advanced Mechanics of Materials	
ME 5655	Dynamics and Mechanical Vibration	
ME 5657	Finite Element Method	
ME 5659	Control Systems Engineering	
ME 5665	Musculoskeletal Biomechanics	
ME 7210	Elasticity and Plasticity	
ME 7238	Advanced Finite Element Method	
ME 7255	Continuum Mechanics and Nonlinear FEM	

PROGRAM CREDIT/GPA REQUIREMENTS

32 total semester hours required

Minimum 3.000 GPA required

[1] Seminar and Principles of Bioengineering are not required for students in the BSMS or PlusOne Bioengineering programs.

Chemical Engineering

Website (http://www.che.neu.edu)

Rebecca Kuntz Willits, PhD
Professor and Chairperson

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617.373.2989
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The department offers a Master of Science and a Doctor of Philosophy in Chemical Engineering. The MS degree is offered as either a thesis MS or a coursework (nonthesis) MS degree. Many courses are in the late afternoon or early evening to make them accessible to part-time students with full-time industrial careers. A full-time MS student may apply for participation in the cooperative (co-op) education plan. MS students pursuing the thesis MS option should first gain the consent of their advisors prior to participating in the co-op plan. The coursework MS may be taken part-time, but the thesis MS and PhD degrees are only offered as a full-time program. Any deviations from the curriculum must be addressed by petition to the graduate committee and will be considered on a case-by-case basis.

Candidates pursuing a thesis MS or a PhD degree can select thesis topics from a diverse range of faculty research interests. New graduate students can learn about ongoing research from individual faculty members, faculty websites, and graduate student seminars. Graduate student seminars are held on a regular basis and provide an interactive forum for learning and exchanging research ideas.

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 251).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP OPTION

Students have the opportunity to pursue the Gordon Engineering Leadership Program (p. 527) in combination with the MS degree.

Programs

Doctor of Philosophy (PhD)

- Chemical Engineering (p. 152)

Master of Science in Chemical Engineering (MSChE)

- Chemical Engineering (p. 156)

Graduate Certificate

- Process Safety Engineering (p. 157)

Chemical Engineering, PhD

Each student admitted to the PhD program in chemical engineering will initially be designated a doctoral student. Upon successful completion of the requirements for doctoral candidacy as described below, a student is reclassified as a doctoral candidate. After establishing candidacy, a student must complete a program of academic coursework and a

dissertation under the direction of a dissertation adviser. All doctoral candidates must also pass a final oral examination.

Doctoral Candidacy for Direct Entry

To qualify for doctoral candidacy, the student must demonstrate mastery of four core courses of chemical engineering (thermodynamics or statistical thermodynamics, kinetics, transport, and mathematics). To become a doctoral candidate, students must maintain a grade-point average (GPA) of 3.250 or above in the four core courses and have no individual grade below a B minus in the four core courses.

In addition, each student must complete 4 semester hours (SH) of Research (CHME 9984)) and demonstrate critical thinking, analysis, and experimental planning skills related to their dissertation research topic through a written candidacy proposal and an oral defense of this proposal. The student must pass, as determined by the student's dissertation committee, this candidacy proposal defense in order to advance to doctoral candidacy. The student earns the classification of doctoral candidate upon successful completion of these requirements.

Doctoral Candidacy for Advanced Entry

To become a doctoral candidate, advanced entry students who have already completed a graduate degree in chemical engineering or a closely related discipline must petition the graduate committee of the Department of Chemical Engineering and demonstrate that the mastery has been attained through coursework either at Northeastern or during a previous graduate degree from another institution (typically granted when the student has achieved a grade of at least A– in an equivalent course). The student must demonstrate mastery of the four core areas of chemical engineering (thermodynamics or statistical thermodynamics, kinetics, transport, and mathematics) through course performance.

The graduate committee may require a student to take or retake any or all of the core courses before achieving doctoral candidacy. Incoming advanced entry students should form a plan of coursework in consultation with the associate chair for graduate studies and have this approved by the graduate committee. For the core courses taken at Northeastern, students should maintain a GPA of 3.250 or above and have no individual grade below a B minus.

In addition, each student must complete 4 SH of Research (CHME 9984) and demonstrate critical thinking, analysis, and experimental planning skills related to their dissertation research topic through a written candidacy proposal and a defense of this proposal. The student must pass, as determined by the student's dissertation committee, this oral candidacy proposal defense in order to advance to doctoral candidacy. The student earns the classification of doctoral candidate upon successful completion of these requirements.

Course Requirements

DIRECT ENTRY

A minimum of 32 SH of academic coursework, **not including any independent study credits,** beyond the bachelor's degree is required. The 32 SH must include at least 24 SH of academic coursework (exclusive of thesis or dissertation) taken at Northeastern University. All four of the core courses (see table under Program Requirements), the 4 SH of research, and the 4 SH of professional development courses must be included in the student's academic graduate coursework.

ADVANCED ENTRY

A **minimum** of 20 SH of academic coursework, **not including any independent study credits,** beyond the master's degree is required. At least 16 SH of academic coursework (exclusive of thesis or dissertation) must be taken at Northeastern University. At least one of the core courses (see table under Program Requirements tab), 4 SH Research (CHME 9984) and 4 SH of professional development courses must be included in the student's academic graduate coursework. At least 8 SH of noncore electives must also be included. If the graduate committee requires additional core courses to achieve doctoral candidacy, these are in addition to the 20 SH minimum.

GENERAL REQUIREMENTS

To meet the full-time registration requirement for PhD students who have completed the majority of their coursework and not yet reached PhD candidacy, a zero-credit course, Candidacy Preparation —Doctoral (CHME 8960), can be taken if needed to fulfill full-time course registration. The course is an individual instruction course, billed at 1 SH, and graded S or U. There is no course content, and students must register in a section with their research or academic adviser as the "instructor."

After obtaining PhD candidacy, students are required to register for Dissertation Term 1 (CHME 9990) and Dissertation Term 2 (CHME 9991) for two consecutive semesters. This is then followed by registration for Dissertation Continuation (CHME 9996) in each semester thereafter until the dissertation has been completed and defended. ***Note:*** **No course credits are awarded for Dissertation Term 1 (CHME 9990) , Dissertation Term 2 (CHME 9991), or Dissertation Continuation (CHME 9996) ;however, a student is considered full time if registered for either of these courses.**

All students pursuing a doctoral degree must enroll in the department's seminar course (CHME 7390) for each semester they are working toward their degree.

Students will be advised on their courses for the first semester by the associate chair for graduate studies. After the first semester, students will work with their dissertation adviser to determine appropriate courses and course schedule to meet their educational needs and aspirations. Upon consultation with the dissertation adviser, a student may take up to 44 SH of course credit without additional financial penalty. Students and dissertation advisers should keep in mind that the university residency requirement requires two semesters of academic studies after becoming a doctoral candidate.

Language Requirement

There is no foreign language requirement for the PhD degree. However, each candidate must be proficient in technical writing and oral presentation in the English language. The graduate committee may require additional coursework to improve language proficiency, if necessary.

Residence Requirement

A student satisfies the residence requirement by completing one academic year of full-time graduate studies during two consecutive academic semesters after qualifying for doctoral candidacy. Additional required coursework (exclusive of seminars) may be completed during this period. Students are required to be continually enrolled while pursuing the completion of the dissertation.

Dissertation

After a student establishes doctoral candidacy, they must complete a dissertation that embodies the results of extended original research and includes material suitable for publication. The student is responsible for proposing a dissertation committee to be approved by the dissertation adviser at least one month prior to the dissertation defense. The committee must have a minimum of four members, in addition to the primary adviser. The primary dissertation adviser and at least one other committee member must be faculty members in the Department of

Chemical Engineering. Additionally, one of the committee members must be external to the Department of Chemical Engineering. Committee membership is not limited to faculty at Northeastern University or to engineering faculty. The student is encouraged to consider experts in the dissertation topic and to work with the dissertation adviser to create a meaningful and helpful committee. The dissertation committee will approve the dissertation in its final form. The graduate school requirements for dissertation formatting and electronic submittal instructions can be found on the College of Engineering's webpage (https://coe.northeastern.edu/academics-experiential-learning/graduate-school-of-engineering/graduate-student-services/dissertation-thesis-instructions/). Students are responsible for contacting the Graduate School of Engineering for any updates to dissertation requirements and appropriate deadlines.

Dissertation Defense and Final Oral Examination

This comprehensive examination includes the public dissertation defense as well as a final oral examination to include the subject matter of the doctoral dissertation and significant developments in the field of the dissertation work. The oral presentation will be open to the public, including students, faculty, and the student's committee.

Departure Prior to Dissertation Completion

Occasionally, students have to leave the Department of Chemical Engineering prior to completion of all degree requirements. In such instances, a student cannot submit a dissertation for credit beyond three years after he or she stops actively pursuing the research. Exceptions may be granted upon petition to the departmental graduate committee. Petitions must demonstrate extenuating circumstances and prove that the research is still of value to the profession.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Biannual review
Dissertation committee
Dissertation proposal
Dissertation defense

Core Requirements

A minimum of 32 semester hours of academic coursework is required, plus 2 optional semester hours for cooperative education and mentoring in chemical engineering. Independent study credits do not count toward the 32 required semester hours.

Code	Title	Hours
Core Courses		
A cumulative 3.250 GPA- with no individual class lower than a B minus-- is required for the four core classes:		
CHME 7320	Chemical Engineering Mathematics	4
CHME 7330	Chemical Engineering Thermodynamics (Statistical Thermodynamics may be taken in the place of Thermodynamics)	4
or CHME 7235	Introduction to Statistical Thermodynamics	
CHME 7340	Chemical Engineering Kinetics	4
CHME 7350	Transport Phenomena	4
Research		
CHME 9984	Research	4
Professional Development		
CHME 7391	Professional Development and Communication in Chemical Engineering 1	1
CHME 7392	Professional Development and Communication in Chemical Engineering 2	1
CHME 7393	Professional Development and Communication in Chemical Engineering 3	1
CHME 7394	Professional Development and Communication in Chemical Engineering 4	1
Seminar		
Complete the following (repeatable) course each semester:		
CHME 7390	Seminar	
Recommended but optional:		
ENCP 6100	Introduction to Cooperative Education	
CHME 7395	Mentoring in Chemical Engineering	

Electives

Code	Title	Hours
Complete 8 semester hours. Consult your faculty adviser for acceptable courses:		8
CHME 5101	Fundamentals of Chemical Engineering Analysis	
CHME 5105	Materials Characterization Techniques	
CHME 5137	Computational Modeling in Chemical Engineering	
CHME 5160	Drug Delivery: Engineering Analysis	
CHME 5185	Design of Experiments and Ethical Research (DOEER)	
CHME 5510	Fundamentals in Process Safety Engineering	
CHME 5520	Process Safety Engineering—Chemical Reactivity, Reliefs, and Hazards Analysis	
CHME 5621	Electrochemical Engineering	
CHME 5630	Biochemical Engineering	
CHME 5631	Biomaterials Principles and Applications	
CHME 5632	Advanced Topics in Biomaterials	
CHME 5683	Introduction to Polymer Science	
CHME 5699	Special Topics in Chemical Engineering	
CHME 6610	Computational Programs in Process Safety for Relief and Scenario Modeling	
CHME 7235	Introduction to Statistical Thermodynamics	
CHME 7240	Polymer Science	
CHME 7262	Special Topics in Process Safety	
CHME 7978	Independent Study	
BIOE 5410	Molecular Bioengineering	
EMGT 5220	Engineering Project Management	
EMGT 6225	Economic Decision Making	
EMGT 6305	Financial Management for Engineers	
ENGR 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage	
ME 5620	Fundamentals of Advanced Materials	

NNMD 5270	Introduction to Nanomedicine
NNMD 5370	Nanomedicine Research Techniques
NNMD 5470	Nano/Biomedical Commercialization: Concept to Market

Dissertation

Code	Title	Hours
CHME 9990	Dissertation Term 1	
CHME 9991	Dissertation Term 2	

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA overall required

Advanced Entry PhD Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Biannual review
Dissertation committee
Dissertation proposal
Dissertation defense

Core Requirements

A minimum of 20 semester hours (SH) of academic coursework is required, plus 2 optional semester hours for cooperative education and mentoring in chemical engineering. Independent study credits do not count toward the 20 required semester hours.

Code	Title	Hours
Core Courses		
Complete at least one of the four core classes. A cumulative 3.250 GPA-- with no individual class below a B minus-- is required for core classes taken: [1]		4
CHME 7320	Chemical Engineering Mathematics	
CHME 7330	Chemical Engineering Thermodynamics	
or CHME 7235	Introduction to Statistical Thermodynamics	
CHME 7340	Chemical Engineering Kinetics	
CHME 7350	Transport Phenomena	
Research		
CHME 9984	Research	4
Seminar and Professional Development		
CHME 7391	Professional Development and Communication in Chemical Engineering 1	1
CHME 7392	Professional Development and Communication in Chemical Engineering 2	1
CHME 7393	Professional Development and Communication in Chemical Engineering 3	1
CHME 7394	Professional Development and Communication in Chemical Engineering 4	1
Complete the following (repeatable) course each semester:		
CHME 7390	Seminar	
Recommended but optional:		
ENCP 6100	Introduction to Cooperative Education	
CHME 7395	Mentoring in Chemical Engineering	

Electives

Code	Title	Hours
Complete a minimum of 8 semester hours. Consult your faculty advisor for acceptable courses:		
CHME 5101	Fundamentals of Chemical Engineering Analysis	
CHME 5105	Materials Characterization Techniques	
CHME 5137	Computational Modeling in Chemical Engineering	
CHME 5160	Drug Delivery: Engineering Analysis	
CHME 5185	Design of Experiments and Ethical Research (DOEER)	
CHME 5510	Fundamentals in Process Safety Engineering	
CHME 5520	Process Safety Engineering—Chemical Reactivity, Reliefs, and Hazards Analysis	
CHME 5621	Electrochemical Engineering	
CHME 5630	Biochemical Engineering	
CHME 5631	Biomaterials Principles and Applications	
CHME 5632	Advanced Topics in Biomaterials	
CHME 5683	Introduction to Polymer Science	
CHME 5699	Special Topics in Chemical Engineering	
CHME 6610	Computational Programs in Process Safety for Relief and Scenario Modeling	
CHME 7235	Introduction to Statistical Thermodynamics	
CHME 7240	Polymer Science	
CHME 7262	Special Topics in Process Safety	
CHME 7978	Independent Study	
BIOE 5410	Molecular Bioengineering	
EMGT 5220	Engineering Project Management	
EMGT 6225	Economic Decision Making	
EMGT 6305	Financial Management for Engineers	
ENGR 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage	
ME 5620	Fundamentals of Advanced Materials	
NNMD 5270	Introduction to Nanomedicine	
NNMD 5370	Nanomedicine Research Techniques	
NNMD 5470	Nano/Biomedical Commercialization: Concept to Market	

Dissertation

Code	Title	Hours
Complete the following two courses:		
CHME 9990	Dissertation Term 1	
CHME 9991	Dissertation Term 2	

Program Credit/GPA Requirements

Minimum 20 total semester hours required
Minimum 3.000 GPA overall required

[1] Additional core classes may be required by the chemical engineering graduate committee to achieve PhD candidacy, which would not count toward the 20 SH minimum for the PhD.

Chemical Engineering, MSChE

For program contact information, please visit this website (https://che.northeastern.edu/academics/graduate-studies/ms-chme/).

The Master of Science in Chemical Engineering is normally pursued by students with a Bachelor of Science in Chemical Engineering or closely allied fields. Students wishing to pursue the master's degree but with undergraduate educational backgrounds other than chemical engineering may be required to complete supplementary undergraduate coursework. These courses are in addition to the minimum course requirements. Students enrolled in the program are encouraged to seek guidance from their instructors and advisor regarding additional coursework that may supplement the graduate curriculum.

Students originally admitted to the master's degree program who wish to switch to the PhD program must petition the associate chair for graduate studies. If admission is granted, then the student must satisfy all the requirements of the doctoral degree program, including the requirements for doctoral candidacy.

Course Requirements

A minimum of 32 semester hours of academic work is required to qualify for the Master of Science degree in chemical engineering.

If pursuing a thesis option, at least 8 semester hours of thesis credit must be included as part of these 32 semester hours of credits. In addition, each student pursuing a thesis option must enroll in the department's seminar course for each semester they are working toward their degree. Students enrolled in the department's seminar course are encouraged to participate in the seminar by providing a research presentation regarding their research project under the guidance of their advisor. The faculty advisor and the student establish the sequence of courses that students take to pursue the Master of Science in Chemical Engineering.

If pursuing a coursework option, students must complete a minimum of 32 semester hours of coursework and no enrollment in the seminar course is required. See required core courses and example elective courses for all graduate students (p. 157).

Degree Requirements	Thesis Option	Coursework Option
Required core courses	16 SH	16 SH
Master of Science thesis	8 SH	N/A
Seminar	0 SH	N/A
Elective courses	8 SH	16 SH
Minimum semester hours required	**32 SH**	**32 SH**

Thesis Requirements

Students pursuing a Master of Science in Chemical Engineering with thesis must submit to the Graduate School of Engineering a written thesis that is approved by the thesis committee and department chair. For details, see the graduate school requirements and electronic submittal instructions (https://coe.northeastern.edu/academics-experiential-learning/graduate-school-of-engineering/graduate-student-services/dissertation-thesis-instructions/). MS with thesis students must also complete an oral master's thesis defense in order to successfully complete the program. The student will be expected to form a master's thesis committee, composed of a minimum of three members—one who is the advisor, one other faculty member from the chemical engineering department, and one member from outside the department. The oral presentation will be open to the public, including students, faculty, and the candidate's committee.

Part-time Students

Part-time students may progress according to their plans and time constraints but within the seven-year time limit. A minimum of 32 semester hours of academic coursework is required for part-time students. The thesis and seminar course are not required for part-time students pursuing a master's degree.

Master of Science students wishing to change their status from part-time to full-time must notify the chemical engineering department and make a formal petition to the Graduate School of Engineering. Refer to the regulations of the Graduate School of Engineering for further information on academic administrative policies.

Departure Prior to Thesis Completion

Occasionally, students must leave the chemical engineering department prior to completion of all degree requirements. In such instances, long time intervals have often elapsed before thesis or manuscript submission. Accordingly, the department has adopted the guideline that a student cannot submit a thesis for credit beyond three years after the student stops actively pursuing the research. Exceptions may be granted upon petition to the departmental graduate committee. Petitions must demonstrate extenuating circumstances and prove that the research is still of value to the profession.

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 251).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Chemical Engineering with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Chemical Engineering in addition to earning a Graduate Certificate in Engineering Leadership (p. 245). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors and 16 semester hours of required chemical engineering coursework.

ENGINEERING BUSINESS

Master's Degree in Chemical Engineering with Graduate Certificate in Engineering Business

Students may complete a Master of Science in Chemical Engineering in addition to earning a Graduate Certificate in Engineering Business. Students must apply and be admitted to the Galante Engineering Business Program in order to pursue this option. The program requires the applicant to have earned or be in a program to earn a Bachelor of Science in Engineering from Northeastern University. The integrated 32-semester-hour degree and certificate will require 16 semester hours of the chemical engineering core courses and 16 semester hours from the outlined business-skill curriculum. The coursework, along with

participation in cocurricular professional development elements, earn the Graduate Certificate in Engineering Business. (p. 236)

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
CHME 7320	Chemical Engineering Mathematics	4
CHME 7330	Chemical Engineering Thermodynamics	4
or CHME 7235	Introduction to Statistical Thermodynamics	
CHME 7340	Chemical Engineering Kinetics	4
CHME 7350	Transport Phenomena	4

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete 16 semester hours from the course list below. (p. 157)		16

THESIS OPTION

Code	Title	Hours
Thesis		
Complete the following courses. Please note that students pursuing the thesis option are required to register for CHME 7990 as many times as necessary to complete 8 semester hours and, in addition, must enroll in CHME 7390 for each semester they are working toward their degree.		8
CHME 7390	Seminar	
CHME 7990	Thesis	
Electives		
Complete 8 semester hours from the course list below. (p. 157)		8

Course List

Students can take electives outside this list with prior approval from the faculty advisor. Students may complete a maximum of 8 semester hours (thesis option) or 12 semester hours (nonthesis options) of coursework for credit outside the Department of Chemical Engineering under the guidance of their advisor and approval of the chemical engineering graduate program director.

Code	Title	Hours
CHME 5101	Fundamentals of Chemical Engineering Analysis	
CHME 5105	Materials Characterization Techniques	
CHME 5137	Computational Modeling in Chemical Engineering	
CHME 5160	Drug Delivery: Engineering Analysis	
CHME 5185	Design of Experiments and Ethical Research (DOEER)	
CHME 5510	Fundamentals in Process Safety Engineering	
CHME 5520	Process Safety Engineering—Chemical Reactivity, Reliefs, and Hazards Analysis	
CHME 5621	Electrochemical Engineering	
CHME 5630	Biochemical Engineering	
CHME 5631	Biomaterials Principles and Applications	
CHME 5632	Advanced Topics in Biomaterials	
CHME 5683	Introduction to Polymer Science	
CHME 5699	Special Topics in Chemical Engineering	
CHME 6610	Computational Programs in Process Safety for Relief and Scenario Modeling	
CHME 7235	Introduction to Statistical Thermodynamics	
CHME 7240	Polymer Science	
CHME 7262	Special Topics in Process Safety	
CHME 7978	Independent Study	
BIOE 5410	Molecular Bioengineering	
EMGT 5220	Engineering Project Management	
EMGT 6225	Economic Decision Making	
EMGT 6305	Financial Management for Engineers	
ENGR 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage	
ME 5620	Fundamentals of Advanced Materials	
NNMD 5270	Introduction to Nanomedicine	
NNMD 5272	Nanomedicine Seminar 1	
NNMD 5274	Nanomedicine Seminar 2	
NNMD 5370	Nanomedicine Research Techniques	
NNMD 5470	Nano/Biomedical Commercialization: Concept to Market	

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

Process Safety Engineering, Graduate Certificate

The Graduate Certificate in Process Safety Engineering focuses on the integration of chemical engineering skills with the knowledge of process safety and regulation with specific attention on designing and developing solutions for industrial firms with the goal of creating environments that are safer and in compliance with regulatory rules and regulations.

This four-course graduate certificate seeks to provide students with opportunities to apply the fundamentals of chemical engineering knowledge and skills to lead efforts within companies to plan and implement process safety designs that assist in meeting the regulatory requirements and confirming code compliance within an industrial firm in order to maintain the safety, health, and welfare of their employees and the public as well as making industrial firms safer and profitable.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Process Safety		
CHME 5510	Fundamentals in Process Safety Engineering	4

CHME 5520	Process Safety Engineering—Chemical Reactivity, Reliefs, and Hazards Analysis	4
Relief and Scenario Modeling		
CHME 6610	Computational Programs in Process Safety for Relief and Scenario Modeling	4
Special Topics		
CHME 7262	Special Topics in Process Safety	4

Program Credit/GPA Requirements

16 total semester hours required
Minimum 3.000 GPA required

Civil and Environmental Engineering

Website (http://www.civ.neu.edu)

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Overview

With a strategic focus in urban engineering and through a range of teaching and research strengths, anchored by several multidisciplinary, multi-institutional centers and programs, our academic programs are designed to prepare professionals to address the global, complex, and ever-evolving engineering challenges of our time by building on current department strengths and expanding into vital areas. We give our future master's and PhD graduates the opportunity to make real-world impact on and long-lasting contributions to the well-being and development of society.

Mission of the Department

Advancing innovative civil and environmental solutions for society and creating globally oriented engineering leaders by integrating experiential education and use-inspired interdisciplinary research.

Academic Programs

Within our graduate programs, students work alongside world-class faculty on advanced research and courses, developing a solid base for their careers. Three overarching themes are emphasized in our programs: environmental health, civil infrastructure security, and sustainable resource engineering. These themes are aligned with the department's premier strengths in simulation (both computational and experimental), smart sensing, data and network science, and urban informatics and are all reflected in the courses offered in our graduate programs.

MASTER OF SCIENCE DEGREE

The department offers four MS degree programs in the following areas: civil engineering (students can choose one out of six concentrations); environmental engineering; engineering and public policy; and sustainable building systems. Options for a master's thesis or report in place of coursework are available. All civil and environmental engineering master's programs are available on a full-time or part-time basis. For a full list of the department's academic program offerings, please refer to the Programs (p. 158) tab.

DOCTOR OF PHILOSOPHY (PHD) DEGREE

The department offers the following PhD degrees: PhD in Civil and Environmental Engineering and Interdisciplinary PhD. The doctoral program is designed to be flexible with respect to subject area and may be adapted to any subject area in civil and environmental engineering, including interdisciplinary options within the department or across departments or colleges.

The PhD is awarded to students who demonstrate high academic achievement and research competence in the selected field. Students must pursue the PhD program on a basis consistent with the residence requirements for the degree (p. 158).

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 251).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP OPTION

Students have the opportunity to pursue the Gordon Engineering Leadership Program (p. 245) in combination with the MS degree.

Programs

Doctor of Philosophy (PhD)

- Civil and Environmental Engineering (p. 158)

Master of Science (MS)

- Engineering and Public Policy (p. 160)

Master of Science in Civil Engineering (MSCivE)

- Civil Engineering with Concentration in Construction Management (p. 163)
- Civil Engineering with Concentration in Data and System (p. 161)s
- Civil Engineering with Concentration in Geotechnical/ Geoenvironmental Engineering (p. 164)
- Civil Engineering with Concentration in Structures (p. 165)
- Civil Engineering with Concentration in Transportation (p. 166)
- Civil Engineering with Concentration in Water, Environmental, and Coastal Systems (p. 168)

Master of Science in Environmental Engineering (MSEnvE)

- Environmental Engineering (p. 169)

Master of Science in Sustainable Building Systems (MSSBS)

- Sustainable Building Systems (p. 170)

Retired Programs

- Civil Engineering

  Please see successor program: Civil and Environmental Engineering, PhD *(p. 158)*

Civil and Environmental Engineering, PhD

The Doctor of Philosophy in Civil and Environmental Engineering offers students an opportunity for in-depth study in a broad range of areas in civil and environmental engineering. Awarding the Doctor of Philosophy degree is based on ability to formulate and execute original research addressing important problems and completion of a rigorous academic program that enhances the student's knowledge in relevant areas. The PhD program has two components:

1. An academic program of graduate-level courses that provides depth in a specific area of Civil and Environmental Engineering (the major field) as well as other coursework that provides additional exposure at an advanced level to one or more disciplines
2. The dissertation, an extended independent research effort on a relevant technical problem resulting in an original contribution to the field

Upon acceptance into the program, an applicant is designated as a doctoral student. This designation is changed to doctoral candidate upon successful completion of the doctoral qualifying examinations (both written and oral area exams) and all the required coursework.

Each student's mastery of subject matter is measured by a qualifying examination covering a subset of topics selected from the major field. A doctoral dissertation committee periodically monitors research progress, and the candidate is required to present and defend his or her research results before the doctoral dissertation committee upon completion of the work.

Coursework Requirement

The academic program must include at least 20 semester hours (Advanced Standing) or 48 semester hours (Direct Entry) of graduate-level coursework at Northeastern University. A student may count no more than 4 semester hours of independent study (such as special project in civil and environmental engineering) toward the minimum course requirements. For direct entry students, a minimum of 40 semester hours must be related to the major field but may include courses from other departments when appropriate. The civil and environmental engineering (CEE) department encourages flexibility in program definition, especially in areas where complementary courses exist in other departments or where expertise resides outside the department and where the objective is to introduce new technology in civil and environmental engineering practice.

To meet the full-time registration requirement for PhD students who have completed the majority of their coursework and not yet reached PhD candidacy, a zero-credit course, Exam Preparation—Doctoral (CIVE 8960), can be taken if needed to fulfill full-time course registration.

Upon successful completion of the qualifying exam and the majority of required coursework, each doctoral candidate must register in two consecutive semesters for Dissertation Term 1 (CIVE 9990) and Dissertation Term 2 (CIVE 9991). Upon completion of this sequence, the candidate must register for Dissertation Continuation (CIVE 9996) in every semester until the dissertation is complete. Students may not register for Continuation until they fulfill the two-semester dissertation sequence.

Qualifying Examination and Degree Candidacy

The objective of the doctoral qualifying examination is to determine whether the applicant possesses mastery of the fundamentals and ability to apply them to solve unfamiliar problems that require analysis, synthesis, and independent thinking, as well as communication skills to present research ideas and plans, motivate problems, respond to related questions, and defend assumptions and technical approach.

The qualifying exam includes written and oral components. Its content depends upon the educational background and objectives of the student. In general, the written component covers four subject areas selected from the major field and includes engineering and science disciplines, as well as civil and environmental engineering application areas. The oral component measures general comprehension and aptitude for research.

If a student fails the exam, he or she may retake it one more time with the permission of the qualifying examination committee.

The qualifying exam is administered within the first 18 months of the PhD program, if the student already holds an MS degree. PhD students who begin the PhD program without a MS degree should take the qualifying exam within the first 30 months of the start of the program.

Under extraordinary circumstances, a student may be granted one additional semester before taking the qualifying exam but only by prior petition to the advisor, concentration representative, and graduate studies committee.

DISSERTATION

Once degree candidacy is established, a doctoral candidate may proceed with his or her dissertation. The candidate must write a dissertation proposal and name a CEE faculty member as the dissertation advisor. The candidate and the advisor must form a dissertation committee, which should have no fewer than four members, of which at least two are full-time (or affiliated) faculty from the CEE department. The committee will monitor progress and approve the final document.

DISSERTATION PROPOSAL PRESENTATION

Each student, along with a faculty advisor, must jointly develop a proposal defining the content of the academic program, subject to review by the dissertation committee. Intellectual rigor, connectivity of subject matter, and compatibility with departmental interests are critical issues. The doctoral dissertation committee's approval of the proposal represents a mutual agreement between the student and the committee.

Comprehensive Examination

The comprehensive exam is a defense of the doctoral research work and an examination on subject matter related to the dissertation area.

Each doctoral candidate must defend his or her dissertation within seven years from the start of the PhD program.

Annual Report

At the beginning of each calendar year, all CEE doctoral students including interdisciplinary students within CEE, should complete the Annual PhD Student Progress Report, which details academic and research activities and accomplishments over the previous year. These forms will be reviewed by the faculty in each respective concentration to ensure satisfactory progress, with feedback provided to the students as necessary.

Residence Requirement

After achieving PhD candidacy, students must complete at least two successive semesters of full-time study on campus to establish residence. The total effort for a PhD program involves a minimum of three years of full-time work beyond the bachelor's degree. Students who enter the doctoral program with a Master of Science degree may complete the requirements in less time but should anticipate at least two years of full-time effort.

Language Requirement

Each doctoral candidate must be proficient in technical writing and oral presentation in the English language. The qualifying examination committee may require additional coursework in the case of any deficiency in these areas.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Qualifying examination and comprehensive examination
Annual review
Dissertation proposal
Dissertation committee
Dissertation defense

Core Requirements

Complete at least 48 semester hours of approved coursework. Consult your faculty advisor for acceptable courses. Please note that a maximum of 4 semester hours of Independent Study (CIVE 7978) will be accepted toward the 48-semester-hour requirement.

Dissertation

Code	Title	Hours
Complete the following:		
CIVE 9990	Dissertation Term 1	
CIVE 9991	Dissertation Term 2	

Program Credit/GPA Requirements

48 total semester hours required
Minimum 3.000 GPA required

Advanced Entry PhD Program Requirements

Coursework Requirement

The CEE department encourages flexibility in program definition, especially in areas where complementary courses exist in other departments or where expertise resides outside the department and where the objective is to introduce new technology in civil and environmental engineering practice. The academic program must include at least 20 semester hours of graduate-level coursework at Northeastern University. A student may count no more than 4 semester hours of independent study (such as special project in civil engineering) toward the minimum course requirements.

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Qualifying examination and comprehensive examination
Annual review
Dissertation proposal
Dissertation committee
Dissertation defense

Core Requirements

Complete 20 semester hours of approved coursework. Consult your faculty advisor for acceptable courses. Please note that a maximum of 4 semester hours of Independent Study (CIVE 7978) will be accepted toward the 20-semester-hour requirement.

Dissertation

Code	Title	Hours
CIVE 9990	Dissertation Term 1	
CIVE 9991	Dissertation Term 2	

Coursework Requirement

The academic program must include at least 20 semester hours of graduate-level coursework at Northeastern University.

A student may count no more than 4 semester hours of independent study (such as special project in civil engineering) toward the minimum course requirements.

Program Credit/GPA Requirements

20 total semester hours required
Minimum 3.000 GPA required

Engineering and Public Policy, MS

For program contact information, please visit this website (https://cee.northeastern.edu/academics/graduate-studies/ms-cepp/).

The purpose of this degree is to provide students with a background in engineering with the tools necessary to conduct robust policy analysis. It includes required core courses from the Department of Civil and Environmental Engineering and the School of Public Policy and Urban Affairs, complemented by electives in engineering and public policy, which can be met by two courses and a master's report (recommended), or by one course and a thesis, or by three courses. A minimum of 16 semester hours must be taken in the College of Engineering.

Degree Requirements	With Report	With Thesis	Coursework Only
Required core courses	20 SH	20 SH	20 SH
Other electives	8 SH	4 SH	12 SH
Master of Science report/ thesis	4 SH	8 SH	
Minimum semester hours required	32 SH	32 SH	32 SH

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty adviser regarding these options (p. 251).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Engineering and Public Policy with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Engineering and Public Policy in addition to earning a Graduate Certificate in Engineering Leadership. Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16 semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour degree and certificate will require 20 hours of adviser-approved technical courses.

Engineering Leadership (p. 245)

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Sustainable Engineering and Systems Modeling

Code	Title	Hours
Complete 12 semester hours from the following:		12
CIVE 5261	Dynamic Modeling for Environmental Investment and Policymaking	
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure	
CIVE 5363	Climate Science, Engineering Adaptation, and Policy	
CIVE 6777	Climate Hazards and Resilient Cities Abroad	
CIVE 6778	Climate Adaptation and Policy Abroad	
CIVE 7100	Time Series and Geospatial Data Sciences	
CIVE 7110	Critical Infrastructure Resilience	
CIVE 7272	Air Quality Management	
ENGR 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage	
ENSY 5100	Hydropower	
IE 5500	Systems Engineering in Public Programs	
IE 5640	Data Mining for Engineering Applications	
IE 6200	Engineering Probability and Statistics	
IE 7280	Statistical Methods in Engineering	
ME 5645	Environmental Issues in Manufacturing and Product Use	
SBSY 5200	Sustainable Engineering Systems for Buildings	

Public Policy and Analysis

Code	Title	Hours
Complete 8 semester hours from the following:		8
ECON 7266	Economics of Government	
INSH 5301	Introduction to Computational Statistics	
INSH 6300	Research Methods in the Social Sciences	
INSH 6500	Statistical Analysis	
LPSC 7311	Strategizing Public Policy	
PPUA 5260	Ecological Economics	
PPUA 6212	Research Toolkit for Urban and Regional Policy: Project Management	
PPUA 6213	Research Toolkit for Urban and Regional Policy: Data Visualization	
PPUA 6502	Economic Analysis for Policy and Planning	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6509	Techniques of Program Evaluation	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete 12 semester hours from the Elective Course List below.		12

REPORT OPTION

Code	Title	Hours
CIVE 8674	Master's Report	4
Complete 8 semester hours from the Elective Course List below.		8

THESIS OPTION

Code	Title	Hours
CIVE 7990	Thesis	8
Complete 4 semester hours from the Elective Course List below.		4

ELECTIVE COURSE LIST

Code	Title	Hours
CIVE 5271	Solid and Hazardous Waste Management	
CIVE 5280	Remote Sensing of the Environment	
CIVE 5281	Coastal Dynamics and Design	
CIVE 5300 and CIVE 5301	Environmental Sampling and Analysis and Lab for CIVE 5300	
CIVE 7150	Data-Driven Decision Support for Civil and Environmental Engineering	
CIVE 7230	Legal Aspects of Civil Engineering	
CIVE 7252	Water Engineering: Planning, Design, and Management	
CIVE 7261	Surface Water Quality Modeling	
EMGT 6225	Economic Decision Making	
ENVR 5210	Environmental Planning	
ENVR 5260	Geographical Information Systems	
LPSC 7312	Cities, Sustainability, and Climate Change	
PHTH 5214	Environmental Health	
PHTH 5230	Global Health	
PPUA 5262	Big Data for Cities	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
PPUA 5264	Energy Democracy and Climate Resilience: Technology, Policy, and Social Change	
PPUA 5270	Food Systems and Public Policy	
PPUA 6101	Environmental Science and Policy Seminar 1	

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

Civil Engineering with Concentration in Data and Systems, MSCivE

This program is designed for students with career goals that require application of data and systems analysis to challenges across any discipline of civil and environmental engineering. The degree requirements include core courses (total of 20 semester hours) in data

analysis and computing, systems and sensors, and data and systems topics in civil and environmental engineering, complemented by electives across multiple departments including mathematics, computer science, engineering, economics, and policy.

Degree Requirements	With Report	With Thesis	Coursework Only
Required core courses	20 SH	20 SH	20 SH
Electives	8 SH	4 SH	12 SH
Master of Science report/ thesis	4 SH	8 SH	
Minimum semester hours required	**32 SH**	**32 SH**	**32 SH**

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 251).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Civil Engineering with Concentration in Data and Systems with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Civil Engineering with Concentration in Data and Systems in addition to earning a Graduate Certificate in Engineering Leadership (p. 245). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 hours of advisor-approved data and systems engineering technical courses.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated. At least 20 semester hours (of the 32 semester hours) must be listed as CIVE or SBSY and must form a cohesive advisor-approved program.

Core Requirements

Code	Title	Hours
Complete 20 semester hours from the following course lists:		20
Data and Computing		
Complete at least 4 semester hours from the following:		4
CIVE 5280	Remote Sensing of the Environment	
CIVE 7100	Time Series and Geospatial Data Sciences	
or ENVR 6500	Biostatistics	
or IE 6200	Engineering Probability and Statistics	
or IE 7280	Statistical Methods in Engineering	
or INSH 5301	Introduction to Computational Statistics	
or MATH 7343	Applied Statistics	
CIVE 7150	Data-Driven Decision Support for Civil and Environmental Engineering	
CIVE 7151	Urban Informatics and Processing	
or PPUA 5262	Big Data for Cities	
CIVE 7388	Special Topics in Civil Engineering (Random Data and Processing)	
DAMG 6105	Data Science Engineering with Python	
DAMG 6210	Data Management and Database Design	
ENVR 5260	Geographical Information Systems	
IE 5640	Data Mining for Engineering Applications	
or IE 7275	Data Mining in Engineering	
PHYS 7331	Network Science Data	
Systems and Sensors		
Complete at least 4 semester hours from the following:		4
CIVE 5261	Dynamic Modeling for Environmental Investment and Policymaking	
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure	
CIVE 5699	Special Topics in Civil Engineering (Vibration-Based Structural Health Monitoring)	
CIVE 7388	Special Topics in Civil Engineering (Dynamics and Control of Infrastructure)	
EECE 5155	Wireless Sensor Networks and the Internet of Things	
IE 5500	Systems Engineering in Public Programs	
OR 6205	Deterministic Operations Research	
OR 7230	Probabilistic Operation Research	
OR 7245	Network Analysis and Advanced Optimization	
PHYS 5116	Complex Networks and Applications	
PPUA 6502	Economic Analysis for Policy and Planning	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	
Civil and Environmental Systems		
Complete at least 8 semester hours from the following:		8
CIVE 5281	Coastal Dynamics and Design	
CIVE 5363	Climate Science, Engineering Adaptation, and Policy	
CIVE 5373	Transportation Systems: Analysis and Planning	
CIVE 5536	Hydrologic and Hydraulic Design	
CIVE 7110	Critical Infrastructure Resilience	
CIVE 7252	Water Engineering: Planning, Design, and Management	
CIVE 7380	Performance Models and Simulation of Transportation Networks	
CIVE 7381	Transportation Demand Forecasting and Model Estimation	
CIVE 7385	Public Transportation	
IE 7200	Supply Chain Engineering	
OR 7310	Logistics, Warehousing, and Scheduling	
SBSY 5100	Sustainable Design and Technologies in Construction	

SBSY 5200	Sustainable Engineering Systems for Buildings
SBSY 5250	Building Performance Simulation

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete the remaining semester hours from the electives list below.		12

REPORT OPTION

Code	Title	Hours
CIVE 8674	Master's Report	4
Complete the remaining semester hours from the electives list below.		8

THESIS OPTION

Code	Title	Hours
CIVE 7990	Thesis	8
Complete the remaining semester hours from the electives list below.		4

Course Lists

Any core course not used to meet the core course requirements can be used as an elective, as can courses in the following table:

ELECTIVES LIST

Code	Title	Hours
CIVE 5699	Special Topics in Civil Engineering (Design and Development of Modern Infrastructure)	
CIVE 6566	Sustainable Urban Transportation: Netherlands	
CIVE 7220	Construction Management	
CIVE 7250	Environmental Chemistry	
CIVE 7251	Environmental Biological Processes	
CIVE 7255	Environmental Physical/Chemical Processes	
CIVE 7260	Hydrologic Modeling	
CIVE 7261	Surface Water Quality Modeling	
CIVE 7382	Advanced Traffic Control and Simulation	
EECE 5642	Data Visualization	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7204	Applied Probability and Stochastic Processes	
IE 5617	Lean Concepts and Applications	
IE 7215	Simulation Analysis	
SBSY 5300	Information Systems for Integrated Project Delivery	

PROGRAM CREDIT/GPA REQUIREMENTS

32 total semester hours required
Minimum 3.000 GPA required

Civil Engineering with Concentration in Construction Management, MSCivE

This program is intended for students interested in construction management and engineering or a closely related field. It includes required core courses primarily from the Department of Civil and Environmental Engineering (https://cee.northeastern.edu/academics/graduate-studies/ms-cive/), complemented by electives in civil and environmental engineering and other departments such as mechanical and industrial engineering and business administration. Based on proven proficiency in given areas, students may waive certain core courses and replace them with alternate elective courses.

Degree Requirements	With Report	With Thesis	Coursework Only
Required core courses	18 SH	18 SH	18 SH
Elective courses	10 SH	6 SH	14 SH
Master of Science report/ thesis	4 SH	8 SH	
Minimum semester hours required	**32 SH**	**32 SH**	**32 SH**

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 251).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Civil Engineering with a Concentration in Construction Management with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Civil Engineering with a Concentration in Construction Management in addition to earning a Graduate Certificate in Engineering Leadership (p. 245). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 33-semester-hour degree and certificate will require 17 hours of advisor-approved construction management technical courses.

ENGINEERING BUSINESS

Master's Degree in Civil Engineering with Concentration in Construction Management with Graduate Certificate in Engineering Business

Students may complete a Master of Science in Civil Engineering with Concentration in Construction Management in addition to earning a Graduate Certificate in Engineering Business. Students must apply and be admitted to the Galante Engineering Business Program in order to pursue this option. The program requires the applicant to have earned or be in a program to earn a Bachelor of Science in Engineering from Northeastern University. The integrated 32-semester-hour degree and certificate will require 16 semester hours of the core courses and 16 semester hours from the outlined business-skill curriculum. The course work, along with participation in cocurricular professional development elements, earn the Graduate Certificate in Engineering Business.

Engineering Business (p. 236)

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
CIVE 5221	Construction Project Control and Organization	2
CIVE 7220	Construction Management	4
CIVE 7230	Legal Aspects of Civil Engineering	4
EMGT 6305	Financial Management for Engineers	4
IE 6200	Engineering Probability and Statistics	4

Options

Complete one of the following options:

COURSE WORK OPTION

Code	Title	Hours
Complete 14 semester hours from the course list below.		14

REPORT OPTION

Code	Title	Hours
CIVE 8674	Master's Report	4
Complete 10 semester hours from the course list below.		10

THESIS OPTION

Code	Title	Hours
CIVE 7990	Thesis	8
Complete 6 semester hours from the course list below.		6

Course List

Code	Title	Hours
ACCT 6200	Financial Reporting and Managerial Decision Making 1	
ACCT 6201	Financial Reporting and Managerial Decision Making 2	
CIVE 5231	Alternative Project Delivery Systems in Construction	
CIVE 5699	Special Topics in Civil Engineering (Design and Development of Modern Infrastructure)	
CIVE 7151	Urban Informatics and Processing	
CIVE 7240	Construction Equipment and Modeling	
CIVE 7301	Advanced Soil Mechanics	
CIVE 7302	Advanced Foundation Engineering	
DAMG 6210	Data Management and Database Design	
EMGT 5300	Engineering/Organizational Psychology	
GE 5010	Customer-Driven Technical Innovation for Engineers	
GE 5100	Product Development for Engineers	
IE 5617	Lean Concepts and Applications	
IE 5640	Data Mining for Engineering Applications	
or IE 7275	Data Mining in Engineering	
IE 7215	Simulation Analysis	
IE 7290	Reliability Analysis and Risk Assessment	
INFO 6215	Business Analysis and Information Engineering	
INFO 6245	Planning and Managing Information Systems Development	
OR 6205	Deterministic Operations Research	
SBSY 5200	Sustainable Engineering Systems for Buildings	
SBSY 5250	Building Performance Simulation	
SBSY 5300	Information Systems for Integrated Project Delivery	

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

Civil Engineering with Concentration in Geotechnical/Geoenvironmental Engineering, MSCivE

This program includes study in the areas of soil mechanics/foundations and geoenvironmental engineering. It includes studies of soil and related earth materials for problems related to the protection of human health and the environment. Related areas include soil mechanics, fate/transport in subsurfaces, subsurface remediation, and others. The degree requirements include core courses from the Department of Civil and Environmental Engineering (https://cee.northeastern.edu/academics/graduate-studies/ms-cive/), complemented by electives in civil and environmental engineering, as well as electives from other departments such as mechanical and industrial engineering.

Degree Requirements	With Report	With Thesis	Coursework Only
Required core courses	8 SH	8 SH	8 SH
Elective courses	20 SH	16 SH	24 SH
Master of Science report/thesis	4 SH	8 SH	
Minimum semester hours required	**32 SH**	**32 SH**	**32 SH**

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 251).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Civil Engineering with a Concentration in Geotechnical/Geoenvironmental Engineering with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Civil Engineering with a Concentration in Geotechnical/Geoenvironmental Engineering in addition to earning a Graduate Certificate in Engineering Leadership (p. 245). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated

32-semester-hour degree and certificate will require 16 hours of advisor-approved geotechnical/geoenvironmental engineering technical courses.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
CIVE 7301	Advanced Soil Mechanics	4
CIVE 7302	Advanced Foundation Engineering	4

Options

Complete one of the following options:

COURSE WORK OPTION

Code	Title	Hours
Complete 24 semester hours from the Elective Course List below.		24

REPORT OPTION

Code	Title	Hours
CIVE 8674	Master's Report	4
Complete 20 semester hours from the Elective Course List below.		20

THESIS OPTION

Code	Title	Hours
CIVE 7990	Thesis	8
Complete 16 semester hours from the Elective Course List below.		16

Elective Course List

Code	Title	Hours
CIVE 5271	Solid and Hazardous Waste Management	
CIVE 5300 and CIVE 5301	Environmental Sampling and Analysis and Lab for CIVE 5300	
CIVE 5536	Hydrologic and Hydraulic Design	
CIVE 5699	Special Topics in Civil Engineering (Design and Development of Modern Infrastructure)	
CIVE 5699	Special Topics in Civil Engineering (Vibration-based Structural Health Monitoring)	
CIVE 7230	Legal Aspects of Civil Engineering	
CIVE 7240	Construction Equipment and Modeling	
CIVE 7250	Environmental Chemistry	
CIVE 7251	Environmental Biological Processes	
CIVE 7260	Hydrologic Modeling	
CIVE 7261	Surface Water Quality Modeling	
CIVE 7311	Soil and Foundation Dynamics	
CIVE 7312	Earthquake Engineering	
CIVE 7313	Ground Improvement	
CIVE 7330	Advanced Structural Analysis	
CIVE 7331	Structural Dynamics	
IE 6200	Engineering Probability and Statistics	
IE 7290	Reliability Analysis and Risk Assessment	
ME 5657	Finite Element Method	

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

Civil Engineering with Concentration in Structures, MSCivE

For program contact information, please visit this website (https://cee.northeastern.edu/academics/graduate-studies/ms-cive/).

This program is designed for students with career goals in structural engineering and structural design. The program includes courses in structural analysis and design, structural mechanics, dynamics of structures, earthquake engineering, wind engineering, and structural health monitoring. The degree requirements include core courses from the Department of Civil and Environmental Engineering, complemented by electives in civil and environmental engineering, as well as electives from other departments such as mechanical and industrial engineering and mathematics.

Degree Requirements	With Report	With Thesis	Coursework Only
Required core courses	8 SH	8 SH	8 SH
Restricted electives	12 SH	12 SH	12 SH
Other electives	8 SH	4 SH	12 SH
Master of Science report/ thesis	4 SH	8 SH	
Minimum semester hours required	**32 SH**	**32 SH**	**32 SH**

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 251).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Civil Engineering with Concentration in Structural Engineering with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Civil Engineering with Concentration in Structural Engineering in addition to earning a Graduate Certificate in Engineering Leadership. Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 hours of advisor-approved structural engineering technical courses.

Engineering Leadership (p. 245)

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
CIVE 7330	Advanced Structural Analysis	4
CIVE 7331	Structural Dynamics	4

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete 12 semester hours from the Restricted Elective List below.		12
Complete 12 semester hours from the Other Elective List below.		12

REPORT OPTION

Code	Title	Hours
CIVE 8674	Master's Report	4
Complete 12 semester hours from the Restricted Elective List below.		12
Complete 8 semester hours from the Other Elective List below.		8

THESIS OPTION

Code	Title	Hours
CIVE 7990	Thesis	8
Complete 12 semester hours from the Restricted Elective List below.		12
Complete 4 semester hours from the Other Elective List below.		4

Course Lists

RESTRICTED ELECTIVE LIST

Code	Title	Hours
CIVE 5522	Structural Systems Modeling	
CIVE 7150	Data-Driven Decision Support for Civil and Environmental Engineering	
CIVE 7340	Seismic Analysis and Design	
CIVE 7342	System Identification	
CIVE 7350	Behavior of Concrete Structures	
CIVE 7351	Behavior of Steel Structures	
CIVE 7354	Wind Engineering	
CIVE 7355	Advanced Bridge Design	
CIVE 7357	Advanced Structural Mechanics	
CIVE 7388	Special Topics in Civil Engineering (Random Data and Processing)	
CIVE 7388	Special Topics in Civil Engineering (Dynamics and Control of Infrastructure Systems)	
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure	
CIVE 5520	Structural Systems	
CIVE 5525	Prestressed Concrete Design	
CIVE 5699	Special Topics in Civil Engineering (Design and Development of Modern Infrastructure)	
CIVE 5699	Special Topics in Civil Engineering (Vibration-based Structural Health Monitoring)	
CIVE 7151	Urban Informatics and Processing	
CIVE 7301	Advanced Soil Mechanics	
CIVE 7302	Advanced Foundation Engineering	
CIVE 7311	Soil and Foundation Dynamics	
CIVE 7312	Earthquake Engineering	
MATH 7241	Probability 1	
MATH 7342	Mathematical Statistics	
MATH 7343	Applied Statistics	
MATL 7365	Properties and Processing of Electronic Materials	
ME 5240	Computer Aided Design and Manufacturing	
ME 5650	Advanced Mechanics of Materials	
ME 5655	Dynamics and Mechanical Vibration	
ME 5657	Finite Element Method	
ME 5659	Control Systems Engineering	
ME 6200	Mathematical Methods for Mechanical Engineers 1	
ME 6201	Mathematical Methods for Mechanical Engineers 2	
ME 7210	Elasticity and Plasticity	
ME 7238	Advanced Finite Element Method	
ME 7255	Continuum Mechanics and Nonlinear FEM	
SBSY 5100	Sustainable Design and Technologies in Construction	
SBSY 5200	Sustainable Engineering Systems for Buildings	

OTHER ELECTIVE LIST

Any restricted elective not used to meet the restricted elective requirement can be taken as another elective.

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

Civil Engineering with Concentration in Transportation, MSCivE

This program is designed for students with career goals in transportation engineering and transportation planning. The degree requirements include core courses from the Department of Civil and Environmental Engineering (https://cee.northeastern.edu/academics/graduate-studies/ms-cive/), complemented by electives in civil and environmental engineering and by related courses in applied mathematics, engineering, economics, policy, and management.

Degree Requirements	With Report	With Thesis	Coursework Only
Required core courses	12 SH	12 SH	12 SH

Restricted electives	8 SH	8 SH	12 SH
Other electives	8 SH	4 SH	8 SH
Master of Science report/ thesis	4 SH	8 SH	
Minimum semester hours required	**32 SH**	**32 SH**	**32 SH**

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 251).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Civil Engineering with Concentration in Transportation with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Civil Engineering with Concentration in Transportation in addition to earning a Graduate Certificate in Engineering Leadership (p. 245). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 hours of advisor-approved transportation engineering technical courses.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
CIVE 5373	Transportation Systems: Analysis and Planning	4
CIVE 5376	Traffic Engineering and Sustainable Urban Street Design	4
IE 6200	Engineering Probability and Statistics	4

Options

Complete one of the following options:

COURSE WORK OPTION

Code	Title	Hours
Complete 12 semester hours from the Restricted Elective List below.		12
Complete 8 semester hours from the Other Elective List below.		8

REPORT OPTION

Code	Title	Hours
CIVE 8674	Master's Report	4
Complete 8 semester hours from the Restricted Elective List below.		8
Complete 8 semester hours from the Other Elective List below.		8

THESIS OPTION

Code	Title	Hours
CIVE 7990	Thesis	8
Complete 8 semester hours from the Restricted Elective List below.		8
Complete 4 semester hours from the Other Elective List below.		4

Course Lists

RESTRICTED ELECTIVE LIST

Code	Title	Hours
CIVE 6566	Sustainable Urban Transportation: Netherlands	
CIVE 7150	Data-Driven Decision Support for Civil and Environmental Engineering	
CIVE 7151	Urban Informatics and Processing	
CIVE 7380	Performance Models and Simulation of Transportation Networks	
CIVE 7381	Transportation Demand Forecasting and Model Estimation	
CIVE 7382	Advanced Traffic Control and Simulation	
CIVE 7385	Public Transportation	
CIVE 7387	Design Aspects of Roadway Safety	
CIVE 7388	Special Topics in Civil Engineering (Random Data and Processing)	
IE 7215	Simulation Analysis	
IE 7280	Statistical Methods in Engineering	

OTHER ELECTIVE LIST

Any restricted elective not used to meet the restricted elective requirement can be used as another elective. Courses outside this list may be taken as electives with adviser approval.

Code	Title	Hours
CIVE 5699	Special Topics in Civil Engineering (Design and Development of Modern Infrastructure)	
DAMG 6210	Data Management and Database Design	
IE 7275	Data Mining in Engineering	
IE 7290	Reliability Analysis and Risk Assessment	
MATH 7343	Applied Statistics	
OR 6205	Deterministic Operations Research	
OR 7230	Probabilistic Operation Research	
OR 7245	Network Analysis and Advanced Optimization	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

Civil Engineering with Concentration in Water, Environmental, and Coastal Systems, MSCivE

This program integrates the study of infrastructure; hydrology; hydraulics; engineering for coastal areas; numerical modeling; remote sensing; spatial and temporal data analysis; and physical, chemical, and biological processes that impact the water and air quality to provide students with the knowledge and tools for developing and managing sustainable, resilient water resources and infrastructure. It includes required core courses from the Department of Civil and Environmental Engineering (https://cee.northeastern.edu/academics/graduate-studies/ms-cive/), complemented by electives in electrical and computer engineering, mechanical and industrial engineering, and earth and environmental sciences.

Degree Requirements	With Report	With Thesis	Coursework Only
Required core courses	8 SH	8 SH	8 SH
Restricted electives	12 SH	12 SH	12 SH
Other electives	8 SH	4 SH	12 SH
Master of Science report/ thesis	4 SH	8 SH	
Minimum semester hours required	**32 SH**	**32 SH**	**32 SH**

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 251).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Civil Engineering with Concentration in Water, Environmental, and Coastal Systems with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Civil Engineering with Concentration in Water, Environmental, and Coastal Systems in addition to earning a Graduate Certificate in Engineering Leadership (p. 245). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 hours of advisor-approved environmental and water systems technical courses.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Complete 8 semester hours of the following:		8
CIVE 5281	Coastal Dynamics and Design	
CIVE 7250	Environmental Chemistry	
CIVE 7251	Environmental Biological Processes	
CIVE 7260	Hydrologic Modeling	
CIVE 7261	Surface Water Quality Modeling	
CIVE 7272	Air Quality Management	
CIVE 7281	Coastal and Nearshore Hydrodynamics	
CIVE 7392	Special Topics in Environmental Engineering (Hydraulic Modeling)	

Options

Complete one of the following options:

COURSE WORK OPTION

Code	Title	Hours
Complete 12 semester hours from the Restricted Elective List below.		12
Complete 12 semester hours from the Other Elective List below.		12

REPORT OPTION

Code	Title	Hours
CIVE 8674	Master's Report	4
Complete 12 semester hours from the Restricted Elective List below.		12
Complete 8 semester hours from the Other Elective List below.		8

THESIS OPTION

Code	Title	Hours
CIVE 7990	Thesis	8
Complete 12 semester hours from the Restricted Elective List below.		12
Complete 4 semester hours from the Other Elective List below.		4

Course Lists

RESTRICTED ELECTIVE LIST

Any required core course not used to meet the required core course requirement can be taken as a restricted elective.

Code	Title	Hours
CIVE 5261	Dynamic Modeling for Environmental Investment and Policymaking	
CIVE 5271	Solid and Hazardous Waste Management	
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure	
CIVE 5280	Remote Sensing of the Environment	
CIVE 5300 and CIVE 5301	Environmental Sampling and Analysis and Lab for CIVE 5300	
CIVE 5363	Climate Science, Engineering Adaptation, and Policy	
CIVE 5536	Hydrologic and Hydraulic Design	
CIVE 7100	Time Series and Geospatial Data Sciences	
CIVE 7110	Critical Infrastructure Resilience	
CIVE 7252	Water Engineering: Planning, Design, and Management	
CIVE 7255	Environmental Physical/Chemical Processes	

ME 6200	Mathematical Methods for Mechanical Engineers 1

OTHER ELECTIVE LIST

Any required core course not used to meet the required core course or restricted elective requirements can be taken as another elective. Any restricted elective not used to meet the restricted elective requirement can be taken as another elective.

Code	Title	Hours
CIVE 5699	Special Topics in Civil Engineering (Design and Development of Modern Infrastructure)	
CIVE 7150	Data-Driven Decision Support for Civil and Environmental Engineering	
CIVE 7151	Urban Informatics and Processing	
CIVE 7388	Special Topics in Civil Engineering (Random Data and Processing)	
EECE 7204	Applied Probability and Stochastic Processes	
ENVR 5260	Geographical Information Systems	
EEMB 5516	Oceanography	
IE 6200	Engineering Probability and Statistics	
IE 7280	Statistical Methods in Engineering	
IE 7290	Reliability Analysis and Risk Assessment	
MATH 7341	Probability 2	
MATH 7343	Applied Statistics	
MATH 7344	Regression, ANOVA, and Design	

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

Environmental Engineering, MSEnvE

This program integrates the study of physical, chemical, and biological processes and fundamental principles for water and wastewater treatment and disposal, hazardous waste management, surface water and groundwater quality, water resources management, and air quality management. Successful graduates will have the ability to develop and implement technologies for various environmental applications with the goal to improve and protect the environment and human health. It includes required core courses from the Department of Civil and Environmental Engineering (https://cee.northeastern.edu/academics/graduate-studies/ms-envi/) (CEE), complemented by electives in civil and environmental engineering, mechanical and industrial engineering, earth and environmental sciences, and mathematics.

Degree Requirements	With Report	With Thesis	Coursework Only
Required core electives	12 SH	12 SH	12 SH
Restricted electives	8 SH	8 SH	12 SH
Other electives	8 SH	4 SH	8 SH
Master of Science report/ thesis	4 SH	8 SH	

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 251).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Environmental Engineering with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Environmental Engineering in addition to earning a Graduate Certificate in Engineering Leadership (p. 245). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16 semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour degree and certificate will require 20 hours of advisor-approved environmental engineering technical courses.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Complete three of the following:		12
CIVE 7250	Environmental Chemistry	
CIVE 7251	Environmental Biological Processes	
CIVE 7255	Environmental Physical/Chemical Processes	
CIVE 7260	Hydrologic Modeling	

Options

Complete one of the following options:

COURSE WORK OPTION

Code	Title	Hours
Complete 12 semester hours from the Restricted Electives List below.		12
Complete 8 semester hours from the Other Electives List below.		8

REPORT OPTION

Code	Title	Hours
CIVE 8674	Master's Report	4
Complete 8 semester hours from the Restricted Electives List below.		8
Complete 8 semester hours from the Other Electives List below.		8

THESIS OPTION

Code	Title	Hours
CIVE 7990	Thesis	8
Complete 8 semester hours from the Restricted Electives List below.		8
Complete 4 semester hours from the Other Electives List below.		4

Course Lists

RESTRICTED ELECTIVES LIST

Any required core course not used to meet the required core course requirement can be taken as a restricted elective.

Code	Title	Hours
CIVE 5261	Dynamic Modeling for Environmental Investment and Policymaking	
CIVE 5271	Solid and Hazardous Waste Management	
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure	
CIVE 5280	Remote Sensing of the Environment	
CIVE 5300 and CIVE 5301	Environmental Sampling and Analysis and Lab for CIVE 5300	
CIVE 5363	Climate Science, Engineering Adaptation, and Policy	
CIVE 5536	Hydrologic and Hydraulic Design	
CIVE 7252	Water Engineering: Planning, Design, and Management	
CIVE 7261	Surface Water Quality Modeling	
CIVE 7272	Air Quality Management	
CIVE 7392	Special Topics in Environmental Engineering (Hydraulic Modeling)	
CIVE 7392	Special Topics in Environmental Engineering (Aquatic Biogeochemistry)	

OTHER ELECTIVES LIST

Any required core course not used to meet the required core course requirement can be taken as another elective. Any restricted elective not used to meet the restricted elective requirement can be taken as another elective.

Code	Title	Hours
CIVE 5699	Special Topics in Civil Engineering (Design and Development of Modern Infrastructure)	
EECE 7204	Applied Probability and Stochastic Processes	
ENVR 5190	Soil Science	
ENVR 5260	Geographical Information Systems	
EEMB 5516	Oceanography	
IE 6200	Engineering Probability and Statistics	
IE 7280	Statistical Methods in Engineering	
IE 7290	Reliability Analysis and Risk Assessment	
MATH 7241	Probability 1	
MATH 7343	Applied Statistics	
MATH 7344	Regression, ANOVA, and Design	

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

Sustainable Building Systems, MSSBS

For program contact information, please visit this website (https://cee.northeastern.edu/academics/graduate-studies/ms-subs/).

The sustainable building systems program focuses on the design and operation of buildings to provide a comfortable, healthy, and productive indoor environment with minimal energy and environmental impact. Students have an opportunity to develop leadership and decision-making skills to implement sustainable building practices in either the private or public sectors in the global market.

The graduates of the **Master of Science in Sustainable Building Systems** program should display a high level of engineering knowledge in a broad range of architectural engineering, civil engineering, and construction management while embracing the concepts of engineering sustainability as related to energy and materials usage and the effects on the environment. Graduates will have the base training necessary to lead efforts within companies to plan and implement sustainable practices for the design and operation of buildings, realize energy and materials efficiency improvements, and minimize environmental impact. Upon graduation, students will have a theoretical background to the concepts behind the LEED (Leadership in Energy and Environmental Design) Green Associate examination.

Below is a typical course sequence for graduation in two semesters. The program is flexible to accommodate full-time students—who wish to proceed over a period of two to four semesters—and part-time students—who can complete the program requirements by taking one to two courses per semester, finishing the program in approximately four years.

Degree Requirements	Full-Time Study	Part-Time Study
Core courses	12	12
Restricted electives	8	8
Open elective	12	12

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 251).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Sustainable Building Systems with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Sustainable Building Systems in addition to earning a Graduate Certificate in Engineering Leadership. Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 hours of advisor-approved sustainable building systems technical courses.

Engineering Leadership (p. 245)

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
ARCH 5210 and ARCH 5211	Environmental Systems and Recitation for ARCH 5210	4
SBSY 5100	Sustainable Design and Technologies in Construction	4

SBSY 5200	Sustainable Engineering Systems for Buildings	4
Students must register for this 0 SH course every semester:		
SBSY 5400	Sustainable Building Systems Seminar	

Electives

RESTRICTED ELECTIVE LIST

Code	Title	Hours
Complete 8 semester hours from the following:		8
ARCH 5220	Integrated Building Systems	
CIVE 5221	Construction Project Control and Organization	
CIVE 5231	Alternative Project Delivery Systems in Construction	
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure	
CIVE 7220	Construction Management	
or EMGT 5220	Engineering Project Management	
CIVE 7230	Legal Aspects of Civil Engineering	
EMGT 6305	Financial Management for Engineers	
SBSY 5250	Building Performance Simulation	
SBSY 5300	Information Systems for Integrated Project Delivery	

OTHER ELECTIVE LIST

Any restricted elective not used to meet the restricted elective requirement can be taken as another elective.

Code	Title	Hours
Complete 12 semester hours from the following:		12
ACCT 6200	Financial Reporting and Managerial Decision Making 1	
ACCT 6201	Financial Reporting and Managerial Decision Making 2	
CIVE 5699	Special Topics in Civil Engineering (Design and Development of Modern Infrastructure)	
CIVE 7151	Urban Informatics and Processing	
CIVE 7350	Behavior of Concrete Structures	
CIVE 7351	Behavior of Steel Structures	
CIVE 7388	Special Topics in Civil Engineering (Dynamics and Control of Infrastructure Systems)	
FINA 6200	Value Creation through Financial Decision Making	
FINA 6216	Valuation and Value Creation	
FINA 6217	Real Estate Finance and Investment	
LPSC 7312	Cities, Sustainability, and Climate Change	
ME 5645	Environmental Issues in Manufacturing and Product Use	

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

Electrical and Computer Engineering

Website (http://www.ece.neu.edu)

Srinivas Tadigadapa, PhD
Professor and Chair

409 Dana Research Center
617.373.7529
617.373.4431 (fax)

The Department of Electrical and Computer Engineering's (ECE) graduate program is a dynamic and thriving center of world-recognized research in a wide range of areas. The department has strong ties to local industry and the world-famous hospitals and medical centers of Boston and is involved in many joint research projects with them. With four NSF- and DHS-funded research centers and over 20 industrial partners, faculty and students are actively conducting cutting-edge research in areas such as computer vision; pattern recognition and machine learning; brain-computer interface; power systems and power electronics; underwater communication networks and signal processing; robotics; information theory; communications, control, and signal processing; RF, electromagnetics, optics, and magnetic materials; micro/nanomechanical structures and advanced nanomaterials; power-first system/computer architecture; internet-of-things; ultralow power biomedical and neural circuits and systems.

ECE's graduate program educates MS and PhD students with deep fundamental and practical knowledge in the various disciplines of electrical and computer engineering by offering a strong curriculum and providing opportunities for research in these disciplines. The department educates the next generation of highly skilled engineers and researchers with necessary skills to address the future needs of industry, government, and humanity.

Overview of Programs Offered

ECE's graduate program offers a Master of Science in Electrical and Computer Engineering, a Master of Science in Electrical and Computer Engineering Leadership, a Doctor of Philosophy in Electrical Engineering, and a Doctor of Philosophy in Computer Engineering.

Mission of the Department

The primary educational missions of the electrical and computer engineering department are to educate undergraduate students so they have the opportunity to obtain successful careers in electrical and computer engineering and related disciplines, and pursue advanced study such as graduate study in engineering or related disciplines, and to educate graduate students so they can make meaningful contributions to research and industry.

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 251).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP OPTION

Students have the opportunity to pursue the Master of Science in Electrical and Computer Engineering Leadership (MSECEL) (p. 202) along with the Graduate Certificate in Engineering Leadership.

In addition, students have the opportunity to pursue the Gordon Engineering Leadership Program (p. 527) in combination with the Master of Science in Electrical and Computer Engineering. This option

results in an increase in total hours beyond that required for the master's degree only.

Programs

Doctor of Philosophy (PhD)

- Computer Engineering (p. 172)
- Cybersecurity (p. 125)
- Electrical Engineering (p. 176)

Master of Science (MS)

- Applied Physics and Engineering (p. 178)
- Data Science (p. 118)
- Robotics (p. 121)

Master of Science in Electrical and Computer Engineering (MSECE)

- Concentration in Communications, Control, and Signal Processing (p. 181)
- Concentration in Computer Systems and Software (p. 184)
- Concentration in Computer Networks and Security (p. 186)
- Concentration in Computer Vision, Machine Learning, and Algorithms (p. 188)
- Concentration in Electromagnetics, Plasma, and Optics (p. 191)
- Concentration in Hardware and Software for Machine Intelligence (p. 193)
- Concentration in Microsystems, Materials, and Devices (p. 198)
- Concentration in Power Systems (p. 200)

Master of Science in Electrical and Computer Engineering Leadership (MSECEL)

- Electrical and Computer Engineering Leadership (p. 202)

Computer Engineering, PhD

The Doctor of Philosophy in Computer Engineering offers students an opportunity for study in a broad range of areas in computer engineering. Details on PhD requirements can be found in the *Graduate Program Guide*. A summary of requirements is given below.

Qualifying Exam and Degree Candidacy

The PhD qualifying exam is the examination for admissions to the doctoral programs in electrical engineering and in computer engineering. It is a written exam in the student's major area, and some concentrations include an oral exam. The exam has the dual purposes of serving as an indicator of the student's capability for successful completion of the PhD in electrical engineering or in computer engineering and of serving as a guide to the student's advisor in developing a suitable plan of study, tailored to the individual needs of the student. Students are tested on graduate course material as specified by the faculty in the chosen area.

A student who has matriculated into the PhD program is considered a predoctoral student, whether they are BS entry or Advanced entry. Upon successful completion of the qualifying exam, the student is designated a PhD candidate. Predoctoral students must take the qualifying exam no later than the second spring after their matriculation in the PhD program. A student who fails the qualifying exam will be permitted to retake the exam only one more time.

Annual Review

PhD students are reviewed annually starting with their second year in the ECE department. Students complete a form and submit a one-page report of their progress during the past year. Each student is evaluated and receives a grade of satisfactory, needs improvement, or unsatisfactory. Students who receive an unsatisfactory grade will meet with their advisor and the ECE department chair in order to receive feedback and set goals for the next year. Students who receive unsatisfactory grades in two consecutive years are terminated from the PhD program.

Residence Requirement

After reaching PhD candidacy, one year of full-time graduate work or two consecutive years of part-time graduate work satisfy the university residence requirement. In the latter case, the student's advisor must approve a detailed schedule in order to ensure that the student devotes at least half of the time to the requirements of the Graduate School of Engineering.

Dissertation

Within one year of passing the PhD qualifying exam, the PhD candidate must form a dissertation committee. A dissertation committee must have at least three members that hold a PhD or equivalent degree. At least two of the committee members must be tenured or tenure-track Department of Electrical and Computer Engineering (ECE) faculty, and the committee must include the student's advisor. The chair of the committee must be a tenured or tenure-track faculty member in the ECE department.

The dissertation committee must design an appropriate program of study that prepares the student to be a successful doctoral-level engineer as well as direct the candidate's dissertation research. The dissertation committee will approve the dissertation in final form.

DISSERTATION AND DISSERTATION CONTINUATION REGISTRATION

Upon successful completion of the PhD qualifying exam and the required course work, the PhD candidate must register in two consecutive semesters for Dissertation Term 1 (EECE 9990) and Dissertation Term 2 (EECE 9991). Upon completion of this sequence, the student must register for Dissertation Continuation (EECE 9996) in every semester until the dissertation is completed. A student may not register for Continuation until he or she fulfills the two-semester sequence of Dissertation.

REGISTRATION REQUIREMENTS FOR PREDOCTORAL AND PHD CANDIDATE GRADUATE ASSISTANTS

The ECE department requires that predoctoral students and PhD candidates who hold research or teaching assistantships be registered full-time. Predoctoral PhD students may register for Research (EECE 9986) (zero credit, full-time equivalent) *if needed* to fulfill the registration requirement.

PHD PROPOSAL REVIEW

Each PhD candidate must demonstrate, by means of the proposal review, subject matter knowledge satisfactory for the award of the degree.

The proposal review is an oral presentation followed by a question-and-answer session administered by the student's dissertation advisor/committee. The proposal review will be given at the time the student submits his or her dissertation proposal to the dissertation advisor/committee for approval. As part of this exam, the dissertation advisor/committee will review the student's doctoral program and his or her performance in graduate courses, as well as examine the student on subject matter related to his or her graduate course work and dissertation subject area.

FINAL DISSERTATION DEFENSE

The final dissertation defense will include the subject matter of the dissertation and significant developments in the field of the dissertation work. Other related fields may be included if recommended by the

examining faculty. The dissertation defense must be scheduled at least six months after the PhD proposal review.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual departmental review (each fall semester after the student has been in the program for at least one year)
Qualifying examination
Dissertation committee
Proposal stage review
Dissertation defense

Core Requirements

Complete 32 semester hours of approved coursework—equivalent of MSECE degree. Then complete 16 semester hours, of which 8 must be graduate-level EECE courses. Consult faculty research advisor for acceptable courses.

Dissertation

Code	Title	Hours
Complete the following two courses:		
EECE 9990	Dissertation Term 1	
EECE 9991	Dissertation Term 2	

Program Credit/GPA Requirements

48 total semester hours required
Minimum 3.000 GPA required

Advanced Entry PhD Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review (each fall semester after the student has been in the program for at least one year)
Qualifying examination
Dissertation committee
Proposal stage review
Dissertation defense

Core Requirements

Complete 16 semester hours of approved coursework. At least 8 semester hours must be graduate-level EECE courses. Consult your faculty adviser for acceptable courses.

Dissertation

Code	Title	Hours
Complete the following two courses:		
EECE 9990	Dissertation Term 1	
EECE 9991	Dissertation Term 2	

Program Credit/GPA Requirements

16 total semester hours required
Minimum 3.000 GPA required

Cybersecurity, PhD

A research-based, interdisciplinary Doctor of Philosophy (PhD) in Cybersecurity combines a strong security technical foundation with a security policy and social sciences perspective. It seeks to prepare graduates to advance the state of the art of security in systems, networks, and the internet in industry, academia, and government. The interdisciplinary nature of the program distinguishes it from traditional doctoral degree programs in computer science, engineering, or social sciences and makes it unique in the Boston area.

Students who choose the PhD in Cybersecurity program have a strong desire to pursue academic research solving critical cybersecurity challenges facing today's society. The PhD program is a natural path for students in the college's Master of Science in Cybersecurity (http://www.ccs.neu.edu/graduate/degree-programs/m-s-in-information-assurance/)program who want to pursue research and students with bachelor's degrees and an interest in research-focused careers. Students who pursue careers in advancing the state of the art of cybersecurity have an opportunity to gain:

- A strong technical foundation in cybersecurity and an interdisciplinary perspective based on policy and social science
- A path to a research-focused career coupled with depth in information assurance research at a leading institution, one of the earliest designees by NSA/DHS as a National Center of Academic Excellence in Information Assurance Research, Information Assurance/Cyber Defense, and Cyber Operations
- The opportunity to work with and learn from faculty who are recognized internationally for their expertise and contributions in information assurance from Northeastern's Khoury College of Computer Sciences, the Department of Electrical and Computer Engineering, and the College of Social Sciences and Humanities
- Access to research projects at Northeastern's research centers focused on security:
  - The Cybersecurity and Privacy Institute (https://cyber.ccis.northeastern.edu/about/): The mission of Northeastern's Cybersecurity and Privacy Institute (the Institute) is to safeguard critical technology. Forging partnerships with experts in industry, government, and academia worldwide, the Institute's faculty and students develop, protect, and enhance technologies on which the world relies—from mobile devices and "smart" IoT applications to tomorrow's self-driving cars and delivery drones. Their expertise spans algorithm auditing; cloud security; cryptography; differential privacy; embedded device security; internet-scale security measurements; machine learning; big data; security, malware, and advanced threats; network protocols and security; web and mobile security; and wireless network security.
  - The International Secure Systems Lab (http://www.iseclab.org/), affiliated with Northeastern, a collaborative effort of European and U.S. researchers focused on web security, malware, and vulnerability analysis; intrusion detection; and other computer security issues.
  - The ALERT Center (http://www.northeastern.edu/alert/), where Northeastern is the lead institution, a multiuniversity Department of Homeland Security Center of Excellence involved in research, education, and technology related to threats from explosives.

The benefits of the Boston area:

- World-renowned for academic and research excellence, the Boston area is also home to some of the nation's largest Department of Defense contractors and government and independent labs such as MIT Lincoln Lab, MITRE, and Draper Lab.

Degree Requirements

The PhD in Cybersecurity degree requires completion of at least 48 semester credit hours beyond a bachelor's degree. Students who enter with an undergraduate degree will typically need four to five years to complete the program, and they will be awarded a master's degree en route to the PhD.

Doctoral Degree Candidacy

A student is considered a PhD degree candidate after completing the core courses with at least a 3.500 grade-point average (GPA), with no grades lower than a B in the core courses, and either publishing a paper in a strong conference or journal or passing an oral exam that is conducted by a committee of three cybersecurity faculty members and based on paper(s) written by the student.

RESIDENCY

One year of continuous full-time study is required after admission to the PhD candidacy. During this period, the student will be expected to make substantial progress in preparing for the comprehensive examination.

TEACHING REQUIREMENT

All cybersecurity PhD students must satisfy the teaching requirement in order to graduate. This requirement is fulfilled when the student works as a teaching assistant (TA) or instructor of record (IoR) for one semester and during this semester:

- Teaches at least three hours of classes
- Prepares at least one assignment or quiz or equivalent

PhD students are expected to satisfy the teaching requirement some time after completing their first year and at least one semester prior to scheduling their PhD defense.

DISSERTATION ADVISING

The doctoral dissertation advising team for each student consists of two cybersecurity faculty members, one in a technical area. When appropriate, the second faculty advisor will be from the policy/social science area.

DISSERTATION COMMITTEE

A PhD student's dissertation committee consists of the two members of the dissertation advising team plus two others: One is a member of the cybersecurity faculty, and the other is an external examiner who is knowledgeable about the student's research topic.

COMPREHENSIVE EXAMINATION

A PhD student must submit a written dissertation proposal and present it to the dissertation committee. The proposal should identify the research problem, the research plan, and the potential impact of the research on the field. The presentation of the proposal will be made in an open forum, and the student must successfully defend it before the dissertation committee after the public presentation.

DISSERTATION DEFENSE

A PhD student must complete and defend a dissertation that involves original research in cybersecurity.

AWARDING OF MASTER'S DEGREES

Students who enter the PhD in Cybersecurity program with a bachelor's degree have the option of obtaining a master's degree from one of the departments participating in the program. To do so, they must meet all of the department's degree requirements.

Program Requirements

Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Qualifying exam and area exam
Annual review
Dissertation proposal
Dissertation committee
Dissertation defense

Core Requirements

A grade of B or higher is required in each core course. A cumulative 3.500 GPA is required for the core requirement.

Code	Title	Hours
Foundations		
CY 5770	Software Vulnerabilities and Security	4
or EECE 5641	Introduction to Software Security	
CY 6740	Network Security	4
or EECE 5699	Computer Hardware and System Security	
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	4

Electives and Tracks

Code	Title	Hours
Note: Consult faculty advisor for other acceptable courses.		
Select at least two courses from one track:		8
Hardware Security		
CS 6410	Compilers	
CS 6710	Wireless Network	
EECE 5666	Digital Signal Processing	
EECE 7352	Computer Architecture	
EECE 7364	Mobile and Wireless Networking	
EECE 7390	Computer Hardware Security	
Machine Learning		
CS 6140	Machine Learning	
CS 7150	Deep Learning	
CY 6720	Machine Learning in Cybersecurity and Privacy	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7397	Advanced Machine Learning	
Network Security		
CS 5700	Fundamentals of Computer Networking	
CS 6710	Wireless Network	
CS 7610	Foundations of Distributed Systems	
CY 5130	Computer System Security	
CY 6750	Cryptography and Communications Security	

EECE 5155	Wireless Sensor Networks and the Internet of Things
EECE 5576	Wireless Communication Systems
EECE 7336	Digital Communications
EECE 7364	Mobile and Wireless Networking
EECE 7374	Fundamentals of Computer Networks
EECE 7393	Analysis and Design of Data Networks
Systems Security	
CS 6410	Compilers
CS 7600	Intensive Computer Systems
CS 7610	Foundations of Distributed Systems
CY 5130	Computer System Security
EECE 7352	Computer Architecture
Theory	
CS 7800	Advanced Algorithms
CS 7805	Complexity Theory
EECE 7337	Information Theory
Usable Security and Privacy	
CS 6350	Empirical Research Methods
CS 6760	Privacy, Security, and Usability
CS 7260	Visualization for Network Science
CS 7340	Theory and Methods in Human Computer Interaction
INSH 6300	Research Methods in the Social Sciences
INSH 6302	Qualitative Methods
INSH 6500	Statistical Analysis
INSH 7400	Quantitative Analysis
Cybersecurity Policy	
CRIM 6200	Criminology
CRIM 6262	Evidence-Based Crime Policy
CY 5200	Security Risk Management and Assessment
CY 5210	Information System Forensics
CY 5250	Decision Making for Critical Infrastructure
POLS 7341	Security and Resilience Policy
POLS 7441	Cyberconflict
Electives	
Selected in consultation with advisor from the graduate-level CS, ECE, and CSSH courses.	20

Dissertation

Code	Title	Hours
CY 9990	Dissertation Term 1	
CY 9991	Dissertation Term 2	
Complete the following (repeatable) course until graduation:		
CY 9996	Dissertation Continuation	

Program Credit/GPA Requirements

48 total semester hours required
Minimum 3.000 GPA required

Advanced Entry PhD Program Requirements

Degree Requirements

Incoming PhD in cybersecurity students who have already completed a Master of Science in an adjacent field may petition to the graduate program administration for advanced entry. Advanced entry petitions are reviewed by the program administration on a case-by-case basis. Please note that advanced entry does not waive by itself any part of the PhD coursework requirements. As a degree conferral requirement, a minimum of 16 semester hours of coursework beyond the 32 semester hours of the master's degree is required of advanced entry PhD students (48 semester hours is required of standard entry PhD students). A grade of B or higher is required in each course. A cumulative 3.500 GPA is required for the core requirement.

Doctoral Degree Candidacy

Refer to the PhD Cybersecurity overview (p. 125) for admission to candidacy requirements.

Residency

Refer to the PhD Cybersecurity overview (p. 125) for residency requirements.

Teaching Requirement

Refer to the PhD Cybersecurity overview (p. 125) for teaching requirements.

Dissertation Advising

Refer to the PhD Cybersecurity overview (p. 125) for dissertation advising requirements.

Dissertation Committee

Refer to the PhD Cybersecurity overview (p. 125) for dissertation committee requirements.

Comprehensive Examination

Refer to the PhD Cybersecurity overview (p. 125) for comprehensive examination requirements.

Dissertation Defense

Refer to the PhD Cybersecurity overview (p. 125) for dissertation defense and completion requirements.

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Qualifying exam and area exam
Annual review
Dissertation proposal
Dissertation committee
Dissertation defense

Core Requirement

Students are required to take all core courses unless otherwise determined by the program. Students must maintain a minimum GPA of 3.500 as well as earn a grade of B or better in each core course.

Code	Title	Hours
Foundations		
CY 5770	Software Vulnerabilities and Security	4
or EECE 5641	Introduction to Software Security	

CY 6740	Network Security	4
or EECE 5699	Computer Hardware and System Security	
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	4

Electives and Tracks

Students are required to take all courses unless otherwise determined by the program.

Code	Title	Hours
Note: Consult faculty advisor for other acceptable courses.		
Select at least two courses from one track:		8
Hardware Security		
CS 6410	Compilers	
CS 6710	Wireless Network	
EECE 5666	Digital Signal Processing	
EECE 7352	Computer Architecture	
EECE 7364	Mobile and Wireless Networking	
EECE 7390	Computer Hardware Security	
Machine Learning		
CS 6140	Machine Learning	
CS 7150	Deep Learning	
CY 6720	Machine Learning in Cybersecurity and Privacy	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7397	Advanced Machine Learning	
Network Security		
CS 5700	Fundamentals of Computer Networking	
CS 6710	Wireless Network	
CS 7610	Foundations of Distributed Systems	
CY 5130	Computer System Security	
CY 6750	Cryptography and Communications Security	
EECE 5155	Wireless Sensor Networks and the Internet of Things	
EECE 5576	Wireless Communication Systems	
EECE 7336	Digital Communications	
EECE 7364	Mobile and Wireless Networking	
EECE 7374	Fundamentals of Computer Networks	
EECE 7393	Analysis and Design of Data Networks	
Systems Security		
CS 6410	Compilers	
CS 7600	Intensive Computer Systems	
CS 7610	Foundations of Distributed Systems	
CY 5130	Computer System Security	
EECE 7352	Computer Architecture	
Theory		
CS 7800	Advanced Algorithms	
CS 7805	Complexity Theory	
EECE 7337	Information Theory	
Usable Security and Privacy		
CS 6350	Empirical Research Methods	
CS 6760	Privacy, Security, and Usability	
CS 7260	Visualization for Network Science	
CS 7340	Theory and Methods in Human Computer Interaction	
INSH 6300	Research Methods in the Social Sciences	
INSH 6302	Qualitative Methods	
INSH 6500	Statistical Analysis	
INSH 7400	Quantitative Analysis	
Cybersecurity Policy		
CRIM 6200	Criminology	
CRIM 6262	Evidence-Based Crime Policy	
CY 5200	Security Risk Management and Assessment	
CY 5210	Information System Forensics	
CY 5250	Decision Making for Critical Infrastructure	
POLS 7341	Security and Resilience Policy	
POLS 7441	Cyberconflict	
Electives		
Selected in consultation with advisor from the graduate-level CS, ECE, and CSSH courses.		20

Dissertation

Code	Title	Hours
CY 9990	Dissertation Term 1	
CY 9991	Dissertation Term 2	
Complete the following (repeatable) course until graduation:		
CY 9996	Dissertation Continuation	

Program Credit/GPA Requirements

Minimum 16 semester hours required
Minimum 3.000 GPA required

Electrical Engineering, PhD

The PhD program in electrical engineering offers students an opportunity for study in a broad range of areas in electrical engineering. Details on PhD requirements can be found in the *Graduate Program Guide.* A summary of requirements is given below.

Qualifying Exam and Degree Candidacy

The PhD qualifying exam is the examination for admissions to the doctoral programs in electrical engineering and in computer engineering. It is a written exam in the student's major area, and some concentrations include an oral exam. The exam has the dual purposes of serving as an indicator of the student's capability for successful completion of the PhD in electrical engineering or in computer engineering and of serving as a guide to the student's adviser in developing a suitable plan of study, tailored to the individual needs of the student. Students are tested on graduate course material as specified by the faculty in the chosen area.

A student who has matriculated into the PhD program is considered a predoctoral student, whether they are BS entry or Advanced Entry. Upon successful completion of the qualifying exam, the student is designated a PhD candidate. Predoctoral students must take the qualifying exam no later than the second spring after their matriculation in the PhD program. A student who fails the qualifying exam will be permitted to retake the exam only one more time.

Annual Review

PhD students are reviewed annually starting with their second year in the Department of Electrical and Computer Engineering (ECE). Students complete a form and submit a one-page report of their progress during the past year. Each student is evaluated and receives a grade of satisfactory, needs improvement, or unsatisfactory. Students who receive an unsatisfactory grade will meet with their adviser and the ECE department chair in order to receive feedback and set goals for the next year. Students who receive unsatisfactory grades in two consecutive years are terminated from the PhD program.

Residence Requirement

After reaching PhD candidacy, one year of full-time graduate work or two consecutive years of part-time graduate work satisfy the university residence requirement. In the latter case, the student's adviser must approve a detailed schedule in order to ensure that the student devotes at least half of the time to the requirements of the Graduate School of Engineering.

Dissertation

Within one year of passing the PhD qualifying exam, the PhD candidate must form a dissertation committee. A dissertation committee must have at least three members that hold a PhD or equivalent degree. At least two of the committee members must be tenured or tenure-track ECE faculty and the committee must include the student's adviser. The chair of the committee must be a tenured or tenure-track faculty member in the ECE department.

The dissertation committee must design an appropriate program of study that prepares the student to be a successful doctoral-level engineer as well as direct the candidate's dissertation research. The dissertation committee will approve the dissertation in final form.

DISSERTATION AND DISSERTATION CONTINUATION REGISTRATION

Upon successful completion of the PhD qualifying exam and the required coursework, the PhD candidate must register in two consecutive semesters for Dissertation Term 1 (EECE 9990) and Dissertation Term 2 (EECE 9991). Upon completion of this sequence, the student must register for Dissertation Continuation (EECE 9996) in every semester until the dissertation is completed. A student may not register for Continuation until he or she fulfills the two-semester sequence of Dissertation.

REGISTRATION REQUIREMENTS FOR PREDOCTORAL AND PHD CANDIDATE GRADUATE ASSISTANTS

The ECE department requires that predoctoral students and PhD candidates who hold research or teaching assistantships be registered full-time. Predoctoral PhD students may register for Research (EECE 9986) (zero credit, full-time equivalent) if needed to fulfill the registration requirement.

PHD PROPOSAL REVIEW

Each PhD candidate must demonstrate, by means of the proposal review, subject matter knowledge satisfactory for the award of the degree.

The proposal review is an oral presentation followed by a question-and-answer session administered by the student's dissertation adviser/committee. The proposal review will be given at the time the student submits his or her dissertation proposal to the dissertation adviser/committee for approval. As part of this exam, the dissertation adviser/committee will review the student's doctoral program and his or her performance in graduate courses, as well as examine the student on subject matter related to his or her graduate coursework and dissertation subject area.

FINAL DISSERTATION DEFENSE

The final dissertation defense will include the subject matter of the dissertation and significant developments in the field of the dissertation work. Other related fields may be included if recommended by the examining faculty. The dissertation defense must be scheduled at least six months after the PhD proposal review.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review (each fall semester after the student has been in the program for at least one year)
Qualifying examination
Dissertation committee
Proposal stage review
Dissertation defense

Core Requirements

Complete 32 semester hours of approved coursework—equivalent of MSECE degree. Then complete 16 semester hours, of which 8 must be graduate-level EECE courses. Consult your faculty research advisor for acceptable courses.

Dissertation

Code	Title	Hours
Complete the following two courses:		
EECE 9990	Dissertation Term 1	
EECE 9991	Dissertation Term 2	

Program Credit/GPA Requirements

48 total semester hours required
Minimum 3.000 GPA required

Advanced Entry PhD Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review (each fall semester after the student has been in the program for at least one year)
Qualifying examination
Dissertation committee
Proposal stage review
Dissertation defense

Core Requirements

Complete 16 semester hours of approved coursework. At least 8 semester hours must be graduate-level EECE courses. Consult your faculty adviser for acceptable courses.

Dissertation

Code	Title	Hours
Complete the following two courses:		
EECE 9990	Dissertation Term 1	
EECE 9991	Dissertation Term 2	

Program Credit/GPA Requirements

16 total semester hours required
Minimum 3.000 GPA required

Applied Physics and Engineering, MS

The combined MS program in applied physics and engineering allows graduate students to receive training in one of three concentrations of the electrical and computer engineering department while also receiving fundamental graduate-level physics training that is relevant to that area.

Thesis Option

A student may complete an additional 8 semester hours of thesis. Students may register for an additional two semesters of thesis work, Thesis (EECE 7990) (4 semester hours) or Thesis (PHYS 7990) (4 semester hours), depending on the affiliation of the thesis advisor. A thesis committee is composed of an advisor and two faculty members from physics or electrical engineering.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Concentrations

Complete one of the following concentrations:

- Microsystems, Materials, and Devices (p. 178)
- Electromagnetics, Plasma, and Optics (p. 178)
- Analysis, Modeling, and Computation (p. 178)

MICROSYSTEMS, MATERIALS, AND DEVICES

Code	Title	Hours
Core Courses		
EECE 7201	Solid State Devices	4
PHYS 7324	Condensed Matter Physics	4
Engineering Course Work		
Complete 12 semester hours from the following:		12
EECE 5606	Micro- and Nanofabrication	
EECE 5680	Electric Drives	
EECE 7204	Applied Probability and Stochastic Processes	
EECE 7240	Analog Integrated Circuit Design	
EECE 7242	Integrated Circuits for Mixed Signals and Data Communication	
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)	
EECE 7245	Microwave Circuit Design for Wireless Communication	
EECE 7353	VLSI Design	
EECE 7398	Special Topics	
Physics Course Work		
Complete 12 semester hours from the following:		12
PHYS 5318	Principles of Experimental Physics	
PHYS 7301	Classical Mechanics/Math Methods	
PHYS 7302	Electromagnetic Theory	
PHYS 7305	Statistical Physics	
PHYS 7315	Quantum Theory 1	
PHYS 7316	Quantum Theory 2	
PHYS 7321	Computational Physics	
PHYS 7331	Network Science Data	
PHYS 7734	Topics: Condensed Matter Physics	

ELECTROMAGNETICS, PLASMA, AND OPTICS

Code	Title	Hours
Core Courses		
EECE 7203	Complex Variable Theory and Differential Equations	4
PHYS 7302	Electromagnetic Theory	4
Engineering Course Work		
Complete 12 semester hours from the following:		12
EECE 5698	Special Topics in Electrical and Computer Engineering (Subsurface Imaging)	
EECE 7105	Optics for Engineers	
EECE 7202	Electromagnetic Theory 1	
EECE 7245	Microwave Circuit Design for Wireless Communication	
EECE 7270	Electromagnetic Theory 2	
EECE 7271	Computational Methods in Electromagnetics	
EECE 7275	Antennas and Radiation	
EECE 7293	Modern Imaging	
Physics Course Work		
Complete 12 semester hours from the following:		12
PHYS 5318	Principles of Experimental Physics	
PHYS 7305	Statistical Physics	
PHYS 7315	Quantum Theory 1	
PHYS 7316	Quantum Theory 2	
PHYS 7321	Computational Physics	
PHYS 7324	Condensed Matter Physics	
PHYS 7731	Biological Physics 1	

ANALYSIS, MODELING, AND COMPUTATION

Code	Title	Hours
Core Courses		
EECE 7205	Fundamentals of Computer Engineering	4
PHYS 7321	Computational Physics	4
Engineering Course Work		
Complete 12 semester hours from the following:		12
EECE 5639	Computer Vision	
EECE 5640	High-Performance Computing	
EECE 5642	Data Visualization	
EECE 5643	Simulation and Performance Evaluation	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7205	Fundamentals of Computer Engineering	
EECE 7271	Computational Methods in Electromagnetics	
EECE 7352	Computer Architecture	
EECE 7353	VLSI Design	
EECE 7374	Fundamentals of Computer Networks	
Physics Course Work		
Complete 12 semester hours from the following:		12
PHYS 5116	Complex Networks and Applications	

PHYS 5318	Principles of Experimental Physics
PHYS 7301	Classical Mechanics/Math Methods
PHYS 7305	Statistical Physics
PHYS 7331	Network Science Data
PHYS 7335	Dynamical Processes in Complex Networks

Thesis Option

Students may register for an additional two semesters of thesis work, Thesis (EECE 7990) or Thesis (PHYS 7990) , depending on the affiliation of the thesis advisor. Thesis credits cannot be substituted for any of the coursework listed above. This option requires a total of 40 semester hours for the master's degree.

Program Credit/GPA Requirements

32–40 total semester hours required
Minimum 3.000 GPA required

Data Science, MS

Khoury College of Computer Sciences and the Department of Electrical and Computer Engineering (ECE) jointly offer a new interdisciplinary master of science program in data science. This program is designed to give students a comprehensive framework for reasoning about data. Students will engage in extensive coursework intended to develop depth in data collection, storage, retrieval, manipulation, visualization, modeling, and interpretation. Students will also be able to choose elective courses from a variety of offerings in Khoury, the College of Engineering (COE), and throughout the campus to explore areas that generate data or specialized data science applications. Successful program graduates will be well positioned to attain data scientist and data engineer positions in a fast-growing field or to progress into doctoral degrees in related disciplines.

Prerequisite Courses

The Master of Science in Data Science curriculum is tailored toward technically or mathematically trained students. To ensure that all students have the foundation necessary to be successful in this program, each incoming student must either complete two introductory courses at Northeastern or complete two placement exams administered one week prior to the beginning of the semester. The two exams cover fundamentals of computer science and programming skills and basic statistics, probability, and linear algebra. This admission requirement can also be fulfilled by successful completion of Introduction to Programming for Data Science (DS 5010) and Introduction to Linear Algebra and Probability for Data Science (DS 5020). The introductory courses are not counted as credit toward the degree but are included in the student's cumulative grade-point average. Students are required to get a passing grade in each section of the placement exams in order to progress into the core courses in the degree program. If the student does not get a passing grade in a part of the placement exam, then the student must take the corresponding introductory course. Students that do not achieve a B or better in the introductory courses will be required to retake the courses.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Students should refer to the course numbering table for graduate course leveling (p. 36).

Core Requirements

A cumulative GPA of 3.000 or higher is required in the following core courses.

Code	Title	Hours
Complete 20 semester hours from the following:		
Data Management and Processing		
DS 5110	Introduction to Data Management and Processing	4
Algorithms		
Complete 4 semester hours from the following:		4
CS 5800	Algorithms	
EECE 7205	Fundamentals of Computer Engineering	
Machine Learning and Data Mining		
DS 5220	Supervised Machine Learning and Learning Theory	4
DS 5230	Unsupervised Machine Learning and Data Mining	4
Presentation and Visualization		
DS 5500	Capstone: Applications in Data Science	4

Electives

Code	Title	Hours
Complete 12 semester hours from the following: [1]		12
Khoury College of Computer Sciences		
CS 5100	Foundations of Artificial Intelligence	
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5200	Database Management Systems	
CS 5335	Robotic Science and Systems	
CS 5340	Computer/Human Interaction	
CS 5610	Web Development	
CS 6120	Natural Language Processing	
CS 6200	Information Retrieval	
CS 6240	Large-Scale Parallel Data Processing	
CS 6350	Empirical Research Methods	
CS 6620	Fundamentals of Cloud Computing	
CS 6650	Building Scalable Distributed Systems	
CS 7140	Advanced Machine Learning	
CS 7150	Deep Learning	
CS 7180	Special Topics in Artificial Intelligence	
CS 7200	Statistical Methods for Computer Science	
CS 7280	Special Topics in Database Management	
CS 7290	Special Topics in Data Science	
DS 7990	Thesis	
DS 7995	Project	
College of Engineering		
CIVE 7100	Time Series and Geospatial Data Sciences	
CIVE 7388	Special Topics in Civil Engineering	
EECE 5639	Computer Vision	
EECE 5640	High-Performance Computing	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	

EECE 7337	Information Theory
EECE 7370	Advanced Computer Vision
EECE 7397	Advanced Machine Learning
IE 7275	Data Mining in Engineering
IE 7280	Statistical Methods in Engineering
College of Social Sciences and Humanities	
ECON 5140	Applied Econometrics
PPUA 5261	Dynamic Modeling for Environmental Decision Making
PPUA 5262	Big Data for Cities
PPUA 5263	Geographic Information Systems for Urban and Regional Policy
PPUA 5266	Urban Theory and Science
PPUA 7237	Advanced Spatial Analysis of Urban Systems
College of Science	
ENVR 5563	Advanced Spatial Analysis
PHYS 5116	Complex Networks and Applications
PHYS 7305	Statistical Physics
PHYS 7321	Computational Physics
PHYS 7331	Network Science Data
Bouvé College of Health Sciences	
PHTH 5202	Introduction to Epidemiology
PHTH 5210	Biostatistics in Public Health
PHTH 6224	Social Epidemiology
College of Arts, Media and Design	
GSND 5110	Game Design and Analysis
GSND 6350	Data-Driven Player Modeling

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

[1] Students taking electives worth less than 4 credits (i.e., Bouvé courses) should enroll for an accompanying data science project course in the same semester to bring the cumulative credits to 4. In order to earn this additional credit, students are expected to work with faculty to design an additional project in line with the curricular aims of their chosen elective and the data science core learning outcomes.

Robotics, MS

For program contact information, please visit this website (https://coe.northeastern.edu/academic-programs/ms-robo/).

MS Robotics is a multidisciplinary Master of Science program offered by the College of Engineering (COE) and the Khoury College of Computer Sciences. The program is designed to provide students comprehensive training in algorithms, sensors, control systems, and mechanisms used in robotics.

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Robotics with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Robotics in addition to earning a Graduate Certificate in Engineering Leadership (p. 245). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 40-semester-hour degree and certificate will require 24 semester hours of advisor-approved Robotics technical courses.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Mechanical Engineering		
Complete one of the following:		4
ME 5250	Robot Mechanics and Control	
ME 5659	Control Systems Engineering	
Electrical and Computer Engineering		
Complete one of the following:		4
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
Computer Science		
Complete one of the following:		4
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5335	Robotic Science and Systems	

Concentrations

Complete one of the following concentrations:

- Mechanical Engineering (p. 121)
- Electrical and Computer Engineering (p. 121)
- Computer Science (p. 122)

MECHANICAL ENGINEERING

Code	Title	Hours
Required Course		
Complete additional ME course not used to fulfill the core requirements:		4
ME 5250	Robot Mechanics and Control	
ME 5659	Control Systems Engineering	
Complete one of the following options:		
Course Work Option		
Complete 16SH of courses from the elective course list. (p.)		16
Project Option		
ME 7945	Master's Project	4
Complete 12SH of courses from the elective course list. (p.)		12
Thesis Option		
ME 7990	Thesis	8
Complete 8SH of courses from the elective course list. (p.)		8

ELECTRICAL AND COMPUTER ENGINEERING

Code	Title	Hours
Required Course		
Complete additional EECE course not used to fulfill the core requirements:		4

EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
Complete one of the following options:		
Course Work Option		
Complete 16SH of courses from the elective course list. (p.)		16
Project Option		
EECE 7674	Master's Project	4
Complete 12SH of courses from the elective course list. (p.)		12
Thesis Option		
EECE 7990	Thesis	8
Complete 8SH of courses from the elective course list. (p.)		8

COMPUTER SCIENCE

Code	Title	Hours
Required Course		
Complete additional CS course not used to fulfill the core requirements:		4
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5335	Robotic Science and Systems	
Complete one of the following options:		
Course Work Option		
Complete 16SH of courses from the elective course list. (p.)		16
Project Option		
CS 8674	Master's Project	4
Complete 12SH of courses from the elective course list. (p.)		12
Thesis Option		
CS 7990	Thesis (complete twice for a total of 8 credits)	8
Complete 8SH of courses from the elective course list. (p.)		8

Elective Course List

Code	Title	Hours
Mechanical Engineering Course List		
IE 7280	Statistical Methods in Engineering	
IE 7315	Human Factors Engineering	
IE 7615	Neural Networks and Deep Learning	
ME 5240	Computer Aided Design and Manufacturing	
ME 5245	Mechatronic Systems	
ME 5250	Robot Mechanics and Control	
ME 5655	Dynamics and Mechanical Vibration	
ME 5659	Control Systems Engineering	
ME 5665	Musculoskeletal Biomechanics	
ME 6200	Mathematical Methods for Mechanical Engineers 1	
ME 6201	Mathematical Methods for Mechanical Engineers 2	
ME 7210	Elasticity and Plasticity	
ME 7247	Advanced Control Engineering	
Electrical and Computer Engineering Course List		
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
EECE 5580	Classical Control Systems	
EECE 5639	Computer Vision	
EECE 5642	Data Visualization	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7150	Autonomous Field Robotics	
EECE 7323	Numerical Optimization Methods	
EECE 7337	Information Theory	
EECE 7370	Advanced Computer Vision	
EECE 7397	Advanced Machine Learning	
Computer Science Course List		
CS 5006	Algorithms	
CS 5100	Foundations of Artificial Intelligence	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	
CS 6350	Empirical Research Methods	
CS 7140	Advanced Machine Learning	
CS 7150	Deep Learning	
CS 7180	Special Topics in Artificial Intelligence	
DS 5220	Supervised Machine Learning and Learning Theory	

PROGRAM CREDIT/GPA REQUIREMENTS

32 total semester hours required
Minimum 3.000 GPA required

Electrical and Computer Engineering with Concentration in Communications, Control, and Signal Processing, MSECE

For program contact information, please visit this website (https://ece.northeastern.edu/academics/graduate-studies/ms-elee/).

The master's degree program in electrical and computer engineering offers in-depth course work within the concentration-choice-related areas. The curriculum is integrated and intensive and is built on state-of-the-art research, taught by faculty who are experts in their areas.

Excluded Courses for All MSECE Concentrations

You **cannot take excluded courses as part of your MSECE program**. Please do not petition to take these courses, as any petition to take these courses will be automatically rejected. Courses from the following subject areas may not count toward any concentration within the MSECE program: CSYE, ENSY, EMGT, INFO, SBSY, TELE. Select CS courses are also excluded from all MSECE concentrations. Please see the program requirements tab and your college administrator for more information.

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 251).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Electrical and Computer Engineering with a Concentration in Communications, Control, and Signal Processing with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Electrical and Computer Engineering with a Concentration in Communications, Control, and Signal Processing in addition to earning a Graduate Certificate in Engineering Leadership (p. 245). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 40-semester-hour degree and certificate will require 24 semester hours of advisor-approved communications, control, and signal processing technical courses.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Options

Complete one of the following options:

COURSE WORK OPTION

Code	Title	Hours
A maximum of two courses may be taken outside of Electrical and Computer Engineering.		
Depth Courses		
Complete 20 semester hours from the depth course list below. (p. 182)		20
Breadth Courses		
Complete 8 semester hours from the breadth course list below. (p. 182)		8
Note: Depth courses cannot be taken for breadth.		
Elective		
Complete 4 additional semester hours from either the depth or breadth course lists below.		4

THESIS OPTION

Code	Title	Hours
A maximum of three courses may be taken outside of Electrical and Computer Engineering.		
Thesis		
EECE 7990	Thesis	8
Depth Courses		
Complete 12 semester hours from the depth course list below. (p. 182)		12
Breadth Courses		
Complete 4 semester hours from the breadth course list below. (p. 182)		4
Note: Depth courses cannot be taken for breadth.		
Elective		
Complete 8 additional semester hours from either the depth or breadth course lists below.		8

Course Lists

DEPTH COURSES

Code	Title	Hours
EECE 5115	Dynamical Systems in Biological Engineering	
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5576	Wireless Communication Systems	
EECE 5580	Classical Control Systems	
EECE 5610	Digital Control Systems	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	
EECE 5626	Image Processing and Pattern Recognition	
EECE 5666	Digital Signal Processing	
EECE 5698	Special Topics in Electrical and Computer Engineering (GNSS Signal Processing)	
EECE 7200	Linear Systems Analysis	
EECE 7204	Applied Probability and Stochastic Processes	
EECE 7211	Nonlinear Control	
EECE 7213	System Identification and Adaptive Control	
EECE 7214	Optimal and Robust Control	
EECE 7310	Modern Signal Processing	
EECE 7311	Two Dimensional Signal and Image Processing	
EECE 7323	Numerical Optimization Methods	
EECE 7336	Digital Communications	
EECE 7337	Information Theory	
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization	
EECE 7346	Probabilistic System Modeling and Analysis	
EECE 7398	Special Topics (Terahertz Communications)	
EECE 7398	Special Topics (Legged Robots)	
EECE 7398	Special Topics (Current Research in NonLinear Systems)	
EECE 7398	Special Topics (Introduction to Distributed Intelligence)	
EECE 7399	Preparing High-Stakes Written and Oral Materials (Only for MS Thesis Students)	
EECE 7400	Special Problems in Electrical and Computer Engineering	
EECE 7674	Master's Project (MS Thesis students cannot take this course)	

BREADTH COURSES

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	
CS 5200	Database Management Systems	
CS 5600	Computer Systems	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 6410	Compilers	

CS 6510	Advanced Software Development
CS 6760	Privacy, Security, and Usability
CS 7800	Advanced Algorithms
CY 5770	Software Vulnerabilities and Security
CY 6740	Network Security
CY 6750	Cryptography and Communications Security
EECE 5155	Wireless Sensor Networks and the Internet of Things
EECE 5161	Thin Film Technologies
EECE 5170	Introduction to Multiferroics Materials and Systems
EECE 5554	Robotics Sensing and Navigation
EECE 5606	Micro- and Nanofabrication
EECE 5638	Compilers for Modern Computer Architectures
EECE 5639	Computer Vision
EECE 5640	High-Performance Computing
EECE 5641	Introduction to Software Security
EECE 5642	Data Visualization
EECE 5643	Simulation and Performance Evaluation
EECE 5644	Introduction to Machine Learning and Pattern Recognition
EECE 5645	Parallel Processing for Data Analytics
EECE 5647	Nanophotonics
EECE 5649	Design of Analog Integrated Circuits with Complementary Metal-Oxide-Semiconductor Technology
EECE 5652	Microwave Circuits and Networks
EECE 5680 and EECE 5681	Electric Drives and Lab for EECE 5680
EECE 5682	Power Systems Analysis 1
EECE 5684 and EECE 5685	Power Electronics and Lab for EECE 5684
EECE 5688	Analysis of Unbalanced Power Grids
EECE 5697	Acoustics and Sensing
EECE 5698	Special Topics in Electrical and Computer Engineering (Biomedical Microsystems)
EECE 5698	Special Topics in Electrical and Computer Engineering (Network Programming)
EECE 5698	Special Topics in Electrical and Computer Engineering (Networks: Technology, Economics, Social Interactions)
EECE 5698	Special Topics in Electrical and Computer Engineering (Hardware and System Security)
EECE 5698	Special Topics in Electrical and Computer Engineering (Advanced Network Management)
EECE 5698	Special Topics in Electrical and Computer Engineering (Electromagnetic Devices)
EECE 7105	Optics for Engineers
EECE 7150	Autonomous Field Robotics
EECE 7201	Solid State Devices
EECE 7202	Electromagnetic Theory 1
EECE 7203	Complex Variable Theory and Differential Equations
EECE 7205	Fundamentals of Computer Engineering
EECE 7224	Power Systems State Estimation
EECE 7226	Modeling and Simulation of Power System Transients
EECE 7228	Advanced Power Electronics
EECE 7240 and EECE 7248	Analog Integrated Circuit Design and Lab for EECE 7240
EECE 7242	Integrated Circuits for Mixed Signals and Data Communication
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)
EECE 7245	Microwave Circuit Design for Wireless Communication
EECE 7247	Radio Frequency Integrated Circuit Design
EECE 7250	Power Management Integrated Circuits
EECE 7270	Electromagnetic Theory 2
EECE 7271	Computational Methods in Electromagnetics
EECE 7275	Antennas and Radiation
EECE 7284	Optical Properties of Matter
EECE 7293	Modern Imaging
EECE 7296	Electronic Materials
EECE 7297	Advanced Magnetic Materials—Magnetic Devices
EECE 7352	Computer Architecture
EECE 7353	VLSI Design
EECE 7364	Mobile and Wireless Networking
EECE 7368	High-Level Design of Hardware-Software Systems
EECE 7370	Advanced Computer Vision
EECE 7374	Fundamentals of Computer Networks
EECE 7377	Scalable and Sustainable System Design
EECE 7390	Computer Hardware Security
EECE 7393	Analysis and Design of Data Networks
EECE 7397	Advanced Machine Learning
EECE 7398	Special Topics (Wireless Network Systems and Applications)
EECE 7398	Special Topics (Advanced Computer Architecture)
EECE 7398	Special Topics (Power System Constrained Optimization)
EECE 7398	Special Topics (Advances in Deep Learning)
EECE 7398	Special Topics (Advanced Radio Frequency Passive Technologies)
EECE 7399	Preparing High-Stakes Written and Oral Materials
ENGR 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage
MATH 7233	Graph Theory

EXCLUDED COURSES FOR ALL MSECE CONCENTRATIONS

Please see your college administrator for more information.

Code	Title	Hours
Courses from the following subject areas may not count toward any concentration within the MSECE program:		
CSYE, ENSY, EMGT, INFO, SBSY, TELE		
The following CS courses may not count toward any concentration within the MSECE program:		
CS 5010	Programming Design Paradigm	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5520	Mobile Application Development	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 5800	Algorithms	
CS 6350	Empirical Research Methods	
CS 6710	Wireless Network	

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

Electrical and Computer Engineering with Concentration in Computer Systems and Software, MSECE

For program contact information, please visit this website (https://ece.northeastern.edu/academics/graduate-studies/ms-elee/).

The master's degree programs in electrical and computer engineering offer in-depth course work within the concentration-choice-related areas. The curriculum is integrated and intensive and is built on groundbreaking research, taught by faculty who are experts in their areas.

Excluded Courses for All MSECE Concentrations

You **cannot take excluded courses as part of your MSECE program**. Please **do not** petition to take these courses, as any petition to take these courses will be automatically rejected. Courses from the following subject areas may not count toward any concentration within the MSECE program: CSYE, ENSY, EMGT, INFO, SBSY, TELE. Select CS courses are also excluded from all MSECE concentrations. Please see the program requirements tab and your college administrator for more information.

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 251).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Electrical and Computer Engineering with Concentration in Computer Systems and Software with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science degree in Electrical and Computer Engineering with Concentration in Computer Systems and Software in addition to earning a Graduate Certificate in Engineering Leadership (p. 245). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 40-semester-hour degree and certificate will require 24 semester hours of advisor-approved computer systems and software technical courses.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Options

Complete one of the following options:

COURSE WORK OPTION

Code	Title	Hours
A maximum of two courses may be taken outside of Electrical and Computer Engineering.		
Depth Courses		
Complete 20 semester hours from the depth course list below. (p. 184)		20
Breadth Courses		
Complete 8 semester hours from the breadth course list below or other EECE courses chosen in consultation with a faculty adviser. (p. 185)		8
Note: Depth courses cannot be taken for breadth.		
Elective		
Complete 4 semester hours of either depth or breadth courses.		4

THESIS OPTION

Code	Title	Hours
A maximum of three courses may be taken outside of Electrical and Computer Engineering.		
Thesis		
EECE 7990	Thesis	8
Depth Courses		
Complete 12 semester hours from the depth course list below. (p. 184)		12
Breadth Courses		
Complete 4 semester hours from the breadth course list below or other EECE courses chosen in consultation with a faculty adviser. (p. 185)		4
Note: Depth courses cannot be taken for breadth.		
Elective		
Complete 8 additional semester hours from either depth or breadth courses.		8

Course Lists

DEPTH COURSES

Code	Title	Hours
CS 5200	Database Management Systems	
CS 5600	Computer Systems	
CS 6410	Compilers	
CS 6510	Advanced Software Development	
EECE 5552	Assistive Robotics	
EECE 5638	Compilers for Modern Computer Architectures	
EECE 5640	High-Performance Computing	
EECE 5643	Simulation and Performance Evaluation	

EECE 5699	Computer Hardware and System Security
EECE 7205	Fundamentals of Computer Engineering
EECE 7352	Computer Architecture
EECE 7353	VLSI Design
EECE 7368	High-Level Design of Hardware-Software Systems
EECE 7377	Scalable and Sustainable System Design
EECE 7390	Computer Hardware Security
EECE 7398	Special Topics (Advanced Computer Architecture)
EECE 7400	Special Problems in Electrical and Computer Engineering
EECE 7399	Preparing High-Stakes Written and Oral Materials (Only for PhD and MS Thesis students)
EECE 7674	Master's Project (MS Thesis students cannot take this course)

BREADTH COURSES

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 6760	Privacy, Security, and Usability	
CS 7800	Advanced Algorithms	
CY 5770	Software Vulnerabilities and Security	
CY 6740	Network Security	
CY 6750	Cryptography and Communications Security	
EECE 5115	Dynamical Systems in Biological Engineering	
EECE 5155	Wireless Sensor Networks and the Internet of Things	
EECE 5161	Thin Film Technologies	
EECE 5170	Introduction to Multiferroics Materials and Systems	
EECE 5550	Mobile Robotics	
EECE 5554	Robotics Sensing and Navigation	
EECE 5576	Wireless Communication Systems	
EECE 5580	Classical Control Systems	
EECE 5606	Micro- and Nanofabrication	
EECE 5610	Digital Control Systems	
EECE 5626	Image Processing and Pattern Recognition	
EECE 5639	Computer Vision	
EECE 5641	Introduction to Software Security	
EECE 5642	Data Visualization	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 5645	Parallel Processing for Data Analytics	
EECE 5647	Nanophotonics	
EECE 5649	Design of Analog Integrated Circuits with Complementary Metal-Oxide-Semiconductor Technology	
EECE 5652	Microwave Circuits and Networks	
EECE 5666	Digital Signal Processing	
EECE 5680 and EECE 5681	Electric Drives and Lab for EECE 5680	
EECE 5682	Power Systems Analysis 1	
EECE 5684 and EECE 5685	Power Electronics and Lab for EECE 5684	
EECE 5688	Analysis of Unbalanced Power Grids	
EECE 5697	Acoustics and Sensing	
EECE 5698	Special Topics in Electrical and Computer Engineering (Biomedical Microsystems)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Network Programming)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Networks: Technology, Economics, Social Interactions)	
EECE 5698	Special Topics in Electrical and Computer Engineering (GNSS Signal Processing)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Feedback Control Systems: Applications to Unmanned Aerial Vehicles)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Electromagnetic Devices)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Advanced Network Management)	
EECE 7105	Optics for Engineers	
EECE 7150	Autonomous Field Robotics	
EECE 7200	Linear Systems Analysis	
EECE 7201	Solid State Devices	
EECE 7202	Electromagnetic Theory 1	
EECE 7203	Complex Variable Theory and Differential Equations	
EECE 7204	Applied Probability and Stochastic Processes	
EECE 7211	Nonlinear Control	
EECE 7213	System Identification and Adaptive Control	
EECE 7214	Optimal and Robust Control	
EECE 7224	Power Systems State Estimation	
EECE 7226	Modeling and Simulation of Power System Transients	
EECE 7228	Advanced Power Electronics	
EECE 7240 and EECE 7248	Analog Integrated Circuit Design and Lab for EECE 7240	
EECE 7242	Integrated Circuits for Mixed Signals and Data Communication	
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)	
EECE 7245	Microwave Circuit Design for Wireless Communication	
EECE 7247	Radio Frequency Integrated Circuit Design	

EECE 7250	Power Management Integrated Circuits
EECE 7270	Electromagnetic Theory 2
EECE 7271	Computational Methods in Electromagnetics
EECE 7275	Antennas and Radiation
EECE 7284	Optical Properties of Matter
EECE 7293	Modern Imaging
EECE 7296	Electronic Materials
EECE 7297	Advanced Magnetic Materials—Magnetic Devices
EECE 7310	Modern Signal Processing
EECE 7323	Numerical Optimization Methods
EECE 7336	Digital Communications
EECE 7337	Information Theory
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization
EECE 7346	Probabilistic System Modeling and Analysis
EECE 7364	Mobile and Wireless Networking
EECE 7370	Advanced Computer Vision
EECE 7374	Fundamentals of Computer Networks
EECE 7393	Analysis and Design of Data Networks
EECE 7397	Advanced Machine Learning
EECE 7398	Special Topics (Wireless Network Systems and Applications)
EECE 7398	Special Topics (Power System Constrained Optimization)
EECE 7398	Special Topics (Legged Robots)
EECE 7398	Special Topics (Advances in Deep Learning)
EECE 7398	Special Topics (Advanced Radio Frequency Passive Technologies)
EECE 7399	Preparing High-Stakes Written and Oral Materials
ENGR 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage
MATH 7233	Graph Theory

EXCLUDED COURSES FOR ALL MSECE CONCENTRATIONS

Please see your college administrator for more information.

Code	Title	Hours
Courses from the following subject areas may not count toward any concentration within the MSECE program:		
CSYE, ENSY, EMGT, INFO, SBSY, TELE		
The following CS courses may not count toward any concentration within the MSECE program:		
CS 5010	Programming Design Paradigm	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5520	Mobile Application Development	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 5800	Algorithms	
CS 6350	Empirical Research Methods	
CS 6710	Wireless Network	

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

Electrical and Computer Engineering with Concentration in Computer Networks and Security, MSECE

For program contact information, please visit this website (https://ece.northeastern.edu/academics/graduate-studies/ms-elee/).

The master's degree program in electrical and computer engineering offers in-depth course work within the concentration-choice-related areas. The curriculum is integrated and intensive and is built on state-of-the-art research, taught by faculty who are experts in their areas.

Excluded Courses for All MSECE Concentrations

You **cannot take excluded courses as part of your MSECE program**. Please **do not** petition to take these courses, as any petition to take these courses will be automatically rejected. Courses from the following subject areas may not count toward any concentration within the MSECE program: CSYE, ENSY, EMGT, INFO, SBSY, TELE. Select CS courses are also excluded from all MSECE concentrations. Please see the program requirements tab and your college administrator for more information.

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 251).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Electrical and Computer Engineering with Concentration in Computer Networks and Security with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Electrical and Computer Engineering with Concentration in Computer Networks and Security in addition to earning a Graduate Certificate in Engineering Leadership (p. 245). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 40-semester-hour degree and certificate will require 24 semester hours of advisor-approved computer networks and security technical courses.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Options

Complete one of the following options:

COURSE WORK OPTION

Code	Title	Hours
A maximum of two courses may be taken outside of Electrical and Computer Engineering.		
Depth Courses		

Complete 20 semester hours from the depth course list below. (p. 187)	20
Breadth Courses	
Complete 8 semester hours from the breadth course list below or other EECE courses chosen in consultation with a faculty adviser. (p. 187)	8
Note: Depth courses cannot be taken for breadth.	
Elective	
Complete 4 semester hours of either depth or breadth courses.	4

THESIS OPTION

Code	Title	Hours
A maximum of three courses may be taken outside of Electrical and Computer Engineering.		
Thesis		
EECE 7990	Thesis	8
Depth Courses		
Complete 12 semester hours from the depth course list below. (p. 187)		12
Breadth Courses		
Complete 4 semester hours from the breadth course list below or other EECE courses chosen in consultation with a faculty adviser. (p. 187)		4
Note: Depth courses cannot be taken for breadth.		
Elective		
Complete 8 additional semester hours of either depth or breadth courses.		8

Course Lists

DEPTH COURSES

Code	Title	Hours
CS 6760	Privacy, Security, and Usability	
CY 6740	Network Security	
CY 6750	Cryptography and Communications Security	
EECE 5155	Wireless Sensor Networks and the Internet of Things	
EECE 5576	Wireless Communication Systems	
EECE 5640	High-Performance Computing	
EECE 5641	Introduction to Software Security	
EECE 5698	Special Topics in Electrical and Computer Engineering (Network Programming)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Networks: Technology, Economics, Social Interactions)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Advanced Network Management)	
EECE 5699	Computer Hardware and System Security	
EECE 7204	Applied Probability and Stochastic Processes	
EECE 7205	Fundamentals of Computer Engineering	
EECE 7346	Probabilistic System Modeling and Analysis	
EECE 7364	Mobile and Wireless Networking	
EECE 7374	Fundamentals of Computer Networks	
EECE 7390	Computer Hardware Security	
EECE 7393	Analysis and Design of Data Networks	
EECE 7398	Special Topics (Terahertz Communications)	
EECE 7398	Special Topics (Wireless Network Systems and Applications)	
EECE 7399	Preparing High-Stakes Written and Oral Materials (Only for PhD and MS Thesis students)	
EECE 7400	Special Problems in Electrical and Computer Engineering	
EECE 7674	Master's Project (MS Thesis students cannot take this course)	

BREADTH COURSES

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	
CS 5200	Database Management Systems	
CS 5600	Computer Systems	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 6410	Compilers	
CS 6510	Advanced Software Development	
CS 7800	Advanced Algorithms	
EECE 5170	Introduction to Multiferroics Materials and Systems	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
EECE 5580	Classical Control Systems	
EECE 5606	Micro- and Nanofabrication	
EECE 5610	Digital Control Systems	
EECE 5626	Image Processing and Pattern Recognition	
EECE 5638	Compilers for Modern Computer Architectures	
EECE 5639	Computer Vision	
EECE 5642	Data Visualization	
EECE 5643	Simulation and Performance Evaluation	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 5645	Parallel Processing for Data Analytics	
EECE 5647	Nanophotonics	
EECE 5649	Design of Analog Integrated Circuits with Complementary Metal-Oxide-Semiconductor Technology	
EECE 5652	Microwave Circuits and Networks	
EECE 5666	Digital Signal Processing	
EECE 5680 and EECE 5681	Electric Drives and Lab for EECE 5680	
EECE 5682	Power Systems Analysis 1	
EECE 5684 and EECE 5685	Power Electronics and Lab for EECE 5684	
EECE 5688	Analysis of Unbalanced Power Grids	
EECE 5697	Acoustics and Sensing	

EECE 5698	Special Topics in Electrical and Computer Engineering (Biomedical Microsystems)
EECE 5698	Special Topics in Electrical and Computer Engineering (Feedback Control Systems: Applications to Unmanned Aerial Vehicles)
EECE 5698	Special Topics in Electrical and Computer Engineering (GNSS Signal Processing)
EECE 5698	Special Topics in Electrical and Computer Engineering (Electromagnetic Devices)
EECE 7105	Optics for Engineers
EECE 7150	Autonomous Field Robotics
EECE 7200	Linear Systems Analysis
EECE 7201	Solid State Devices
EECE 7202	Electromagnetic Theory 1
EECE 7203	Complex Variable Theory and Differential Equations
EECE 7211	Nonlinear Control
EECE 7213	System Identification and Adaptive Control
EECE 7214	Optimal and Robust Control
EECE 7224	Power Systems State Estimation
EECE 7226	Modeling and Simulation of Power System Transients
EECE 7228	Advanced Power Electronics
EECE 7240 and EECE 7248	Analog Integrated Circuit Design and Lab for EECE 7240
EECE 7242	Integrated Circuits for Mixed Signals and Data Communication
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)
EECE 7245	Microwave Circuit Design for Wireless Communication
EECE 7247	Radio Frequency Integrated Circuit Design
EECE 7270	Electromagnetic Theory 2
EECE 7271	Computational Methods in Electromagnetics
EECE 7275	Antennas and Radiation
EECE 7284	Optical Properties of Matter
EECE 7293	Modern Imaging
EECE 7296	Electronic Materials
EECE 7297	Advanced Magnetic Materials—Magnetic Devices
EECE 7310	Modern Signal Processing
EECE 7323	Numerical Optimization Methods
EECE 7336	Digital Communications
EECE 7337	Information Theory
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization
EECE 7352	Computer Architecture
EECE 7353	VLSI Design
EECE 7368	High-Level Design of Hardware-Software Systems
EECE 7370	Advanced Computer Vision
EECE 7377	Scalable and Sustainable System Design
EECE 7397	Advanced Machine Learning
EECE 7398	Special Topics (Legged Robots)
EECE 7398	Special Topics (Advanced Computer Architecture)
EECE 7398	Special Topics (Power System Constrained Optimization)
EECE 7398	Special Topics (Advances in Deep Learning)
EECE 7398	Special Topics (Advanced Radio Frequency Passive Technologies)
EECE 7399	Preparing High-Stakes Written and Oral Materials
ENGR 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage
MATH 7233	Graph Theory

EXCLUDED COURSES FOR ALL MSECE CONCENTRATIONS

Please see your college administrator for more information.

Code	Title	Hours
Courses from the following subject areas may not count toward any concentration within the MSECE program:		
CSYE, ENSY, EMGT, INFO, SBSY, TELE		
The following CS courses may not count toward any concentration within the MSECE program:		
CS 5010	Programming Design Paradigm	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5520	Mobile Application Development	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 5800	Algorithms	
CS 6350	Empirical Research Methods	
CS 6710	Wireless Network	

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

Electrical and Computer Engineering with Concentration in Computer Vision, Machine Learning, and Algorithms, MSECE

For program contact information, please visit this website (https://ece.northeastern.edu/academics/graduate-studies/ms-elee/).

The master's degree program in electrical and computer engineering offers in-depth course work within the concentration-choice-related areas. The curriculum is integrated and intensive and is built on state-of-the-art research, taught by faculty who are experts in their areas.

Excluded Courses for All MSECE Concentrations

You **cannot take excluded courses as part of your MSECE program**. Please **do not** petition to take these courses, as any petition to take these courses will be automatically rejected. Courses from the following subject areas may not count toward any concentration within the MSECE

program: CSYE, ENSY, EMGT, INFO, SBSY, TELE. Select CS courses are also excluded from all MSECE concentrations. Please see the program requirements tab and your college administrator for more information.

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 251).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Electrical and Computer Engineering with Concentration in Computer Vision, Machine Learning, and Algorithms with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Electrical and Computer Engineering with Concentration in Computer Vision, Machine Learning, and Algorithms in addition to earning a Graduate Certificate in Engineering Leadership (p. 245). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 40-semester-hour degree and certificate will require 24 semester hours of advisor-approved computer vision, machine learning, and algorithms technical courses.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Options

Complete one of the following options:

COURSE WORK OPTION

Code	Title	Hours
A maximum of two courses may be taken outside of Electrical and Computer Engineering.		
Depth Courses		
Complete 20 semester hours from the depth course list below. (p. 189)		20
Breadth Courses		
Complete 8 semester hours from the breadth course list below or other EECE courses chosen in consultation with a faculty adviser. (p. 189)		8
Note: Depth courses cannot be taken for breadth.		
Elective		
Complete 4 semester hours of either depth or breadth courses.		4

THESIS OPTION

Code	Title	Hours
A maximum of three courses may be taken outside of Electrical and Computer Engineering.		
Thesis		
EECE 7990	Thesis	8
Depth Courses		
Complete 12 semester hours from the depth course list below. (p. 189)		12
Breadth Courses		
Complete 4 semester hours from the breadth course list below or other EECE courses chosen in consultation with a faculty adviser. (p. 189)		4
Note: Depth courses cannot be taken for breadth.		
Elective		
Complete 8 additional semester hours from either depth or breadth courses.		8

Course Lists

DEPTH COURSES

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 7800	Advanced Algorithms	
EECE 5360	Combinatorial Optimization	
EECE 5550	Mobile Robotics	
EECE 5554	Robotics Sensing and Navigation	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	
EECE 5626	Image Processing and Pattern Recognition	
EECE 5639	Computer Vision	
EECE 5640	High-Performance Computing	
EECE 5642	Data Visualization	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 5645	Parallel Processing for Data Analytics	
EECE 7150	Autonomous Field Robotics	
EECE 7204	Applied Probability and Stochastic Processes	
EECE 7205	Fundamentals of Computer Engineering	
EECE 7323	Numerical Optimization Methods	
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization	
EECE 7352	Computer Architecture	
EECE 7370	Advanced Computer Vision	
EECE 7397	Advanced Machine Learning	
EECE 7398	Special Topics (Advances in Deep Learning)	
EECE 7399	Preparing High-Stakes Written and Oral Materials (Only for PhD and MS Thesis students)	
EECE 7400	Special Problems in Electrical and Computer Engineering	
EECE 7674	Master's Project (MS Thesis students cannot take this course)	
MATH 7233	Graph Theory	

BREADTH COURSES

Code	Title	Hours
CS 5200	Database Management Systems	
CS 5600	Computer Systems	
CS 6410	Compilers	
CS 6510	Advanced Software Development	
CS 6760	Privacy, Security, and Usability	
CY 5770	Software Vulnerabilities and Security	

CY 6740	Network Security
CY 6750	Cryptography and Communications Security
EECE 5155	Wireless Sensor Networks and the Internet of Things
EECE 5115	Dynamical Systems in Biological Engineering
EECE 5161	Thin Film Technologies
EECE 5170	Introduction to Multiferroics Materials and Systems
EECE 5552	Assistive Robotics
EECE 5576	Wireless Communication Systems
EECE 5580	Classical Control Systems
EECE 5606	Micro- and Nanofabrication
EECE 5610	Digital Control Systems
EECE 5638	Compilers for Modern Computer Architectures
EECE 5641	Introduction to Software Security
EECE 5643	Simulation and Performance Evaluation
EECE 5647	Nanophotonics
EECE 5649	Design of Analog Integrated Circuits with Complementary Metal-Oxide-Semiconductor Technology
EECE 5652	Microwave Circuits and Networks
EECE 5666	Digital Signal Processing
EECE 5680 and EECE 5681	Electric Drives and Lab for EECE 5680
EECE 5682	Power Systems Analysis 1
EECE 5684 and EECE 5685	Power Electronics and Lab for EECE 5684
EECE 5688	Analysis of Unbalanced Power Grids
EECE 5697	Acoustics and Sensing
EECE 5698	Special Topics in Electrical and Computer Engineering (Network Programming)
EECE 5698	Special Topics in Electrical and Computer Engineering (Biomedical Microsystems)
EECE 5698	Special Topics in Electrical and Computer Engineering (Feedback Control Systems: Applications to Unmanned Aerial Vehicles)
EECE 5698	Special Topics in Electrical and Computer Engineering (GNSS Signal Processing)
EECE 5698	Special Topics in Electrical and Computer Engineering (Networks: Technology, Economics, Social Interactions)
EECE 5698	Special Topics in Electrical and Computer Engineering (Hardware and System Security)
EECE 5698	Special Topics in Electrical and Computer Engineering (Advanced Network Management)
EECE 5698	Special Topics in Electrical and Computer Engineering (Electromagnetic Devices)
EECE 7105	Optics for Engineers
EECE 7200	Linear Systems Analysis
EECE 7201	Solid State Devices
EECE 7202	Electromagnetic Theory 1
EECE 7203	Complex Variable Theory and Differential Equations
EECE 7211	Nonlinear Control
EECE 7213	System Identification and Adaptive Control
EECE 7214	Optimal and Robust Control
EECE 7224	Power Systems State Estimation
EECE 7226	Modeling and Simulation of Power System Transients
EECE 7228	Advanced Power Electronics
EECE 7240 and EECE 7248	Analog Integrated Circuit Design and Lab for EECE 7240
EECE 7242	Integrated Circuits for Mixed Signals and Data Communication
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)
EECE 7245	Microwave Circuit Design for Wireless Communication
EECE 7247	Radio Frequency Integrated Circuit Design
EECE 7250	Power Management Integrated Circuits
EECE 7270	Electromagnetic Theory 2
EECE 7271	Computational Methods in Electromagnetics
EECE 7275	Antennas and Radiation
EECE 7284	Optical Properties of Matter
EECE 7293	Modern Imaging
EECE 7296	Electronic Materials
EECE 7297	Advanced Magnetic Materials—Magnetic Devices
EECE 7310	Modern Signal Processing
EECE 7336	Digital Communications
EECE 7337	Information Theory
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization
EECE 7346	Probabilistic System Modeling and Analysis
EECE 7353	VLSI Design
EECE 7364	Mobile and Wireless Networking
EECE 7368	High-Level Design of Hardware-Software Systems
EECE 7374	Fundamentals of Computer Networks
EECE 7377	Scalable and Sustainable System Design
EECE 7390	Computer Hardware Security
EECE 7393	Analysis and Design of Data Networks
EECE 7398	Special Topics (Wireless Network Systems and Applications)
EECE 7398	Special Topics (Legged Robots)
EECE 7398	Special Topics (Advanced Computer Architecture)

EECE 7398	Special Topics (Power System Constrained Optimization)
EECE 7398	Special Topics (Advanced Radio Frequency Passive Technologies)
EECE 7399	Preparing High-Stakes Written and Oral Materials
ENGR 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage

EXCLUDED COURSES FOR ALL MSECE CONCENTRATIONS

Please see your college administrator for more information.

Code	Title	Hours
Courses from the following subject areas may not count toward any concentration within the MSECE program:		
CSYE, ENSY, EMGT, INFO, SBSY, TELE		
The following CS courses may not count toward any concentration within the MSECE program:		
CS 5010	Programming Design Paradigm	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5520	Mobile Application Development	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 5800	Algorithms	
CS 6350	Empirical Research Methods	
CS 6710	Wireless Network	

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

Electrical and Computer Engineering with Concentration in Electromagnetics, Plasma, and Optics, MSECE

For program contact information, please visit this website (https://ece.northeastern.edu/academics/graduate-studies/ms-elee/).

The master's degree program in electrical and computer engineering offers in-depth course work within the concentration-choice-related areas. The curriculum is integrated and intensive and is built on state-of-the-art research, taught by faculty who are experts in their areas.

Excluded Courses for All MSECE Concentrations

You **cannot take excluded courses as part of your MSECE program**. Please **do not** petition to take these courses, as any petition to take these courses will be automatically rejected. Courses from the following subject areas may not count toward any concentration within the MSECE program: CSYE, ENSY, EMGT, INFO, SBSY, TELE. Select CS courses are also excluded from all MSECE concentrations. Please see the program requirements tab and your college administrator for more information.

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 251).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Electrical and Computer Engineering with Concentration in Electromagnetics, Plasma, and Optics with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Electrical and Computer Engineering with Concentration in Electromagnetics, Plasma, and Optics in addition to earning a Graduate Certificate in Engineering Leadership (p. 245). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16 semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 40-semester-hour degree and certificate will require 24 semester hours of advisor-approved electromagnetics, plasma, and optics technical courses.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Options

Complete one of the following options:

COURSE WORK OPTION

Code	Title	Hours
A maximum of two courses may be taken outside of Electrical and Computer Engineering.		
Depth Courses		
Complete 20 semester hours from the depth course list below. (p. 192)		20
Breadth Courses		
Complete 8 semester hours from the breadth course list below. (p. 192)		8
Note: Depth courses cannot be taken for breadth.		
Elective		
Complete 4 additional semester hours from either depth or breadth courses.		4

THESIS OPTION

Code	Title	Hours
A maximum of three courses may be taken outside of Electrical and Computer Engineering.		
Thesis		
EECE 7990	Thesis	8
Depth Courses		
Complete 12 semester hours from the depth course list below. (p. 192)		12
Breadth Courses		
Complete 4 semester hours from the breadth course list below. (p. 192)		4
Note: Depth courses cannot be taken for breadth.		
Elective		
Complete 8 additional semester hours from either depth or breadth courses.		8

Course Lists

DEPTH COURSES

Code	Title	Hours
EECE 5170	Introduction to Multiferroics Materials and Systems	
EECE 5693	Electromagnetic Devices for RF and Wireless Communications	
EECE 5697	Acoustics and Sensing	
EECE 7105	Optics for Engineers	
EECE 7202	Electromagnetic Theory 1	
EECE 7203	Complex Variable Theory and Differential Equations	
EECE 7270	Electromagnetic Theory 2	
EECE 7271	Computational Methods in Electromagnetics	
EECE 7275	Antennas and Radiation	
EECE 7284	Optical Properties of Matter	
EECE 7293	Modern Imaging	
EECE 7296	Electronic Materials	
EECE 7297	Advanced Magnetic Materials—Magnetic Devices	
EECE 7398	Special Topics (Advanced Radio Frequency Passive Technologies)	
EECE 7399	Preparing High-Stakes Written and Oral Materials (Only for PhD and MS Thesis students)	
EECE 7400	Special Problems in Electrical and Computer Engineering	
EECE 7674	Master's Project (MS Thesis students cannot take this course)	

BREADTH COURSES

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	
CS 5200	Database Management Systems	
CS 5600	Computer Systems	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 6410	Compilers	
CS 6510	Advanced Software Development	
CS 6760	Privacy, Security, and Usability	
CS 7800	Advanced Algorithms	
CY 5770	Software Vulnerabilities and Security	
CY 6740	Network Security	
CY 6750	Cryptography and Communications Security	
EECE 5115	Dynamical Systems in Biological Engineering	
EECE 5155	Wireless Sensor Networks and the Internet of Things	
EECE 5161	Thin Film Technologies	
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
EECE 5576	Wireless Communication Systems	
EECE 5580	Classical Control Systems	
EECE 5606	Micro- and Nanofabrication	
EECE 5610	Digital Control Systems	
EECE 5626	Image Processing and Pattern Recognition	
EECE 5638	Compilers for Modern Computer Architectures	
EECE 5639	Computer Vision	
EECE 5640	High-Performance Computing	
EECE 5641	Introduction to Software Security	
EECE 5642	Data Visualization	
EECE 5643	Simulation and Performance Evaluation	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 5645	Parallel Processing for Data Analytics	
EECE 5647	Nanophotonics	
EECE 5649	Design of Analog Integrated Circuits with Complementary Metal-Oxide-Semiconductor Technology	
EECE 5652	Microwave Circuits and Networks	
EECE 5666	Digital Signal Processing	
EECE 5680 and EECE 5681	Electric Drives and Lab for EECE 5680	
EECE 5682	Power Systems Analysis 1	
EECE 5684 and EECE 5685	Power Electronics and Lab for EECE 5684	
EECE 5688	Analysis of Unbalanced Power Grids	
EECE 5698	Special Topics in Electrical and Computer Engineering (Network Programming)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Biomedical Microsystems)	
EECE 5698	Special Topics in Electrical and Computer Engineering (GNSS Signal Processing)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Feedback Control Systems: Applications to Unmanned Aerial Vehicles)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Networks: Technology, Economics, Social Interactions)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Hardware and System Security)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Advanced Network Management)	
EECE 7150	Autonomous Field Robotics	
EECE 7200	Linear Systems Analysis	
EECE 7201	Solid State Devices	
EECE 7204	Applied Probability and Stochastic Processes	
EECE 7205	Fundamentals of Computer Engineering	
EECE 7211	Nonlinear Control	

EECE 7213	System Identification and Adaptive Control
EECE 7214	Optimal and Robust Control
EECE 7224	Power Systems State Estimation
EECE 7226	Modeling and Simulation of Power System Transients
EECE 7228	Advanced Power Electronics
EECE 7240 and EECE 7248	Analog Integrated Circuit Design and Lab for EECE 7240
EECE 7242	Integrated Circuits for Mixed Signals and Data Communication
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)
EECE 7245	Microwave Circuit Design for Wireless Communication
EECE 7247	Radio Frequency Integrated Circuit Design
EECE 7250	Power Management Integrated Circuits
EECE 7310	Modern Signal Processing
EECE 7323	Numerical Optimization Methods
EECE 7336	Digital Communications
EECE 7337	Information Theory
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization
EECE 7346	Probabilistic System Modeling and Analysis
EECE 7352	Computer Architecture
EECE 7353	VLSI Design
EECE 7364	Mobile and Wireless Networking
EECE 7368	High-Level Design of Hardware-Software Systems
EECE 7370	Advanced Computer Vision
EECE 7374	Fundamentals of Computer Networks
EECE 7377	Scalable and Sustainable System Design
EECE 7390	Computer Hardware Security
EECE 7393	Analysis and Design of Data Networks
EECE 7397	Advanced Machine Learning
EECE 7398	Special Topics (Wireless Network Systems and Applications)
EECE 7398	Special Topics (Legged Robots)
EECE 7398	Special Topics (Advanced Computer Architecture)
EECE 7398	Special Topics (Power System Constrained Optimization)
EECE 7398	Special Topics (Advances in Deep Learning)
EECE 7399	Preparing High-Stakes Written and Oral Materials
ENGR 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage
MATH 7233	Graph Theory

EXCLUDED COURSES FOR ALL MSECE CONCENTRATIONS

Please see your college administrator for more information.

Code	Title	Hours
Courses from the following subject areas may not count toward any concentration within the MSECE program:		
CSYE, ENSY, EMGT, INFO, SBSY, TELE		
The following CS courses may not count toward any concentration within the MSECE program:		
CS 5010	Programming Design Paradigm	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5520	Mobile Application Development	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 5800	Algorithms	
CS 6350	Empirical Research Methods	
CS 6710	Wireless Network	

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

Electrical and Computer Engineering with Concentration in Hardware and Software for Machine Intelligence, MSECE

Complete all courses and requirements listed below unless otherwise indicated.

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
A maximum of two courses may be taken outside of Electrical and Computer Engineering.		
Depth Courses		
Complete 20 semester hours from the depth course list below. (p. 194)		20
Breadth Courses		
Complete 8 semester hours from the breadth course list below or other EECE courses chosen in consultation with a faculty adviser. (p. 194)		8
Note: Depth courses cannot be taken for breadth.		
Elective		
Complete 4 semester hours of either depth or breadth courses.		4

THESIS OPTION

Code	Title	Hours
A maximum of three courses may be taken outside of Electrical and Computer Engineering.		
Thesis		
EECE 7990	Thesis	8
Depth Courses		
Complete 12 semester hours from the depth course list below. (p. 194)		12
Breadth Courses		

Complete 4 semester hours from the breadth course list below or other EECE courses chosen in consultation with a faculty adviser. (p. 194)	4
Note: Depth courses cannot be taken for breadth.	
Elective	
Complete 8 additional semester hours from either depth or breadth courses.	8

Course Lists

DEPTH COURSES

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5335	Robotic Science and Systems	
CS 7340	Theory and Methods in Human Computer Interaction	
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	
EECE 5639	Computer Vision	
EECE 5640	High-Performance Computing	
EECE 5641	Introduction to Software Security	
EECE 5642	Data Visualization	
EECE 5643	Simulation and Performance Evaluation	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 5645	Parallel Processing for Data Analytics	
EECE 5699	Computer Hardware and System Security	
EECE 7150	Autonomous Field Robotics	
EECE 7204	Applied Probability and Stochastic Processes	
EECE 7205	Fundamentals of Computer Engineering	
EECE 7323	Numerical Optimization Methods	
EECE 7337	Information Theory	
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization	
EECE 7346	Probabilistic System Modeling and Analysis	
EECE 7352	Computer Architecture	
EECE 7353	VLSI Design	
EECE 7368	High-Level Design of Hardware-Software Systems	
EECE 7370	Advanced Computer Vision	
EECE 7377	Scalable and Sustainable System Design	
EECE 7390	Computer Hardware Security	
EECE 7393	Analysis and Design of Data Networks	
EECE 7397	Advanced Machine Learning	
EECE 7398	Special Topics (Legged Robotics)	
EECE 7398	Special Topics (Human Centered Computing)	
EECE 7398	Special Topics (Advances in Deep Learning)	
EECE 7398	Special Topics (Deep Learning Embedded Systems)	
EECE 7399	Preparing High-Stakes Written and Oral Materials (Only for PhD and MS Thesis students)	
EECE 7400	Special Problems in Electrical and Computer Engineering	
EECE 7674	Master's Project (MS Thesis students cannot take this course)	
IE 7615	Neural Networks and Deep Learning	
MATH 7233	Graph Theory	
PHIL 5010	AI Ethics	

BREADTH COURSES

Code	Title	Hours
CS 5200	Database Management Systems	
CS 5600	Computer Systems	
CS 6410	Compilers	
CS 6510	Advanced Software Development	
CS 6760	Privacy, Security, and Usability	
CY 5770	Software Vulnerabilities and Security	
CY 6740	Network Security	
CY 6750	Cryptography and Communications Security	
EECE 5155	Wireless Sensor Networks and the Internet of Things	
EECE 5115	Dynamical Systems in Biological Engineering	
EECE 5161	Thin Film Technologies	
EECE 5170	Introduction to Multiferroics Materials and Systems	
EECE 5360	Combinatorial Optimization	
EECE 5576	Wireless Communication Systems	
EECE 5580	Classical Control Systems	
EECE 5606	Micro- and Nanofabrication	
EECE 5610	Digital Control Systems	
EECE 5626	Image Processing and Pattern Recognition	
EECE 5638	Compilers for Modern Computer Architectures	
EECE 5647	Nanophotonics	
EECE 5649	Design of Analog Integrated Circuits with Complementary Metal-Oxide-Semiconductor Technology	
EECE 5652	Microwave Circuits and Networks	
EECE 5666	Digital Signal Processing	
EECE 5680 and EECE 5681	Electric Drives and Lab for EECE 5680	
EECE 5682	Power Systems Analysis 1	
EECE 5684 and EECE 5685	Power Electronics and Lab for EECE 5684	
EECE 5688	Analysis of Unbalanced Power Grids	
EECE 5697	Acoustics and Sensing	

EECE 5698	Special Topics in Electrical and Computer Engineering (Network Programming)
EECE 5698	Special Topics in Electrical and Computer Engineering (Biomedical Microsystems)
EECE 5698	Special Topics in Electrical and Computer Engineering (Feedback Control Systems: Applications to Unmanned Aerial Vehicles)
EECE 5698	Special Topics in Electrical and Computer Engineering (GNSS Signal Processing)
EECE 5698	Special Topics in Electrical and Computer Engineering (Networks: Technology, Economics, Social Interactions)
EECE 5698	Special Topics in Electrical and Computer Engineering (Advanced Network Management)
EECE 5698	Special Topics in Electrical and Computer Engineering (Electromagnetic Devices)
EECE 7105	Optics for Engineers
EECE 7200	Linear Systems Analysis
EECE 7201	Solid State Devices
EECE 7202	Electromagnetic Theory 1
EECE 7203	Complex Variable Theory and Differential Equations
EECE 7211	Nonlinear Control
EECE 7213	System Identification and Adaptive Control
EECE 7214	Optimal and Robust Control
EECE 7224	Power Systems State Estimation
EECE 7226	Modeling and Simulation of Power System Transients
EECE 7228	Advanced Power Electronics
EECE 7240 and EECE 7248	Analog Integrated Circuit Design and Lab for EECE 7240
EECE 7242	Integrated Circuits for Mixed Signals and Data Communication
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)
EECE 7245	Microwave Circuit Design for Wireless Communication
EECE 7247	Radio Frequency Integrated Circuit Design
EECE 7250	Power Management Integrated Circuits
EECE 7270	Electromagnetic Theory 2
EECE 7271	Computational Methods in Electromagnetics
EECE 7275	Antennas and Radiation
EECE 7284	Optical Properties of Matter
EECE 7293	Modern Imaging
EECE 7296	Electronic Materials
EECE 7297	Advanced Magnetic Materials—Magnetic Devices
EECE 7310	Modern Signal Processing
EECE 7336	Digital Communications
EECE 7364	Mobile and Wireless Networking
EECE 7374	Fundamentals of Computer Networks
EECE 7398	Special Topics (Wireless Network Systems and Applications)
EECE 7398	Special Topics (Advanced Computer Architecture)
EECE 7398	Special Topics (Power System Constrained Optimization)
EECE 7398	Special Topics (Advanced Radio Frequency Passive Technologies)
EECE 7399	Preparing High-Stakes Written and Oral Materials
ENGR 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage

EXCLUDED COURSES FOR ALL MSECE CONCENTRATIONS

Please see your college administrator for more information.

Code	Title	Hours
Courses from the following subject areas may not count toward any concentration within the MSECE program:		
CSYE, ENSY, EMGT, INFO, SBSY, TELE		
The following CS courses may not count toward any concentration within the MSECE program:		
CS 5010	Programming Design Paradigm	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5520	Mobile Application Development	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 5800	Algorithms	
CS 6350	Empirical Research Methods	
CS 6710	Wireless Network	

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
A maximum of two courses may be taken outside of Electrical and Computer Engineering.		
Depth Courses		
Complete 20 semester hours from the depth course list below. (p. 194)		20
Breadth Courses		
Complete 8 semester hours from the breadth course list below or other EECE courses chosen in consultation with a faculty adviser. (p. 194)		8
Note: Depth courses cannot be taken for breadth.		

Elective		
Complete 4 semester hours of either depth or breadth courses.		4

THESIS OPTION

Code	Title	Hours
A maximum of three courses may be taken outside of Electrical and Computer Engineering.		
Thesis		
EECE 7990	Thesis	8
Depth Courses		
Complete 12 semester hours from the depth course list below. (p. 194)		12
Breadth Courses		
Complete 4 semester hours from the breadth course list below or other EECE courses chosen in consultation with a faculty adviser. (p. 194)		4
Note: Depth courses cannot be taken for breadth.		
Elective		
Complete 8 additional semester hours from either depth or breadth courses.		8

Course Lists

DEPTH COURSES

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5335	Robotic Science and Systems	
CS 7340	Theory and Methods in Human Computer Interaction	
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	
EECE 5639	Computer Vision	
EECE 5640	High-Performance Computing	
EECE 5641	Introduction to Software Security	
EECE 5642	Data Visualization	
EECE 5643	Simulation and Performance Evaluation	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 5645	Parallel Processing for Data Analytics	
EECE 5699	Computer Hardware and System Security	
EECE 7150	Autonomous Field Robotics	
EECE 7204	Applied Probability and Stochastic Processes	
EECE 7205	Fundamentals of Computer Engineering	
EECE 7323	Numerical Optimization Methods	
EECE 7337	Information Theory	
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization	
EECE 7346	Probabilistic System Modeling and Analysis	
EECE 7352	Computer Architecture	
EECE 7353	VLSI Design	
EECE 7368	High-Level Design of Hardware-Software Systems	
EECE 7370	Advanced Computer Vision	
EECE 7377	Scalable and Sustainable System Design	
EECE 7390	Computer Hardware Security	
EECE 7393	Analysis and Design of Data Networks	
EECE 7397	Advanced Machine Learning	
EECE 7398	Special Topics (Legged Robotics)	
EECE 7398	Special Topics (Human Centered Computing)	
EECE 7398	Special Topics (Advances in Deep Learning)	
EECE 7398	Special Topics (Deep Learning Embedded Systems)	
EECE 7399	Preparing High-Stakes Written and Oral Materials (Only for PhD and MS Thesis students)	
EECE 7400	Special Problems in Electrical and Computer Engineering	
EECE 7674	Master's Project (MS Thesis students cannot take this course)	
IE 7615	Neural Networks and Deep Learning	
MATH 7233	Graph Theory	
PHIL 5010	AI Ethics	

BREADTH COURSES

Code	Title	Hours
CS 5200	Database Management Systems	
CS 5600	Computer Systems	
CS 6410	Compilers	
CS 6510	Advanced Software Development	
CS 6760	Privacy, Security, and Usability	
CY 5770	Software Vulnerabilities and Security	
CY 6740	Network Security	
CY 6750	Cryptography and Communications Security	
EECE 5155	Wireless Sensor Networks and the Internet of Things	
EECE 5115	Dynamical Systems in Biological Engineering	
EECE 5161	Thin Film Technologies	
EECE 5170	Introduction to Multiferroics Materials and Systems	
EECE 5360	Combinatorial Optimization	
EECE 5576	Wireless Communication Systems	
EECE 5580	Classical Control Systems	
EECE 5606	Micro- and Nanofabrication	
EECE 5610	Digital Control Systems	
EECE 5626	Image Processing and Pattern Recognition	
EECE 5638	Compilers for Modern Computer Architectures	
EECE 5647	Nanophotonics	

EECE 5649	Design of Analog Integrated Circuits with Complementary Metal-Oxide-Semiconductor Technology
EECE 5652	Microwave Circuits and Networks
EECE 5666	Digital Signal Processing
EECE 5680 and EECE 5681	Electric Drives and Lab for EECE 5680
EECE 5682	Power Systems Analysis 1
EECE 5684 and EECE 5685	Power Electronics and Lab for EECE 5684
EECE 5688	Analysis of Unbalanced Power Grids
EECE 5697	Acoustics and Sensing
EECE 5698	Special Topics in Electrical and Computer Engineering (Network Programming)
EECE 5698	Special Topics in Electrical and Computer Engineering (Biomedical Microsystems)
EECE 5698	Special Topics in Electrical and Computer Engineering (Feedback Control Systems: Applications to Unmanned Aerial Vehicles)
EECE 5698	Special Topics in Electrical and Computer Engineering (GNSS Signal Processing)
EECE 5698	Special Topics in Electrical and Computer Engineering (Networks: Technology, Economics, Social Interactions)
EECE 5698	Special Topics in Electrical and Computer Engineering (Advanced Network Management)
EECE 5698	Special Topics in Electrical and Computer Engineering (Electromagnetic Devices)
EECE 7105	Optics for Engineers
EECE 7200	Linear Systems Analysis
EECE 7201	Solid State Devices
EECE 7202	Electromagnetic Theory 1
EECE 7203	Complex Variable Theory and Differential Equations
EECE 7211	Nonlinear Control
EECE 7213	System Identification and Adaptive Control
EECE 7214	Optimal and Robust Control
EECE 7224	Power Systems State Estimation
EECE 7226	Modeling and Simulation of Power System Transients
EECE 7228	Advanced Power Electronics
EECE 7240 and EECE 7248	Analog Integrated Circuit Design and Lab for EECE 7240
EECE 7242	Integrated Circuits for Mixed Signals and Data Communication
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)
EECE 7245	Microwave Circuit Design for Wireless Communication
EECE 7247	Radio Frequency Integrated Circuit Design
EECE 7250	Power Management Integrated Circuits
EECE 7270	Electromagnetic Theory 2
EECE 7271	Computational Methods in Electromagnetics
EECE 7275	Antennas and Radiation
EECE 7284	Optical Properties of Matter
EECE 7293	Modern Imaging
EECE 7296	Electronic Materials
EECE 7297	Advanced Magnetic Materials—Magnetic Devices
EECE 7310	Modern Signal Processing
EECE 7336	Digital Communications
EECE 7364	Mobile and Wireless Networking
EECE 7374	Fundamentals of Computer Networks
EECE 7398	Special Topics (Wireless Network Systems and Applications)
EECE 7398	Special Topics (Advanced Computer Architecture)
EECE 7398	Special Topics (Power System Constrained Optimization)
EECE 7398	Special Topics (Advanced Radio Frequency Passive Technologies)
EECE 7399	Preparing High-Stakes Written and Oral Materials
ENGR 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage

EXCLUDED COURSES FOR ALL MSECE CONCENTRATIONS

Please see your college administrator for more information.

Code	Title	Hours
Courses from the following subject areas may not count toward any concentration within the MSECE program:		
CSYE, ENSY, EMGT, INFO, SBSY, TELE		
The following CS courses may not count toward any concentration within the MSECE program:		
CS 5010	Programming Design Paradigm	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5520	Mobile Application Development	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 5800	Algorithms	
CS 6350	Empirical Research Methods	
CS 6710	Wireless Network	

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

Electrical and Computer Engineering with Concentration in Microsystems, Materials, and Devices, MSECE

For program contact information, please visit this website (https://ece.northeastern.edu/academics/graduate-studies/ms-elee/).

The master's degree program in electrical and computer engineering offers in-depth course work within the concentration-choice-related areas. The curriculum is integrated and intensive and is built on state-of-the-art research, taught by faculty who are experts in their areas.

EXCLUDED COURSES FOR ALL MSECE CONCENTRATIONS

You **cannot take excluded courses as part of your MSECE program**. Please **do not** petition to take these courses, as any petition to take these courses will be automatically rejected. Courses from the following subject areas may not count toward any concentration within the MSECE program: CSYE, ENSY, EMGT, INFO, SBSY, TELE. Select CS courses are also excluded from all MSECE concentrations. Please see the program requirements tab and your college administrator for more information.

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 251).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Electrical and Computer Engineering with Concentration in Microsystems, Materials, and Devices with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Electrical and Computer Engineering with Concentration in Microsystems, Materials, and Devices in addition to earning a Graduate Certificate in Engineering Leadership (p. 245). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 40-semester-hour degree and certificate will require 24 semester hours of advisor-approved microsystems, materials, and devices technical courses.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Options

Complete one of the following options:

COURSE WORK OPTION

Code	Title	Hours
A maximum of two courses may be taken outside of Electrical and Computer Engineering.		
Depth Courses		
Complete 20 semester hours from the depth course list below. (p. 198)		20
Breadth Courses		
Complete 8 semester hours from the breadth course list below. (p. 199)		8
Note: Depth courses cannot be taken for breadth.		
Elective		
Complete 4 additional semester hours from either depth or breadth courses.		4

THESIS OPTION

Code	Title	Hours
A maximum of three courses may be taken outside of Electrical and Computer Engineering.		
Thesis		
EECE 7990	Thesis	8
Depth Courses		
Complete 12 semester hours from the depth course list below. (p. 198)		12
Breadth Courses		
Complete 4 semester hours from the breadth course list below. (p. 199)		4
Note: Depth courses cannot be taken for breadth.		
Elective		
Complete 8 additional semester hours from either depth or breadth courses.		8

Course Lists

DEPTH COURSES

Code	Title	Hours
EECE 5161	Thin Film Technologies	
EECE 5606	Micro- and Nanofabrication	
EECE 5647	Nanophotonics	
EECE 5649	Design of Analog Integrated Circuits with Complementary Metal-Oxide-Semiconductor Technology	
EECE 5652	Microwave Circuits and Networks	
EECE 7201	Solid State Devices	
EECE 7240 and EECE 7248	Analog Integrated Circuit Design and Lab for EECE 7240	
EECE 7242	Integrated Circuits for Mixed Signals and Data Communication	
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)	
EECE 7245	Microwave Circuit Design for Wireless Communication	
EECE 7247	Radio Frequency Integrated Circuit Design	
EECE 7250	Power Management Integrated Circuits	
EECE 7284	Optical Properties of Matter	
EECE 7296	Electronic Materials	
EECE 7297	Advanced Magnetic Materials—Magnetic Devices	
EECE 7353	VLSI Design	
EECE 7398	Special Topics (Advanced Radio Frequency Passive Technologies)	
EECE 7399	Preparing High-Stakes Written and Oral Materials (Only for PhD and MS Thesis students)	
EECE 7400	Special Problems in Electrical and Computer Engineering	
EECE 7674	Master's Project (MS Thesis students cannot take this course)	

BREADTH COURSES

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	
CS 5200	Database Management Systems	
CS 5600	Computer Systems	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 6410	Compilers	
CS 6510	Advanced Software Development	
CS 6760	Privacy, Security, and Usability	
CS 7800	Advanced Algorithms	
CY 5770	Software Vulnerabilities and Security	
CY 6740	Network Security	
CY 6750	Cryptography and Communications Security	
EECE 5115	Dynamical Systems in Biological Engineering	
EECE 5155	Wireless Sensor Networks and the Internet of Things	
EECE 5170	Introduction to Multiferroics Materials and Systems	
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
EECE 5576	Wireless Communication Systems	
EECE 5580	Classical Control Systems	
EECE 5610	Digital Control Systems	
EECE 5626	Image Processing and Pattern Recognition	
EECE 5638	Compilers for Modern Computer Architectures	
EECE 5639	Computer Vision	
EECE 5640	High-Performance Computing	
EECE 5641	Introduction to Software Security	
EECE 5642	Data Visualization	
EECE 5643	Simulation and Performance Evaluation	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 5645	Parallel Processing for Data Analytics	
EECE 5666	Digital Signal Processing	
EECE 5680 and EECE 5681	Electric Drives and Lab for EECE 5680	
EECE 5682	Power Systems Analysis 1	
EECE 5684 and EECE 5685	Power Electronics and Lab for EECE 5684	
EECE 5688	Analysis of Unbalanced Power Grids	
EECE 5697	Acoustics and Sensing	
EECE 5698	Special Topics in Electrical and Computer Engineering (Network Programming)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Networks: Technology, Economics, Social Interactions)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Feedback Control Systems: Applications to Unmanned Aerial Vehicles)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Advanced Network Management)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Hardware and System Security)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Electromagnetic Devices)	
EECE 7105	Optics for Engineers	
EECE 7150	Autonomous Field Robotics	
EECE 7200	Linear Systems Analysis	
EECE 7202	Electromagnetic Theory 1	
EECE 7203	Complex Variable Theory and Differential Equations	
EECE 7204	Applied Probability and Stochastic Processes	
EECE 7205	Fundamentals of Computer Engineering	
EECE 7211	Nonlinear Control	
EECE 7213	System Identification and Adaptive Control	
EECE 7214	Optimal and Robust Control	
EECE 7224	Power Systems State Estimation	
EECE 7226	Modeling and Simulation of Power System Transients	
EECE 7228	Advanced Power Electronics	
EECE 7270	Electromagnetic Theory 2	
EECE 7271	Computational Methods in Electromagnetics	
EECE 7275	Antennas and Radiation	
EECE 7310	Modern Signal Processing	
EECE 7323	Numerical Optimization Methods	
EECE 7336	Digital Communications	
EECE 7337	Information Theory	
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization	
EECE 7346	Probabilistic System Modeling and Analysis	
EECE 7352	Computer Architecture	
EECE 7364	Mobile and Wireless Networking	
EECE 7368	High-Level Design of Hardware-Software Systems	
EECE 7370	Advanced Computer Vision	
EECE 7374	Fundamentals of Computer Networks	
EECE 7377	Scalable and Sustainable System Design	
EECE 7390	Computer Hardware Security	
EECE 7393	Analysis and Design of Data Networks	
EECE 7397	Advanced Machine Learning	
EECE 7398	Special Topics (Wireless Network Systems and Applications)	
EECE 7398	Special Topics (Legged Robots)	

EECE 7398	Special Topics (Advanced Computer Architecture)
EECE 7398	Special Topics (Power System Constrained Optimization)
EECE 7398	Special Topics (Advances in Deep Learning)
EECE 7399	Preparing High-Stakes Written and Oral Materials
ENGR 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage
MATH 7233	Graph Theory

EXCLUDED COURSES FOR ALL MSECE CONCENTRATIONS

Please see your college administrator for more information.

Code	Title	Hours
Courses from the following subject areas may not count toward any concentration within the MSECE program:		
CSYE, ENSY, EMGT, INFO, SBSY, TELE		
The following CS courses may not count toward any concentration within the MSECE program:		
CS 5010	Programming Design Paradigm	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5520	Mobile Application Development	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 5800	Algorithms	
CS 6350	Empirical Research Methods	
CS 6710	Wireless Network	

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

Electrical and Computer Engineering with Concentration in Power Systems, MSECE

For program contact information, please visit this website (https://ece.northeastern.edu/academics/graduate-studies/ms-elee/).

The master's degree program in electrical and computer engineering offers in-depth course work within the concentration-choice-related areas. The curriculum is integrated and intensive and is built on state-of-the-art research, taught by faculty who are experts in their areas.

Excluded Courses for All MSECE Concentrations

You **cannot take excluded courses as part of your MSECE program**. Please **do not** petition to take these courses, as any petition to take these courses will be automatically rejected. Courses from the following subject areas may not count toward any concentration within the MSECE program: CSYE, ENSY, EMGT, INFO, SBSY, TELE. Select CS courses are also excluded from all MSECE concentrations. Please see the program requirements tab and your college administrator for more information.

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 251).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Electrical and Computer Engineering with Concentration in Power Systems with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Electrical and Computer Engineering with Concentration in Power Systems in addition to earning a Graduate Certificate in Engineering Leadership (p. 245). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 40-semester-hour degree and certificate will require 24 semester hours of advisor-approved power systems technical courses.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Options

Complete one of the following options:

COURSE WORK OPTION

Code	Title	Hours
A maximum of two courses may be taken outside of Electrical and Computer Engineering.		
Depth Courses		
Complete 20 semester hours from the depth course list below. (p. 201)		20
Breadth Courses		
Complete 8 semester hours from the breadth course list below. (p. 201)		8
Note: Depth courses cannot be taken for breadth.		
Elective		
Complete 4 additional semester hours from either depth or breadth courses.		4

THESIS OPTION

Code	Title	Hours
A maximum of three courses may be taken outside of Electrical and Computer Engineering.		
Thesis		
EECE 7990	Thesis	8
Depth Courses		
Complete 12 semester hours from the depth course list below. (p. 201)		12
Breadth Courses		
Complete 4 semester hours from the breadth course list below. (p. 201)		4
Note: Depth courses cannot be taken for breadth.		
Elective		
Complete 8 additional semester hours from either the depth or breadth courses.		8

Course Lists

DEPTH COURSES

Code	Title	Hours
EECE 5580	Classical Control Systems	
EECE 5610	Digital Control Systems	
EECE 5680 and EECE 5681	Electric Drives and Lab for EECE 5680	
EECE 5682	Power Systems Analysis 1	
EECE 5684 and EECE 5685	Power Electronics and Lab for EECE 5684	
EECE 5688	Analysis of Unbalanced Power Grids	
EECE 7200	Linear Systems Analysis	
EECE 7211	Nonlinear Control	
EECE 7213	System Identification and Adaptive Control	
EECE 7214	Optimal and Robust Control	
EECE 7224	Power Systems State Estimation	
EECE 7226	Modeling and Simulation of Power System Transients	
EECE 7228	Advanced Power Electronics	
EECE 7250	Power Management Integrated Circuits	
EECE 7323	Numerical Optimization Methods	
EECE 7398	Special Topics (Power System Constrained Optimization)	
EECE 7399	Preparing High-Stakes Written and Oral Materials (Only for PhD and MS Thesis students)	
EECE 7400	Special Problems in Electrical and Computer Engineering	
EECE 7674	Master's Project (MS Thesis students cannot take this course)	
ENGR 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage	

BREADTH COURSES

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	
CS 5200	Database Management Systems	
CS 5600	Computer Systems	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 6410	Compilers	
CS 6510	Advanced Software Development	
CS 6760	Privacy, Security, and Usability	
CS 7800	Advanced Algorithms	
CY 5770	Software Vulnerabilities and Security	
CY 6740	Network Security	
CY 6750	Cryptography and Communications Security	
EECE 5115	Dynamical Systems in Biological Engineering	
EECE 5155	Wireless Sensor Networks and the Internet of Things	
EECE 5161	Thin Film Technologies	
EECE 5170	Introduction to Multiferroics Materials and Systems	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
EECE 5576	Wireless Communication Systems	
EECE 5606	Micro- and Nanofabrication	
EECE 5626	Image Processing and Pattern Recognition	
EECE 5638	Compilers for Modern Computer Architectures	
EECE 5639	Computer Vision	
EECE 5640	High-Performance Computing	
EECE 5641	Introduction to Software Security	
EECE 5642	Data Visualization	
EECE 5643	Simulation and Performance Evaluation	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 5645	Parallel Processing for Data Analytics	
EECE 5647	Nanophotonics	
EECE 5649	Design of Analog Integrated Circuits with Complementary Metal-Oxide-Semiconductor Technology	
EECE 5652	Microwave Circuits and Networks	
EECE 5666	Digital Signal Processing	
EECE 5697	Acoustics and Sensing	
EECE 5698	Special Topics in Electrical and Computer Engineering (Biomedical Microsystems)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Network Programming)	
EECE 5698	Special Topics in Electrical and Computer Engineering (GNSS Signal Processing)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Feedback Control Systems: Applications to Unmanned Aerial Vehicles)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Networks: Technology, Economics, Social Interactions)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Hardware and System Security)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Advanced Network Management)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Electromagnetic Devices)	
EECE 7105	Optics for Engineers	
EECE 7150	Autonomous Field Robotics	
EECE 7201	Solid State Devices	
EECE 7202	Electromagnetic Theory 1	
EECE 7203	Complex Variable Theory and Differential Equations	
EECE 7204	Applied Probability and Stochastic Processes	

EECE 7205	Fundamentals of Computer Engineering
EECE 7240 and EECE 7248	Analog Integrated Circuit Design and Lab for EECE 7240
EECE 7242	Integrated Circuits for Mixed Signals and Data Communication
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)
EECE 7245	Microwave Circuit Design for Wireless Communication
EECE 7247	Radio Frequency Integrated Circuit Design
EECE 7270	Electromagnetic Theory 2
EECE 7271	Computational Methods in Electromagnetics
EECE 7275	Antennas and Radiation
EECE 7284	Optical Properties of Matter
EECE 7293	Modern Imaging
EECE 7296	Electronic Materials
EECE 7297	Advanced Magnetic Materials—Magnetic Devices
EECE 7310	Modern Signal Processing
EECE 7323	Numerical Optimization Methods
EECE 7336	Digital Communications
EECE 7337	Information Theory
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization
EECE 7346	Probabilistic System Modeling and Analysis
EECE 7352	Computer Architecture
EECE 7353	VLSI Design
EECE 7364	Mobile and Wireless Networking
EECE 7368	High-Level Design of Hardware-Software Systems
EECE 7370	Advanced Computer Vision
EECE 7374	Fundamentals of Computer Networks
EECE 7377	Scalable and Sustainable System Design
EECE 7390	Computer Hardware Security
EECE 7393	Analysis and Design of Data Networks
EECE 7397	Advanced Machine Learning
EECE 7398	Special Topics (Wireless Network Systems and Applications)
EECE 7398	Special Topics (Legged Robots)
EECE 7398	Special Topics (Advanced Computer Architecture)
EECE 7398	Special Topics (Advances in Deep Learning)
EECE 7398	Special Topics (Advanced Radio Frequency Passive Technologies)
EECE 7399	Preparing High-Stakes Written and Oral Materials
MATH 7233	Graph Theory

EXCLUDED COURSES FOR ALL MSECE CONCENTRATIONS

Please see your college administrator for more information.

Code	Title	Hours
Courses from the following subject areas may not count toward any concentration within the MSECE program:		
CSYE, ENSY, EMGT, INFO, SBSY, TELE		
The following CS courses may not count toward any concentration within the MSECE program:		
CS 5010	Programming Design Paradigm	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5520	Mobile Application Development	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 5800	Algorithms	
CS 6350	Empirical Research Methods	
CS 6710	Wireless Network	

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

Electrical and Computer Engineering Leadership, MSECEL

The Gordon Engineering Leadership Program is a transformational, technical, and challenging graduate-level learning experience targeted for engineering professionals.

The Gordon Institute, in collaboration with the College of Engineering, offers the **Master of Science in Electrical and Computer Engineering Leadership (MSECEL)** along with the **Graduate Certificate in Engineering Leadership** as formal recognition of the combined focus in electrical and computer engineering technical skills and midlevel engineers' leadership acumen and broadened cross-functional capabilities.

Pursuing the MSECEL and the graduate certificate allows participants to:

- Enhance technical knowledge in electrical and computer engineering
- Take part in a hands-on curriculum (http://www.northeastern.edu/gordonleadership/about-the-institute/curriculum/) taught by industry-experienced professors
- Work with peers from across engineering fields on leadership skills development
- Receive one-on-one mentoring from industry experts and faculty

The Gordon Engineering Leadership Program anchors around an intense, market-worthy challenge project based on your organization's strategic needs. This is a unique opportunity to apply your classroom experience to a professional setting, potentially further accelerating your career.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Leadership		
ENLR 5121	Engineering Leadership 1	2
ENLR 5122	Engineering Leadership 2	2
Foundations		
ENLR 5131	Scientific Foundations of Engineering 1	2

ENLR 5132	Scientific Foundations of Engineering 2	2
Project		
ENLR 7440	Engineering Leadership Challenge Project 1	4
ENLR 7442	Engineering Leadership Challenge Project 2	4
Concentration Courses		
Complete 16 semester hours from any of the approved depth/breadth course lists within any of the seven EECE concentrations. Students are encouraged to take at least three courses within the same concentration.		16

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

Mechanical and Industrial Engineering

Website (https://mie.northeastern.edu/academics/graduate-studies/)

Marilyn L. Minus, PhD
Professor and Chair

334 Snell Engineering Center
617.373.2740
617.373.2921 (fax)

Mechanical engineers design, develop, and support the manufacture of machinery and devices to transmit power or to convert energy from thermal to mechanical form in order to power the modern world and its machines. Traditionally, mechanical engineers have designed and tested devices, such as heating and air-conditioning systems, machine tools, internal combustion engines, and steam power plants. Today, they also play primary roles in the development of new technologies in a variety of fields—energy conversion, solar energy utilization, environmental control, prosthetics, transportation, manufacturing, robotics, and new-materials development.

Industrial engineers design and analyze systems that include people, equipment, and materials and their interactions and performance in the workplace. An industrial engineer collects this information and evaluates alternatives to make decisions that best advance the goals of the enterprise. Industrial engineers work in manufacturing firms, hospitals, banks, public utilities, transportation, government agencies, insurance companies, and construction firms. Among the projects they undertake are design and implementation of a computer-integrated supply chain or manufacturing system, facilities planning for a variety of industries, design of a robotics system in a manufacturing environment, long-range corporate planning, development and implementation of a quality-control system, simulation analyses to improve processes and make operational decisions, design of healthcare operations to enhance patient safety and improve efficiency, productivity, and development of computer systems for information control.

Mission of the Department

The mission of the Department of Mechanical and Industrial Engineering is to educate persons for professional and technical excellence; to perform research to advance the science and practice of engineering; to engage in service activities that advance the department, the university, and the profession; and to instill in ourselves and our students habits and attitudes that promote ethical behavior, professional responsibility, and careers that advance the well-being of society.

Academic Programs

The Department of Mechanical and Industrial Engineering (MIE) offers comprehensive research and educational programs for both Master of Science (MS) and Doctor of Philosophy (PhD) students. Our cutting-edge and vibrant doctoral programs include PhDs in industrial engineering, mechanical engineering, and an interdisciplinary PhD (housed in the College of Engineering). Our MS degree programs are offered in both traditional mechanical and industrial engineering, as well as data analytics engineering, energy systems, engineering management, human factors, operations research, and robotics. These extensive programs and concentrations allow for the selection of a degree that meets a wide variety of personal and professional goals. Graduate students work with our world-renowned faculty to achieve research experience and their career goals and have opportunities to participate in the graduate cooperative education program.

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (https://www.northeastern.edu/graduate/programs/#/certificate/engineering,leadership/-/-/-/-/-).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP OPTION

Students have the opportunity to pursue the Gordon Engineering Leadership Program (https://www.northeastern.edu/graduate/program/graduate-certificate-in-engineering-leadership-5272/) in combination with the MS degree.

ENGINEERING BUSINESS

Students have the opportunity to pursue the Galante Engineering Business Certificate (https://www.northeastern.edu/graduate/program/galante-engineering-business-certificate-14806/) in combination with several MS degrees.

Programs

Doctor of Philosophy (PhD)

- Industrial Engineering (p. 204)
- Mechanical Engineering (p. 207)

Master of Science (MS)

- Advanced and Intelligent Manufacturing (p. 210)
- Data Analytics Engineering (p. 212)
- Human Factors (p. 215)

Master of Science in Industrial Engineering (MSIE)

- Industrial Engineering (p. 217)

Master of Science in Engineering Management (MSEM)

- Engineering Management (p. 219)

Master of Science in Energy Systems (MSEneS)

- Energy Systems (p. 222)
- Energy Systems—Academic Link Program (p. 224)

Master of Science in Mechanical Engineering (MSME)

- Mechanical Engineering with Concentration in General Mechanical Engineering (p. 224)
- Mechanical Engineering with Concentration in Mechanics and Design (p. 228)

- Mechanical Engineering with Concentration in Materials Science (p. 226)
- Mechanical Engineering with Concentration in Mechatronics (p. 229)
- Mechanical Engineering with Concentration in Thermofluids (p. 231)

Master of Science in Operations Research (MSOR)

- Operations Research (p. 233)

Graduate Certificate

- Data Analytics Engineering (p. 235)
- Energy Systems (p. 235)
- Energy Systems Management (p. 235)
- Engineering Business (p. 236)
- Engineering Economic Decision Making (p. 237)
- Engineering Management (p. 237)
- Lean Six Sigma (p. 237)
- Renewable Energy (p. 237)
- Software Engineering Systems (p. 246)
- Sustainable Energy Systems (p. 238)
- Supply Chain Engineering Management (p. 238)
- Technology Systems Management (p. 238)

Industrial Engineering, PhD

Requirements

The Doctor of Philosophy (PhD) is awarded to students who demonstrate high academic achievement and research competence in the field of industrial engineering. To earn a PhD, a student must complete approved and advanced coursework and submit and defend an original dissertation of independent research. The Department of Mechanical and Industrial Engineering (MIE) expects all successful doctoral candidates to show depth of knowledge and research innovation in their chosen field of specialization.

The MIE department admits applicants to the PhD program either directly after earning a suitable bachelor's degree (i.e., bachelor's entry) or after earning a master's degree (i.e., advanced entry). Upon acceptance into the program, an applicant is designated as a doctoral student. This designation is changed to doctoral candidate upon successful completion of the doctoral qualifying examinations (both written and oral exams) as well as all the required coursework.

Academic and Research Advisors

PhD students must find a research advisor within their first year of study. The research advisor must be a full-time or jointly appointed faculty. If the research advisor is outside the MIE department, a faculty member with 51 percent or more appointments in the MIE department must be chosen as co-advisor, and a petition must be filed and approved by the co-advisor and the MIE Graduate Affairs Committee. Students are advised by the faculty advisor of their discipline before they select their research advisor(s). The research advisor and co-advisor (if applicable) must serve on the PhD student's oral examination, dissertation proposal, and dissertation defense committees.

Change of Research Advisor

Students who want to change their research advisors need to use the MIE petition form. The petition form needs to be signed both by the student and the student's current and future research advisors. The signed form then needs to be submitted to the MIE department for further processing.

Course Requirements and Plan of Study

Each doctoral student, together with his or her research advisor, should develop an initial program during the first semester of study. The final program is also subject to the approval of the dissertation committee, who will add the program of study to the student's record upon admission to doctoral candidacy.

DIRECT ENTRY

A typical program of study includes at least 40 semester hours of coursework beyond a bachelor's degree. Students who choose to get a master's degree along the way to PhD must complete a total of 52 semester hours (32 semester hours to earn a master's degree and an additional 20 semester hours in order to earn a PhD). The 32 semester hours of coursework that apply toward the master's degree may include up to 8 semester hours of thesis or 4 semester hours of project or approved independent study coursework. Students may petition the MIE Graduate Affairs Committee to substitute up to 4 semester hours of Independent Study (IE 7978) as part of their required coursework. An independent study must be approved by the research advisor. When thesis or project is selected, an independent study course cannot be taken.

ADVANCED ENTRY

A typical program of study includes at least 20 semester hours of coursework beyond a master's degree. Students may petition the MIE Graduate Affairs Committee to substitute up to 4 semester hours of Independent Study (IE 7978) as part of their required coursework. An independent study must be approved by the research advisor.

PhD Candidacy

To qualify as a doctoral candidate, a doctoral student must successfully complete the doctoral qualifying examinations (both a written comprehensive exam and an oral exam—see below) as well as all the required coursework.

Doctoral Qualifying Examinations

Background and motivation: To demonstrate breadth and depth in each of the subject exams, crossover and merging exams are necessary in an effort to provide students with an opportunity to master the core disciplines in mechanical or industrial engineering (at both undergraduate and graduate levels) along with a focus area of importance to their specialization. These exams also provide an assessment as to whether students have adequate knowledge to pursue advanced study and possess attributes of a doctoral candidate by demonstrating understanding of and the ability to apply fundamental principles. Also, an oral exam tied to the written exams is necessary in an effort to evaluate a student's potential to perform independent research in the chosen field of specialization for the doctoral program.

Doctoral qualifying examinations framework: The doctoral qualifying examinations consist of the following two parts:

1. Two **written comprehensive** exams, which are respectively referred to as exam A and exam B
2. An **oral** exam to be administered no later than the end of the semester in which the written exams are taken and passed

WRITTEN COMPREHENSIVE EXAMINATIONS

All doctoral students admitted directly with a bachelor's degree must take the written comprehensive exams no later than the first time that they are offered after their first two years of study. The written comprehensive exams include two exams, **exam A** and **exam B,** which are given on

the Thursday and/or Friday of the first week of classes during regular semesters. A complete list of these exams along with topical coverage and details are provided in the PhD Qualifying Examinations Guidelines on the MIE department graduate website (https://mie.northeastern.edu/academics/graduate-studies/). Students should also consult extensively with their research advisor regarding all aspects of the qualifying exams.

Written Comprehensive Exams Rules
Exam A, about four to six hours in length, should be selected from the list of major exams based on the student's concentration (i.e., industrial engineering—IND, sample list provided). No deviation from this rule will be permitted. Exam B, about two to three hours in length, should be selected from the list of exams B for PhD degree program in industrial engineering (a sample list is provided below), and only one exam from this list should be selected. All students are required to have their research advisor's approval on selection of exam B prior to registering to take the written comprehensive exams. Note that exam B cannot be similar or close to one of the topics covered in exam A.

List of exams A and B based on student's research concentration:

Samples of exam A for industrial engineering PhD students:

- **Industrial Engineering (IND):** Probability and Probabilistic OR (IND1), Statistics (IND2), and Deterministic OR (IND3)

Samples of exam B for industrial engineering PhD students:

- Data Mining (DMN)
- Human-Machine Systems (HMS)
- Manufacturing Systems (MFS)
- Networks and Advanced Optimization (NAO)
- Reliability and Quality Assurance (RQA)
- Supply Chain Engineering (SCE)

ORAL EXAMINATION

The objective of the oral exam is to assess a student's potential to perform independent research in the chosen field of specialization. This exam shall be administered **no later than the end of the semester in which the written exams are taken and passed**. The exam shall be publicly advertised **at least one week in advance** and all faculty members and students may attend and participate.

Oral examination procedure: The student's research advisor convenes and chairs an oral examination committee comprised of a minimum of three faculty members deemed appropriate by the research advisor. This committee provides a set of technical papers pertinent to the student's research area at least one month before the examination. The oral examination committee will then conduct the exam that comprises the following two parts (both completed in a one-hour session):

1. A 30-minute oral presentation on a selected number of papers out of the assigned technical papers
2. A 30-minute oral exam by committee members' questions and evaluation of the student covering topics specifically related to the student's research area

GRADING PROCEDURE

Grading procedure and results of the written comprehensive examination: The MIE Graduate Affairs Committee will review all students' performance in the written comprehensive exams. Depending on the results of both major and minor exams and in consultation with the student's research advisor, the Graduate Affairs Committee will recommend one of the following three possible options:

1. No invitation to oral exam: The student will be dismissed from the program. He or she may be granted a master's degree if the requirements are already met; otherwise, the student may continue to fulfill the requirements for a master's degree in industrial engineering (IE), mechanical engineering (ME), or other MIE departmental MS degree (e.g., operations research (OR)).
2. No invitation to oral exam yet: The student will be asked to retake the written exam(s) again in the next offering and/or take additional courses.
3. Student is invited to oral exam.

The Graduate Affairs Committee makes its final recommendation considering all aspects of the exam including, but not limited to, examiners' reports and results and the student's research performance and coursework. The Graduate Affairs Committee reserves the right to recommend option 1 above for students who register for the exams but do not show up.

Grading procedure and results of the oral examination: If the student's performance in the oral exam is not satisfactory, the student will be dismissed from the program. He or she may be granted a master's degree if the requirements are met; otherwise, the student may continue to fulfill the requirements for a master's degree in industrial engineering (IE), mechanical engineering (ME), or other MIE departmental MS degree (e.g., operations research (OR)).

Upon successfully passing the oral exam, the student continues in the PhD program. Upon passing all the required coursework, he or she will become a PhD candidate. The results of written and oral exams and any recommended coursework will become part of the student's record.

APPEAL PROCEDURE

The preliminary qualifying examination process provides means for reevaluation for students who fail one or more exams to appeal the Graduate Affairs Committee decision. All communications related to these examinations should be coordinated through the student's research advisor. Only the student's research advisor may request the MIE Graduate Affairs Committee to reevaluate the student's failed exams.

PhD Students Annual Review

After the completion of their doctoral qualifying examinations, all PhD students in the MIE department must complete the PhD students' annual review form with their research advisor(s) and submit any supporting documents. This review should occur during the fall semester of each academic year and all subsequent years thereafter. Annual reviews will be filed with the MIE department's graduate affairs office.

PhD Students Changing Their Program

PhD students who, for any reason, decide to change their program (i.e., from PhD in ME to PhD in IE or vice versa) must take (or retake) the doctoral qualifying examinations (both written comprehensive exams and oral exam) based on the student's new major research area (i.e., industrial engineering, materials, mechanics, mechatronics, or thermofluids).

Interdisciplinary PhD Students with MIE as the Home Department

Students pursuing the College of Engineering (COE) interdisciplinary PhD program with the MIE department as their home department must take one of the major written comprehensive exams (exam A) of the MIE doctoral qualifying examinations. The minor exam (exam B) can be substituted with appropriate exam(s) from other department(s) involved with the student's interdisciplinary PhD program. Students dismissed from the ME or IE PhD programs in the MIE department cannot enroll in

the PhD interdisciplinary engineering program with MIE as the primary affiliation.

Dissertation Proposal Preparation and Presentation Timing

Students must present their dissertation proposal no more than 18 months after successfully completing the oral exam. In addition, the presentation of the dissertation proposal and the actual dissertation defense (see below) shall be no less than six months apart. The student's dissertation committee will invite any additional faculty deemed appropriate to that field; this dissertation committee will then conduct the dissertation proposal session. Each student's dissertation committee must be comprised of at least three members, including the research advisor. At least two of those three members must be full-time MIE faculty members. At least three committee members should hold a PhD and at least two shall be Northeastern University faculty members. The chair of the dissertation committee shall be a full-time tenured or tenure-track member of the faculty of Northeastern University and will hold a PhD or an appropriate terminal degree for the discipline. Exceptions to this policy will be considered and, if appropriate, approved by the provost or their designee.

Dissertation Course Requirements

Upon successful completion of the doctoral qualifying examinations (both written preliminary and oral exams) as well as all the required coursework, the doctoral candidate, in consultation with his or her research advisor, must register in two consecutive semesters (may include full summer term) for Dissertation Term 1 (IE 9990) and Dissertation Term 2 (IE 9991). Upon completion of this sequence, the student must then register for Dissertation Continuation (IE 9996) in every semester (in each fall and spring semester and also in the summer term if summer is the student's last semester) until the dissertation is completed. Students may not register for Dissertation Continuation (IE 9996) until they complete the two-semester registration sequence for Dissertation Term 1 (IE 9990) and Dissertation Term 2 (IE 9991).

To meet the full-time registration requirement for PhD students who have completed the majority of their coursework and not yet reached PhD candidacy, a zero-credit course, Candidacy Preparation—Doctoral (IE 8960), can be taken if needed to meet the full-time course registration requirement. Candidacy Preparation—Doctoral (IE 8960) is an individual instruction course, billed as 1 semester hour, and graded as S or U. This course does not have any course content, and students must register in a section for which their research or academic advisor is listed as the "instructor" in the online registration system.

Final Oral (Dissertation Defense) Examination

All doctoral candidates must pass a final oral exam. This exam will be scheduled once the dissertation committee agrees that the candidate's research has reached a stage where it is appropriate for a formal presentation and after completion of all other requirements for the PhD, including all coursework approved in the final program of study. The objective of the exam is for the candidate to present and defend the results of the dissertation research and to demonstrate depth of knowledge and significant expertise in the area of that research under questioning from the dissertation committee and other attendees.

The exam shall be publicly advertised **at least one week in advance** and all faculty members may attend and participate. At the conclusion of the presentation and subsequent questions period, the dissertation committee will convene to determine the outcome. The committee may recommend that the candidate be awarded the PhD or may require additional research and/or modifications of the dissertation. In some cases, candidates may be asked to present an additional final oral dissertation defense.

Residency Requirement

After achieving PhD candidacy, the university residency requirement is satisfied by two semesters of full-time graduate registration or four semesters of part-time graduate registration. Students must be continually enrolled during the pursuit of their dissertation.

Program Requirements

Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Doctoral qualifying exams (both written comprehensive and oral area exams)
Annual review
Dissertation committee formation
Dissertation proposal
Dissertation defense

Core Requirements

Code	Title	Hours
Recommended Courses		
Note: Semester hours can be counted toward coursework component with advisor approval.		
MEIE 6830	Graduate Traineeship I (Technical Writing and Communications) (2 SHs)	
MEIE 6860	Graduate Traineeship II (Research Ethics and Professional Development) (2 SHs)	
Approved Coursework		
Requires 40 semester hours of coursework, including up to 4 semester hours of Independent Study (IE 7978).		40

Dissertation

Code	Title	Hours
Complete the following (must register in two consecutive semesters, which may include full summer term):		
IE 9990	Dissertation Term 1	
IE 9991	Dissertation Term 2	

Program Credit/GPA Requirements

40 total semester hours required
Minimum 3.000 GPA required

Advanced Entry PhD Program Requirements

Master's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Doctoral qualifying exams (both written comprehensive and oral area exams)
Annual review
Dissertation committee formation
Dissertation proposal
Dissertation defense

General Requirements

Code	Title	Hours
Recommended Courses (semester hours can be counted toward coursework component with adviser approval)		
	MEIE 6830 Graduate Traineeship I (Technical Writing and Communications) (2 SHs)	
	MEIE 6860 Graduate Traineeship II (Research Ethics and Professional Development) (2 SHs)	
Approved Course Work		
Requires 20 semester hours of coursework, including up to 4 semester hours of Independent Study (IE 7978). Please consult your faculty adviser for acceptable courses.		20

Dissertation Courses

Code	Title	Hours
Complete the following two courses. Must register in two consecutive semesters (may include full summer term):		
IE 9990	Dissertation Term 1	
IE 9991	Dissertation Term 2	

Program Credit/GPA Requirements

20 total semester hours required
Minimum 3.000 GPA required

Mechanical Engineering, PhD

Requirements

The PhD is awarded to students who demonstrate high academic achievement and research competence in the fields of mechanical engineering. To earn a PhD, a student must complete an approved, rigorous program of advanced coursework and submit and defend an original dissertation of independent research. The Department of Mechanical and Industrial Engineering (MIE) expects all successful doctoral candidates to show depth of knowledge and research innovation in their chosen field of specialization.

The MIE department admits applicants to the PhD program either directly after earning a suitable bachelor's degree (i.e., direct entry) or after earning a suitable master's degree (i.e., advanced entry). Upon acceptance into the program, an applicant is designated as a doctoral student. This designation is changed to doctoral candidate upon successful completion of the doctoral qualifying examinations (both written and oral exams) as well as all the required coursework.

Academic and Research Advisors

PhD students must find a research advisor within their first year of study. The research advisor must be a full-time or jointly appointed faculty. If the research advisor is outside the MIE department, a faculty member with 51 percent or more appointments in the MIE department must be chosen as co-advisor, and a petition must be filed and approved by the co-advisor and the MIE Graduate Affairs Committee. Students are advised by the faculty advisor of their discipline before they select their research advisor(s). The research advisor and co-advisor (if applicable) must serve on the PhD student's oral examination, dissertation proposal and dissertation defense committees.

Change of Research Advisor

Students who wish to change their research advisor need to use the MIE petition form to make that request. The petition form must be signed by the student and by the student's current and future research advisor. The signed petition form should then be submitted to the MIE department for further processing.

Course Requirements and Plan of Study

Each doctoral student, together with his or her research advisor, should develop an initial program during the first semester of study. The final program is also subject to the approval of the dissertation committee, who will add the program of study to the student's record upon admission to doctoral candidacy.

DIRECT ENTRY

A typical program of study includes at least 40 semester hours of coursework beyond a bachelor's degree. Students who choose to get a master's degree along the way to a PhD must complete a total of 52 semester hours (32 semester hours to earn a master's degree and an additional 20 semester hours in order to earn a PhD). The 32 semester hours of coursework that apply toward the master's degree may include up to 8 semester hours of thesis or 4 semester hours of project or approved independent study coursework. Students may petition the MIE Graduate Affairs Committee to substitute up to 4 semester hours of Independent Study (ME 7978) as part of their required coursework. An independent study must be approved by the research advisor. When thesis or project is selected, an independent study course cannot be taken.

ADVANCED ENTRY

A typical program of study includes at least 20 semester hours of coursework beyond a master's degree. Students may petition the MIE Graduate Affairs Committee to substitute up to 4 semester hours of Independent Study (ME 7978) as part of their required coursework. An independent study must be approved by the research advisor.

PHD CANDIDACY

To qualify as a doctoral candidate, a doctoral student must successfully complete the doctoral qualifying examinations (both a written comprehensive exam and an oral exam—see below) as well as all the required coursework.

Doctoral Qualifying Examinations

Background and motivation: To demonstrate breadth and depth in each of the subject exams, crossover and merging exams are necessary in an effort to provide students with an opportunity to master the core disciplines in mechanical or industrial engineering (at both undergraduate and graduate levels) along with a focus area of importance to their specialization. These exams also provide an assessment as to whether students have adequate knowledge to pursue advanced study and possess attributes of a doctoral candidate by demonstrating understanding of and the ability to apply fundamental principles. Also, an oral exam tied to the written exams is necessary in an effort to evaluate a student's potential to perform independent research in the chosen field of specialization for the doctoral program.

Doctoral qualifying examinations framework: The doctoral qualifying examinations consist of the following two parts:

1. Two **written comprehensive** exams, which are respectively referred to as exam A and exam B
2. An **oral** exam to be administered no later than the end of the semester in which the written exams are taken and passed

WRITTEN COMPREHENSIVE EXAMINATIONS

All doctoral students admitted directly with a bachelor's degree must take the written comprehensive exams no later than the first time that it is offered after their first two years of study. The written comprehensive exams include two exams, **exam A** and **exam B,** which are given on

the Thursday and/or Friday of the first week of classes during regular semesters. A complete list of these exams along with topical coverage and details are provided in the PhD Qualifying Examinations Guidelines on the MIE department graduate website (https://mie.northeastern.edu/academics/graduate-studies/). Students should also consult extensively with their research advisor regarding all aspects of the qualifying exams.

WRITTEN COMPREHENSIVE EXAMS RULES

Exam A, about four to six hours in length, should be selected from the list of major exams based on the student's concentration (i.e., materials, mechanics, mechatronics, or thermofluids, sample list provided). No deviation from this rule will be permitted. Exam B, about two to three hours in length, should be selected from the list of B exams for PhD degree program in mechanical engineering (a sample list is provided below), and only one exam from this list should be selected. All students are required to have their research advisor's approval for their selection of exams A and B prior to registering to take the written comprehensive exams. Note that exam B cannot be similar or close to one of the topics covered in exam A.

List of exams A and B are based on student's research concentration.

Samples of exam A for mechanical engineering PhD students:

- **Materials Science Engineering (MSE):** Kinetics of Materials (MSE1), Thermodynamics of Materials (MSE2), and Diffusion, Soft Matter, and Mechanical Behavior (MSE3)
- **Mechanics (MEC):** Mechanics of Deformable Media (MEC1), Dynamics and Vibration (MEC2), and Finite Element Method (MEC3)
- **Dynamic Systems and Control (DSC):** Dynamic Systems (DSC1), Mechanical Vibrations (DSC2), and Control Systems (DSC3)
- **Thermofluids Science (TFS):** Thermodynamics (TFS1), Fluid Mechanics (TFS2), Heat Transfer (TFS3), and Engineering Mathematics (TFS4)—*TFS area students should choose three out of the four from this list for Exam A*

Samples of exam B for mechanical engineering PhD students:

- Control Systems (DSC3)
- Dynamic Systems (DSC1)
- Dynamics and Vibration (MEC2)
- Electric/Magnetic/Optics (EMO)
- Engineering Mathematics (MTH)
- Finite Element Method (MEC3)
- Fluid Mechanics (TFS2) or Rheology (REO)
- Heat Transfer (TFS3)
- Mechanics of Deformable Media (MEC1)
- Soft Materials (SM)
- Thermodynamics (TFS1)

ORAL EXAMINATION

The objective of the oral exam is to assess a student's potential to perform independent research in the chosen field of specialization. This exam shall be administered **no later than the end of the semester in which the written exams are taken and passed.** The exam shall be publicly advertised **at least one week in advance,** and all faculty members and students may attend and participate.

Oral examination procedure: The student's research advisor convenes and chairs an oral examination committee comprised of a minimum of three faculty members deemed appropriate by the research advisor. This committee provides a set of technical papers pertinent to the student's research area at least one month before the examination. The oral examination committee will then conduct the exam that comprises the following two parts (both completed in a one-hour session):

1. A 30-minute oral presentation on a selected number of papers out of the assigned technical papers
2. A 30-minute oral exam by committee members' questions and evaluation of the student covering topics specifically related to the student's research area

GRADING PROCEDURE

Grading procedure and results of the written comprehensive examination: The MIE Graduate Affairs Committee will review all students' performance in the written comprehensive exams. Depending on the results of both major and minor exams and in consultation with the student's research advisor, the Graduate Affairs Committee will recommend one of the following three possible options:

1. No invitation to oral exam: The student will be dismissed from the program. He or she may be granted a master's degree if the requirements are already met; otherwise, the student may continue to fulfill the requirements for a master's degree in industrial engineering (IE), mechanical engineering (ME), or other MIE departmental MS degree (e.g., operations research (OR)).
2. No invitation to oral exam yet: The student will be asked to retake the written exam(s) again in the next offering and/or take additional courses.
3. Student is invited to oral exam.

The Graduate Affairs Committee makes its final recommendation considering all aspects of the exam including, but not limited to, examiners' reports and results, student's research performance, and coursework. The Graduate Affairs Committee reserves the right to recommend option 1 above for students who register for the exams but do not show up.

Grading procedure and results of the oral examination: If the student's performance in the oral exam is not satisfactory, the student will be dismissed from the program. He or she may be granted a master's degree if the requirements are met; otherwise, the student may continue to fulfill the requirements for a master's degree in industrial engineering (IE), mechanical engineering (ME), or other MIE departmental MS degree (e.g., operations research (OR)).

Upon successfully passing the oral exam, the student continues in the PhD program. Upon passing all the required coursework, he or she will become a PhD candidate. The results of written and oral exams and any recommended coursework will become part of the student's record.

APPEAL PROCEDURE

The preliminary qualifying examination process provides means for reevaluation for students who fail one or more exams to appeal the Graduate Affairs Committee decision. All communications related to these examinations should be coordinated through the student's research advisor. Only the student's research advisor may request the MIE Graduate Affairs Committee to reevaluate the student's failed exams using the appeal form found here (http://www.coe.neu.edu/sites/default/files/pdfs/coe/gse/miepetitionform.pdf).

PhD Students Annual Review

After the completion of their doctoral qualifying examinations, all PhD students in the MIE department must complete the PhD Students Annual Review form with their research advisor(s) and submit any supporting documents. This review should occur during the fall semester of each

academic year and all subsequent years thereafter. Annual reviews will be filed with the MIE Department of Graduate Affairs.

PhD Students Changing Their Program

PhD students who, for any reason, decide to change their degree program (i.e., from PhD in ME to PhD in IE or vice versa) must take (or retake) the doctoral qualifying examinations (both written comprehensive exams and oral exam) based on the student's new major research area (i.e., industrial engineering, materials, mechanics, mechatronics, or thermofluids).

Interdisciplinary PhD Students with MIE as the Home Department

Students pursuing the College of Engineering (COE) interdisciplinary PhD program with the MIE department as their home department must take one of the major written comprehensive exams (exam A) of the MIE doctoral qualifying examinations. The minor exam (exam B) can be substituted with appropriate exam(s) from other department(s) involved with the student's interdisciplinary PhD program. Students dismissed from the ME or IE PhD programs in the MIE department cannot enroll in the PhD Interdisciplinary Engineering program with MIE as the primary affiliation.

Dissertation Proposal Preparation and Presentation Timing

Students must present their dissertation proposal no more than 18 months after successfully completing the oral exam. In addition, the presentation of the dissertation proposal and the actual dissertation defense (see below) shall be no less than 6 months apart. The student's dissertation committee will invite any additional faculty deemed appropriate to that field; this dissertation committee will then conduct the dissertation proposal session. Each student's dissertation committee must be comprised of at least three members, including the research advisor. At least two of those three members must be full-time MIE faculty members. At least three committee members should hold a PhD and at least two shall be Northeastern University faculty. The chair of the dissertation committee shall be a full-time tenured or tenure-track member of the faculty of Northeastern University and will hold a PhD or an appropriate terminal degree for the discipline. Exceptions to this policy will be considered and, if appropriate, approved by the provost or their designee.

Dissertation Course Requirements

Upon successful completion of the doctoral qualifying examinations (both written preliminary and oral exams) as well as all the required coursework, the doctoral candidate, in consultation with his or her research advisor, must register in two consecutive semesters (may include full summer term) for Dissertation Term 1 (ME 9990) and Dissertation Term 2 (ME 9991). Upon completion of this sequence, the student must then register for Dissertation Continuation (ME 9996) in every semester (in each fall and spring term and also in the summer term if summer is the student's last semester) until the dissertation is completed. Students may not register for Dissertation Continuation (ME 9996) until they fulfill the two-semester sequence of Dissertation Term 1 (ME 9990) and Dissertation Term 2 (ME 9991).

To meet the full-time registration requirement for PhD students who have completed the majority of their coursework and not yet reached PhD candidacy, a zero-credit course, Candidacy Preparation—Doctoral (ME 8960), can be taken if needed to fulfill the full-time course registration requirement. Candidacy Preparation—Doctoral (ME 8960) is an individual instruction course, billed as 1 semester hour, and graded S or U. Candidacy Preparation—Doctoral (ME 8960) does not have any course content, and students must register in a section for which their research or academic advisor is listed as the "instructor."

Final Oral (Dissertation Defense) Examination

All doctoral candidates must pass a final oral exam. This exam will be scheduled once the dissertation committee agrees that the candidate's research is at a stage where it is appropriate for formal presentation and after completion of all other PhD requirements, including all the coursework approved in the final program of study. The objective of the exam is for the candidate to present and defend the results of the dissertation research and to demonstrate depth of knowledge and significant expertise in the area of that research under questioning from the dissertation committee and other attendees.

The exam shall be publicly advertised **at least one week in advance** and all faculty members may attend and participate. At the conclusion of the presentation and subsequent questions period, the dissertation committee will convene to determine the outcome. The committee may recommend that the candidate be awarded the PhD or may require additional research and/or modifications of the dissertation. In some cases, candidates may be asked to present an additional final oral dissertation defense.

Residency Requirement

After achieving PhD candidacy, the university residency requirement is satisfied by two semesters of full-time graduate registration or four semesters of part-time graduate registration. Students must be continually enrolled during the pursuit of dissertation.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Doctoral qualifying exams (both written comprehensive and oral area exams)
Annual review
Dissertation committee formation
Dissertation proposal
Dissertation defense

Core Requirements

Code	Title	Hours
Recommended Courses (semester hours can be counted toward coursework component with advisor approval)		
	MEIE 6830 Graduate Traineeship I (Technical Writing and Communications) (2 SH)	
	MEIE 6860 Graduate Traineeship II (Research Ethics and Professional Development) (2 SH)	
Approved Coursework		
	Requires 40 semester hours of coursework, including up to 4 semester hours of Independent Study (ME 7978). Students who choose to get an MS degree along the way to a PhD must complete a total of 52 semester hours (32 semester hours toward the sought MS degree and 20 semester hours beyond the earned MS degree). The 32 semester hours applied toward the master's degree may include up to 8 semester hours of MS Thesis or 4 semester hours of MS Project or approved independent study coursework. Please consult your faculty advisor for acceptable courses.	40

Dissertation

Code	Title	Hours
	Complete the following two courses. Must register in two consecutive semesters (may include full summer term):	

ME 9990	Dissertation Term 1
ME 9991	Dissertation Term 2

Program Credit/GPA Requirements

40 total semester hours required
Minimum 3.000 GPA required

Advanced Entry PhD Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Doctoral qualifying exams (both written comprehensive and oral area exams)
Annual review
Dissertation committee formation
Dissertation proposal
Dissertation defense

Core Requirements

Code	Title	Hours
Recommended Courses (semester hours can be counted toward coursework component with adviser approval)		
MEIE 6830	Graduate Traineeship I (Technical Writing and Communications) (2 SHs)	
MEIE 6860	Graduate Traineeship II (Research Ethics and Professional Development) (2 SHs)	
Approved Course Work		
Requires 20 semester hours of coursework, including up to 4 semester hours of Independent Study (ME 7978). Please consult your faculty adviser for acceptable courses.		20

Dissertation

Code	Title	Hours
Complete the following two courses. Must register in two consecutive semesters (may include full summer term):		
ME 9990	Dissertation Term 1	
ME 9991	Dissertation Term 2	

Program Credit/GPA Requirements

20 total semester hours required
Minimum 3.000 GPA required

Advanced and Intelligent Manufacturing, MS

Overview

The Department of Mechanical and Industrial Engineering (MIE) offers the Master of Science in Advanced and Intelligent Manufacturing (MS in AIM) to meet the growing demand for engineers, researchers, and scientists trained in advanced manufacturing and Industry 4.0 technologies. This degree program offers students an opportunity to either train for industry jobs with coursework and co-op experience or prepare for a doctoral program through coursework and research experience. MIE department offers both core courses and elective courses required to complete the program. Students can take MS Project or MS Thesis under any MIE faculty. This program is designed for engineering and science students planning to pursue careers in advanced and smart manufacturing. The key sectors that require manufacturing professionals include automotive, aerospace, defense, appliances, computing machines, smartphones, and communication equipment. The MS in AIM program helps students acquire knowledge and skills to:

- Build digital (CAD) models of parts and products to support manual and computer-aided manufacturing
- Design, develop, and analyze traditional and advanced manufacturing processes
- Utilize additive manufacturing to produce complex parts with ease and efficiency
- Select manufacturing processes to fabricate parts and products for quality and cost
- Configure and analyze manufacturing systems for efficiency, responsiveness, and high throughput
- Understand the characteristics and challenges of nanomanufacturing processes
- Leverage Industry 4.0 technologies including internet of things, cloud computing, sensor analytics for advanced manufacturing
- Adopt condition-based maintenance strategies to achieve high resource utilization
- Apply automation, robotics, and artificial intelligence to make manufacturing smart and self-operational
- Use human-machine interaction tools such as augmented reality and virtual realty
- Analyze human performance in sociotechnical systems such as supply chains
- Apply data analytics methods to gain insights from design and manufacturing data

In the context of this program, the traditional manufacturing covers metal removal, forming, casting, and particulate processes. The additive manufacturing covers topics such as 3D-printed parts using different approaches. The nanomanufacturing covers fabrication as well as printing of micro and nano devices and design and creation of multifunctional materials. Intelligent manufacturing focuses on factory automation, prognostics and health management, dynamic scheduling, cloud-enabled manufacturing, and industrial internet of things for manufacturing performance assurance. It also leverages real-time data analytics and control systems, advanced high-fidelity models, networked data, and computation for seamless interoperation of cyber and physical assets in manufacturing facilities.

General Degree Requirements

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, statistics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved coursework (exclusive of any preparatory courses) with a minimum grade-point average (GPA) of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: coursework option, project option, and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

Specific Degree Requirements

Core courses for the Master of Science in Advanced and Intelligent Manufacturing provide students with a foundation in traditional and advanced materials processing, additive manufacturing, intelligent manufacturing, and digital manufacturing. Students can select electives from a wide range of fields including mechanical engineering, industrial engineering, operations research, and engineering management. Alternatively, students can also take courses outside the MIE department

by seeking a prior approval from their faculty advisor or MS thesis advisor. The course curriculum is designed to prepare students for industry jobs as well as for pursuing a doctoral program in manufacturing, mechanical engineering, and industrial engineering.

Academic and Research Advisors

All nonthesis students are advised by the faculty advisor designated for their respective concentration or program. Students willing to pursue the thesis option must first find a research advisor within their first year of study. The research advisor will guide the students' thesis work, and thesis reader(s) may be assigned at the discretion of their research advisor. The research advisor must be a full-time or jointly appointed faculty in the MIE department. If the research advisor is outside the MIE department, before the thesis option can be approved, a faculty member with 51 percent or more appointments in the MIE department must be chosen as co-advisor, and a petition must be filed and approved by the co-advisor and the MIE Graduate Affairs Committee. Thesis option students are advised by the faculty advisor of their concentration before they select their research advisor(s). The research advisor and co-advisor must serve as thesis readers.

Plan of Study and Course Selection

It is recommended that all new students attend orientation sessions held by the MIE department and the Graduate School of Engineering to acquaint themselves with the coursework requirements and research activities of the department as well as with the general policies, procedures, and expectations.

In order to receive proper guidance with their coursework needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study (PS) to the department before enrolling in second-semester courses. This form not only helps the students manage their coursework but it also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Students pursuing study or research under the guidance of a faculty member can choose project option by taking Master's Project (IE 7945) or Master's Project (ME 7945). An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

Students pursuing coursework option may petition the MIE Graduate Affairs Committee to substitute Independent Study (IE 7978) or Independent Study (ME 7978) up to 4 semester hours. An independent study must be approved by the instructor and the academic advisor. The petition must clearly state the instructor; the reason for taking the course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme. Students in other options (i.e., thesis or project) are not eligible to take independent study. When taking thesis or project options, the independent study course cannot be taken.

Options for MS Students (coursework only, project, or thesis)

Students accepted into any of the MS programs in the MIE department can choose one of the three options: coursework only, project, or thesis. Please see the Program Requirements tab on the top menu of this page for more information. MS students who want to pursue project or thesis options must find, within the first year of their study, a faculty member or a research advisor who will be willing to direct and supervise a mutually agreed research project or MS thesis. Moreover, students who receive financial support from the university in the form of a research, teaching, or tuition assistantship must complete 8 semester hours of thesis. Students are strongly encouraged to complete their 8 semester hours of Thesis (IE 7990) or Thesis (ME 7990) over two consecutive semesters.

Students who complete the thesis option must make a presentation of their thesis before approval by the department. The MS thesis presentation shall be publicly advertised at least one week in advance and all faculty members and students may attend and participate. If deemed appropriate by the research advisor, other faculty members may be invited to serve as thesis readers to provide technical opinions and judge the quality of the thesis and presentation.

Change of Program/Concentration

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE Graduate Affairs Committee, the student must not be in the first semester of their current program, must have a 3.300 GPA, and have completed at least 8 semester hours of required coursework in their sought program at Northeastern.

Graduate Certificate Options

Students enrolled in a graduate degree program in the College of Engineering are eligible to pursue an engineering graduate certificate in addition to or in combination with the MS degree. For more information please refer to Graduate Certificate Programs (p. 251).

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
IE 6300	Manufacturing Methods and Processes	4
IE 7270	Intelligent Manufacturing	4
ME 5240	Computer Aided Design and Manufacturing	4
ME 5640	Additive Manufacturing	4

Restricted Elective Courses

Code	Title	Hours
Complete 4 semester hours from the following:		4
IE 6500	Human Performance	
ME 7374	Special Topics in Mechanical Engineering (Nano and Microscale Manufacturing)	

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete 12 semester hours from the Elective Course List below.		12

PROJECT OPTION

Code	Title	Hours
IE 7945	Master's Project	4
Complete 8 semester hours from the Elective Course List below.		8

THESIS OPTION

Code	Title	Hours
IE 7990	Thesis	8
Complete 4 semester hours from the Elective Course List below.		4

Elective Course List

Code	Title	Hours
Industrial Engineering		
IE 5617	Lean Concepts and Applications	
IE 6200	Engineering Probability and Statistics	
IE 7200	Supply Chain Engineering	
IE 7215	Simulation Analysis	
IE 7270	Intelligent Manufacturing	
IE 7275	Data Mining in Engineering	
IE 7280	Statistical Methods in Engineering	
IE 7285	Statistical Quality Control	
IE 7290	Reliability Analysis and Risk Assessment	
IE 7315	Human Factors Engineering	
IE 7374	Special Topics in Industrial Engineering	
IE 7615	Neural Networks and Deep Learning	
IE 7945	Master's Project	
IE 7978	Independent Study	
IE 7990	Thesis	
IE 7996	Thesis Continuation	
Operations Research		
OR 7230	Probabilistic Operation Research	
OR 7235	Inventory Theory	
OR 7240	Integer and Nonlinear Optimization	
OR 7245	Network Analysis and Advanced Optimization	
OR 7310	Logistics, Warehousing, and Scheduling	
Materials Engineering		
MATL 6270	Principles, Devices, and Materials for Energy Storage and Energy Harvesting	
MATL 6285	Structure, Properties, and Processing of Polymeric Materials	
MATL 7365	Properties and Processing of Electronic Materials	
Mechanical Engineering		
ME 5245	Mechatronic Systems	
ME 5250	Robot Mechanics and Control	
ME 5645	Environmental Issues in Manufacturing and Product Use	
ME 5650	Advanced Mechanics of Materials	
ME 5659	Control Systems Engineering	
ME 7247	Advanced Control Engineering	
Engineering Management		
EMGT 5220	Engineering Project Management	
EMGT 6225	Economic Decision Making	
EMGT 6305	Financial Management for Engineers	

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

[1] A thesis is required for all students who receive financial support from the university in the form of a research, teaching, or tuition assistantship. The thesis topic should cover one or more of the areas from statistics, mathematics, optimization, data mining, machine learning, database design, big data, visualization tools, or forecasting methods. The thesis should train students for research in data and operations analytics and/or prepare them for a doctoral program.

Data Analytics Engineering, MS

For program contact information, please visit this website (https://mie.northeastern.edu/academics/graduate-studies/ms-daae/#_ga=2817169511782761919158431629 3-404706139157895 4920).

Overview

The Department of Mechanical and Industrial Engineering (MIE) offers the Master of Science in Data Analytics Engineering to meet the current and projected workforce demands. This degree program offers students an opportunity to train for industry jobs or to acquire rigorous analytical skills and research experience to prepare for a doctoral program in health, security, and sustainability at Northeastern University. While the core courses for this program are offered by the College of Engineering, students can choose elective courses from diverse disciplines spread across various colleges at Northeastern. The MS degree in data analytics engineering is designed to train students with engineering, science, mathematics, and statistics backgrounds as advanced data analytics professionals and researchers who can transform large streams of data into understandable and actionable information for the purpose of making decisions. The key sectors that require analytics professionals include healthcare, smart manufacturing, supply chain and logistics, national security, defense, banking, finance, marketing, human resources, and sports.

The Master of Science in Data Analytics Engineering program helps students acquire knowledge and skills to:

- Discover opportunities to improve products, processes, systems, and enterprises through data analytics
- Apply optimization, statistical, and machine-learning methods to solve complex problems involving large data from multiple sources
- Process and explore data from a variety of sources, including Internet of Things (IoT), an integrated network of devices and sensors, customer touch points, processes, social media, and people
- Work with technology teams to design and build large and complex SQL and NoSQL databases
- Use tools and methods for data mining, big data processing, and data visualization to generate reports for analysis and decision making
- Create integrated views of data collected from multiple sources of an enterprise
- Understand and explain results of data analytics to decision makers
- Design and develop data analytics projects

This degree program seeks to prepare students for a comprehensive list of tasks including collecting, storing, processing, and analyzing data; reporting descriptive statistics and patterns; performing diagnostic,

predictive, and prescriptive analytics; drawing conclusions and insights; making actionable recommendations; and designing and managing data analytics projects.

General Degree Requirements

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, statistics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved coursework (exclusive of any preparatory courses) with a minimum grade-point average (GPA) of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: coursework option, project option, and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

Specific Degree Requirements

Core courses for the Master of Science in Data Analytics Engineering provide students with a foundation in algorithms and optimization, statistics, data and knowledge engineering, data mining, and visualization. These courses are designed to provide students with a strong understanding of probability and statistics, statistical learning, optimization methods, data mining, database design, and visualization. Students can select electives from a wide range of fields including business, finance, engineering, healthcare, manufacturing, and urban communities/cities. Elective courses provide students with the knowledge and understanding of descriptive, prescriptive, diagnostic, and predictive analytics as applied to a specific field of interest such as business, healthcare, manufacturing, and urban communities/cities. Alternatively, students can select their electives so that they can prepare for a doctoral program by taking advanced courses in mathematics, statistics, machine learning, natural language processing, and pattern recognition.

Academic and Research Advisors

All nonthesis students are advised by the faculty advisor designated for their respective concentration or program. Students willing to pursue the thesis option must first find a research advisor within their first year of study. The research advisor will guide the students' thesis work, and thesis reader(s) may be assigned at the discretion of their research advisor. The research advisor must be a full-time or jointly appointed faculty in the MIE department. However, if the research advisor is outside the MIE department, before the thesis option can be approved, a faculty member with 51 percent or more appointments in the MIE department must be chosen as co-advisor, and a petition must be filed and approved by the co-advisor and the MIE Graduate Affairs Committee. Thesis option students are advised by the faculty advisor of their concentration before they select their research advisor(s). The research advisor and co-advisor must serve as thesis readers.

Plan of Study and Course Selection

It is recommended that all new students attend orientation sessions held by the MIE department and the Graduate School of Engineering to acquaint themselves with the coursework requirements and research activities of the department as well as with the general policies, procedures, and expectations.

In order to receive proper guidance with their coursework needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study (PS) to the department before enrolling in second-semester courses. This form not only helps the students manage their coursework but it also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Students pursuing study or research under the guidance of a faculty member can choose project option by taking Master's Project (Master's Project (IE 7945)) . An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

Students pursuing coursework option may petition the MIE Graduate Affairs Committee to substitute up to a 4-semester-hour independent study (Independent Study (IE 7978)) . An independent study must be approved by the instructor and the academic advisor. The petition must clearly state the instructor; the reason for taking the course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme. Students in other options (i.e., thesis or project) are not eligible to take independent study. When taking thesis or project options, the independent study course cannot be taken.

Options for MS Students (Coursework Only, Project, or Thesis)

Students accepted into any of the MS programs in the MIE department can choose one of the three options: coursework only, project, or thesis. Please see the Program Requirements tab on the top menu of this page for more information. MS students who want to pursue project or thesis options must find, within the first year of their study, a faculty member or a research advisor who will be willing to direct and supervise a mutually agreed research project or MS thesis. Moreover, students who receive financial support from the university in the form of a research, teaching, or tuition assistantship must complete 8 semester hours of thesis. Students are strongly encouraged to complete their 8 semester hours of Thesis (ME 7990 or IE 7990) over two consecutive semesters.

Students who complete the thesis option must make a presentation of their thesis before approval by the department. The MS thesis presentation shall be publicly advertised at least one week in advance and all faculty members and students may attend and participate. If deemed appropriate by the research advisor, other faculty members may be invited to serve as thesis readers to provide technical opinions and judge the quality of the thesis and presentation.

Change of Program/Concentration

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE Graduate Affairs Committee, the student must not be in the first semester of their current program, must have a 3.300 GPA, and have completed at least 8 semester hours of required coursework in their sought program at Northeastern.

Graduate Certificate Options

Students enrolled in a graduate degree program in the College of Engineering are eligible to pursue an engineering graduate certificate in addition to or in combination with the MS degree. For more information please refer to Graduate Certificate Programs (p. 251). Please note that students pursuing the Master of Science in Data Analytics Engineering are not eligible for the Graduate Certificate in Data Analytics Engineering.

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Data Analytics Engineering with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Data Analytics Engineering in addition to earning a Graduate Certificate in Engineering Leadership. Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 semester hours of advisor-approved data analytics technical courses.

Engineering Leadership (p. 245)

ENGINEERING BUSINESS

Master's Degree in Data Analytics Engineering with Graduate Certificate in Engineering Business

Students may complete a Master of Science in Data Analytics Engineering in addition to earning a Graduate Certificate in Engineering Business. Students must apply and be admitted to the Galante Engineering Business Program in order to pursue this option. The program requires the applicant to have earned or be in a program to earn a Bachelor of Science in Engineering from Northeastern University. The integrated 32-semester-hour degree and certificate will require 16 semester hours of the data analytics engineering core courses and 16 semester hours from the outlined business-skill curriculum. The coursework, along with participation in cocurricular professional development elements, earn the Graduate Certificate in Engineering Business.

Engineering Business (p. 236)

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
IE 6200	Engineering Probability and Statistics	4
IE 6600	Computation and Visualization for Analytics	4
IE 6700	Data Management for Analytics	4
or DAMG 6210	Data Management and Database Design	
IE 7275	Data Mining in Engineering	4
IE 7280	Statistical Methods in Engineering	4
OR 6205	Deterministic Operations Research	4

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete 8 semester hours from the elective course list below.		8

PROJECT OPTION

Code	Title	Hours
IE 7945	Master's Project	4
Complete 4 semester hours from the elective course list below.		4

THESIS OPTION [1]

Code	Title	Hours
Complete 8 semester hours of thesis:		
IE 7990	Thesis	8

Elective Course List

Any course in the following list will serve as an elective course, provided the course is offered and the student satisfied prerequisites and program requirements. Students can take electives outside this list with a prior approval from the faculty advisor.

Code	Title	Hours
Civil Engineering and Environmental Engineering		
CIVE 7100	Time Series and Geospatial Data Sciences	
Computer Science		
CS 5002	Discrete Structures	
CS 5004	Object-Oriented Design	
CS 5006	Algorithms	
CS 5100	Foundations of Artificial Intelligence	
CS 5150	Game Artificial Intelligence	
CS 5200	Database Management Systems	
CS 5310	Computer Graphics	
CS 5330	Pattern Recognition and Computer Vision	
CS 5335	Robotic Science and Systems	
CS 5800	Algorithms	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	
CS 6200	Information Retrieval	
Criminal Justice		
CRIM 7718	Advanced Data Analysis	
Data Science		
DS 5010	Introduction to Programming for Data Science	
DS 5110	Introduction to Data Management and Processing	
DS 5220	Supervised Machine Learning and Learning Theory	
DS 5230	Unsupervised Machine Learning and Data Mining	
Electrical and Computer Engineering		
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7397	Advanced Machine Learning	
Engineering Management		
EMGT 5220	Engineering Project Management	
EMGT 6225	Economic Decision Making	
EMGT 6305	Financial Management for Engineers	
Health Informatics		

HINF 5101	Introduction to Health Informatics and Health Information Systems
HINF 5102	Data Management in Healthcare
HINF 5200	Theoretical Foundations in Personal Health Informatics
HINF 5301	Evaluating Health Technologies
HINF 6202	Business of Healthcare Informatics
HINF 6240	Improving the Patient Experience through Informatics
HINF 6335	Management Issues in Healthcare Information Technology
HINF 6400	Introduction to Health Data Analytics
Industrial Engineering	
IE 5400	Healthcare Systems Modeling and Analysis
IE 6300	Manufacturing Methods and Processes
IE 6500	Human Performance
IE 7200	Supply Chain Engineering
IE 7215	Simulation Analysis
IE 7270	Intelligent Manufacturing
IE 7285	Statistical Quality Control
IE 7290	Reliability Analysis and Risk Assessment
IE 7615	Neural Networks and Deep Learning
Information Systems	
INFO 7390	Advances in Data Sciences and Architecture
Mathematics	
MATH 5131	Introduction to Mathematical Methods and Modeling
MATH 7234	Optimization and Complexity
MATH 7243	Machine Learning and Statistical Learning Theory
MATH 7340	Statistics for Bioinformatics
MATH 7342	Mathematical Statistics
MATH 7343	Applied Statistics
MATH 7344	Regression, ANOVA, and Design
MATH 7346	Time Series
Mechanical Engineering	
ME 6201	Mathematical Methods for Mechanical Engineers 2
Network Science	
NETS 6116	Complex Networks and Applications 2
NETS 7341	Network Economics
NETS 7350	Bayesian and Network Statistics
Operations Research	
OR 6500	Metaheuristics and Applications
OR 7230	Probabilistic Operation Research
OR 7235	Inventory Theory
OR 7240	Integer and Nonlinear Optimization
OR 7245	Network Analysis and Advanced Optimization
OR 7270	Convex Optimization and Applications
OR 7310	Logistics, Warehousing, and Scheduling
Physics	
PHYS 5116	Complex Networks and Applications
PHYS 7331	Network Science Data
PHYS 7332	Network Science Data 2
Public Policy and Urban Affairs	
PPUA 5261	Dynamic Modeling for Environmental Decision Making
PPUA 5262	Big Data for Cities
PPUA 5263	Geographic Information Systems for Urban and Regional Policy
PPUA 7237	Advanced Spatial Analysis of Urban Systems

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

[1] A thesis is required for all students who receive financial support from the university in the form of a research, teaching, or tuition assistantship. The thesis topic should cover one or more of the areas from statistics, mathematics, optimization, data mining, machine learning, database design, big data, visualization tools, or forecasting methods. The thesis should train students for research in data and operations analytics and/or prepare them for a doctoral program.

Human Factors, MS

Website (https://mie.northeastern.edu/academics/graduate-studies/ms-hf/)

Overview

This program addresses the growing need for engineering professionals trained in advanced human factors who can utilize human factors theories, procedures, and empirically derived knowledge into understandable and actionable information for use in the design and evaluation of a wide variety of products and systems. The key sectors demanding human factors professionals include transportation, healthcare, robotics, manufacturing, computer, consumer products, social, and organizational and military issues. The core courses of the proposed Master of Science in Human Factors program are built on the foundations of human factors and ergonomics, probabilities and statistics, etc. Topics from these foundation areas are integrated to create human factors for engineering applications. Students can select their elective or breadth courses from a wide range of fields. The program seeks to prepare students for a comprehensive set of human-factors-related professional positions.

General Degree Requirements

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved coursework (exclusive of any preparatory courses) with a minimum grade-point average (GPA) of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: coursework option, project option, and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

Academic and Research Advisors

All nonthesis students are advised by the faculty advisor designated for their respective concentration or program. Students willing to pursue the thesis option must first find a research advisor within their first year of study. The research advisor will guide the students' thesis work, and thesis reader(s) may be assigned at the discretion of their research advisor. The research advisor must be a full-time or jointly appointed faculty. If the research advisor is outside the MIE department, before the thesis option can be approved, a faculty member with 51 percent or more appointments in the MIE department must be chosen as co-advisor, and a petition must be filed and approved by the co-advisor and the MIE Graduate Affairs Committee. Thesis option students are advised by the faculty advisor of their concentration before they select their research advisor(s). The research advisor and co-advisor must serve as thesis readers.

Plan of Study and Course Selection

It is recommended that all new students attend orientation sessions held by the MIE department and the Graduate School of Engineering to acquaint themselves with the coursework requirements and research activities of the department as well as with the general policies, procedures, and expectations.

In order to receive proper guidance with their coursework needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study (PS) to the department before enrolling in second-semester courses. This form not only helps the students manage their coursework but it also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Students may also petition to waive a core course by demonstrating evidence of their having passed a similar approved IE or OR graduate course. In such situations, the students must first obtain approval from their academic advisor for the course(s) they are planning to substitute.

Students pursuing study or research under the guidance of a faculty member can choose project option by taking Master's Project (IE 7945) . An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

Students pursuing coursework option may petition the MIE Graduate Affairs Committee to substitute up to a 4-semester-hour Independent Study (IE 7978) . An independent study must be approved by the academic advisor. The petition must clearly state the instructor; the reason for taking the course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme. Students in other options (i.e., thesis or project) are not eligible to take independent study. When taking thesis or project options, the independent study course cannot be taken.

Options for MS Students (coursework only, project, or thesis)

Students accepted into any of the MS programs in the MIE department can choose one of the three options: coursework only, project, or thesis. Please see the Program Requirements tab on the top menu of this page for more information. MS students who want to pursue project or thesis options must find, within the first year of their study, a faculty member or a research advisor who will be willing to direct and supervise a mutually agreed research project or MS thesis. Moreover, students who receive financial support from the university in the form of a research, teaching, or tuition assistantship must complete 8 semester hours of thesis. Students are strongly encouraged to complete their 8 semester hours of Thesis (IE 7990) over two consecutive semesters.

Students who complete the thesis option must make a presentation of their thesis before approval by the department. The MS thesis presentation shall be publicly advertised at least one week in advance and all faculty members and students may attend and participate. If deemed appropriate by the research advisor, other faculty members may be invited to serve as thesis readers to provide technical opinions and judge the quality of the thesis and presentation.

Change of Program/Concentration

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE Graduate Affairs Committee, the student must not be in the first semester of their current program, must have a 3.300 GPA, and have completed at least 8 semester hours of required coursework in their sought program at Northeastern.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
IE 6500	Human Performance	4
IE 7280	Statistical Methods in Engineering	4
IE 7315	Human Factors Engineering	4
EMGT 5300	Engineering/Organizational Psychology	4

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete 16 semester hours from the course list below. (p. 216)		16

PROJECT OPTION

Code	Title	Hours
IE 7945	Master's Project	4
Complete 12 semester hours from the course list below. (p. 216)		12

THESIS OPTION

Code	Title	Hours
IE 7990	Thesis	8
Complete 8 semester hours from the course list below. (p. 216)		8

Course List

Code	Title	Hours
College of Engineering		
IE 5137	Computational Modeling in Industrial Engineering	
IE 5390	Structured Data Analytics for Industrial Engineering	

IE 5640	Data Mining for Engineering Applications	
IE 6600	Computation and Visualization for Analytics	
CIVE 7388	Special Topics in Civil Engineering (Urban Informatics and Processing)	
College of Social Sciences and Humanities		
ECON 7200	Topics in Applied Economics	
ECON 7251	International Finance	
ECON 7271	Industrial Organization	
College of Science		
PSYC 5180	Quantitative Methods 1	
PSYC 5181	Quantitative Methods 2	3
PSYC 7300	Advanced Quantitative Analysis	
PSYC 7301	Research Methodologies Psychology	
Bouvé College of Health Sciences		
PT 5600	Ergonomics and the Work Environment	
EXSC 5210	Physical Activity and Exercise: Prescription, Measurement, and Testing	
EXSC 5220	Advanced Exercise Physiology	
Khoury College of Computer Sciences		
CS 5340	Computer/Human Interaction	
CS 6350	Empirical Research Methods	
College of Arts, Media and Design		
ARTG 5150	Information Visualization Principles and Practices	
ARTG 5310	Visual Cognition	
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 5600	Experience Design Studio 1: Principles	
ARTG 5610	Design Systems	
ARTG 5640	Prototyping for Experience Design	
Design Research Methods		
ARTG 6310	Design for Behavior and Experience	
ARTG 6320	Design of Information-Rich Environments	
GSND 6240	Exploratory Concept Design	
GSND 6250	Spatial and Temporal Design	
GSND 6330	Player Experience	
GSND 6340	Biometrics for Design	

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

Industrial Engineering, MSIE

For program contact information, please visit this website (https://mie.northeastern.edu/academics/graduate-studies/ms-inde/#_ga=2.109915845178276191915843162 93-404706139157895 4920).

Overview

The Department of Mechanical and Industrial Engineering (MIE) offers comprehensive research and educational programs for students pursuing the Master of Science (MS) in Industrial Engineering. Industrial engineering (IE) applies mathematical modeling and analytical tools to make better decisions for designing and managing efficient and effective systems. IE is applied in many areas, including healthcare systems, supply chains, logistics and transportation engineering, manufacturing, sustainability, resilient systems, energy systems, and human-in-the loop systems. We partner with organizations ranging from startups to well-established corporations, to government and nongovernment organizations. For example, our supply chain resilience research is trying to understand and mitigate persistent drug shortages in the United States. Our research in healthcare systems engineering uses methods from lean six-sigma tools to advanced mathematical models to improve system and product reliability and optimize healthcare process quality, delays, cost, efficiency, and effectiveness—national priorities. Recent healthcare applications include improvements in scheduling, readmissions, cost reductions, cancer care, and health services planning. We use stochastic and simulation modeling to study environmental issues related to green manufacturing, product recovery, and end-of-life management. We use data analytics for designing prognostics and preventive strategies for manufacturing operations. Our research and teaching together are designed to develop IE practitioners who can work, innovate, and excel in a variety of businesses. These extensive programs and course work allow for the selection of a degree that meets a wide variety of personal and professional goals.

General Degree Requirements

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved course work (exclusive of any preparatory courses) with a minimum grade-point average (GPA) of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: course work option, project option, and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

Academic and Research Advisors

All nonthesis students are advised by the faculty advisor designated for their respective concentration or program. Students willing to pursue the thesis option must first find a research advisor within their first year of study. The research advisor will guide the students' thesis work, and thesis reader(s) may be assigned at the discretion of their research advisor. The research advisor must be a full-time or jointly appointed faculty. If the research advisor is outside the MIE department, before the thesis option can be approved, a faculty member with 51 percent or more appointments in the MIE department must be chosen as co-advisor, and a petition must be filed and approved by the co-advisor and the MIE Graduate Affairs Committee. Thesis option students are advised by the faculty advisor of their concentration before they select their research advisor(s). The research advisor and co-advisor must serve as thesis readers.

Plan of Study and Course Selection

It is recommended that all new students attend orientation sessions held by the MIE department and the Graduate School of Engineering to acquaint themselves with the course work requirements and research activities of the department as well as with the general policies, procedures, and expectations.

In order to receive proper guidance with their course work needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study (PS) to the department before enrolling in second-semester courses. This form not only helps the students manage their course work but it also helps the department to plan for requested course offerings.

The PS form may be modified at any time as the students progress in their degree programs.

Students may also petition to waive a core course by demonstrating evidence of their having passed a similar approved IE or OR graduate course. In such situations, the students must first obtain approval from their academic advisor for the course(s) they are planning to substitute.

Students pursuing study or research under the guidance of a faculty member can choose project option by taking Master's Project (IE 7945). An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

Students pursuing course work option may petition the MIE Graduate Affairs Committee to substitute up to a 4-semester-hour Independent Study (IE 7978). An independent study must be approved by the academic advisor. The petition must clearly state the instructor; the reason for taking the course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme. Students in other options (i.e., thesis or project) are not eligible to take independent study. When taking thesis or project options, the independent study course cannot be taken.

Options for MS Students (course work only, project, or thesis)

Students accepted into any of the MS programs in the MIE department can choose one of the three options: course work only, project, or thesis. Please see the Program Requirements tab on the top menu of this page for more information. MS students who want to pursue project or thesis options must find, within the first year of their study, a faculty member or a research advisor who will be willing to direct and supervise a mutually agreed research project or MS thesis. Moreover, students who receive financial support from the university in the form of a research, teaching, or tuition assistantship must complete 8 semester hours of thesis. Students are strongly encouraged to complete their 8 semester hours of Thesis (IE 7990) over two consecutive semesters.

Students who complete the thesis option must make a presentation of their thesis before approval by the department. The MS thesis presentation shall be publicly advertised at least one week in advance and all faculty members and students may attend and participate. If deemed appropriate by the research advisor, other faculty members may be invited to serve as thesis readers to provide technical opinions and judge the quality of the thesis and presentation.

Change of Program/Concentration

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE Graduate Affairs Committee, the student must not be in the first semester of their current program, must have a 3.3 GPA, and have completed at least 8 semester hours of required course work in their sought program at Northeastern.

Graduate Certificate Options

Students enrolled in a graduate degree program in the College of Engineering have the opportunity to pursue an engineering graduate certificate in addition to or in combination with the MS degree. For more information please refer to Graduate Certificate Programs (p. 251).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Industrial Engineering with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Industrial Engineering in addition to earning a Graduate Certificate in Engineering Leadership (p. 245). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 hours of advisor-approved industrial engineering technical courses.

ENGINEERING BUSINESS

Master's Degree in Industrial Engineering with Graduate Certificate in Engineering Business

Students may complete a Master of Science in Industrial Engineering in addition to earning a Graduate Certificate in Engineering Business. Students must apply and be admitted to the Galante Engineering Business Program in order to pursue this option. The program requires the applicant to have earned or be in a program to earn a Bachelor of Science in Engineering from Northeastern University. The integrated 32-semester-hour degree and certificate will require 16 semester hours of the industrial engineering core courses and 16 semester hours from the outlined business-skill curriculum. The course work, along with participation in cocurricular professional development elements, earn the Graduate Certificate in Engineering Business.

Engineering Business (p. 236)

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
IE 6200	Engineering Probability and Statistics	4
OR 6205	Deterministic Operations Research	4
Complete 8 semester hours from the following:		8
IE 5400	Healthcare Systems Modeling and Analysis	
IE 7200	Supply Chain Engineering	
IE 7215	Simulation Analysis	
IE 7315	Human Factors Engineering	
IE 7275	Data Mining in Engineering	

Options

Complete one of the following options:

COURSE WORK OPTION

Code	Title	Hours
Complete 16 semester hours from the course list below.		16

PROJECT OPTION

Code	Title	Hours
IE 7945	Master's Project	4
Complete 12 semester hours from the course list below.		12

THESIS OPTION

Code	Title	Hours
IE 7990	Thesis (required for all students who receive financial support from the university in the form of a research, teaching, or tuition assistantship)	8
Complete 8 semester hours from the course list below.		8

Course List

Code	Title	Hours
Computer Systems Engineering		
CSYE 7280	User Experience Design and Testing	
Data Analytics		
DA 5020	Collecting, Storing, and Retrieving Data	
Engineering Management		
EMGT 5220	Engineering Project Management	
EMGT 5300	Engineering/Organizational Psychology	
EMGT 6225	Economic Decision Making	
EMGT 6305	Financial Management for Engineers	
General Engineering		
GE 5010	Customer-Driven Technical Innovation for Engineers	
GE 5100	Product Development for Engineers	
Industrial Engineering		
IE 5374	Special Topics in Industrial Engineering	
IE 5617	Lean Concepts and Applications	
IE 6300	Manufacturing Methods and Processes	
IE 6600	Computation and Visualization for Analytics	
IE 7275	Data Mining in Engineering	
IE 7280	Statistical Methods in Engineering	
IE 7285	Statistical Quality Control	
IE 7290	Reliability Analysis and Risk Assessment	
IE 7315	Human Factors Engineering	
Operations Research		
OR 6500	Metaheuristics and Applications	
OR 7230	Probabilistic Operation Research	
OR 7235	Inventory Theory	
OR 7240	Integer and Nonlinear Optimization	
OR 7245	Network Analysis and Advanced Optimization	
OR 7270	Convex Optimization and Applications	
OR 7310	Logistics, Warehousing, and Scheduling	
Supply Chain Management		
SCHM 6213	Global Supply Chain Strategy	
SCHM 6214	Sourcing and Procurement	
SCHM 6215	Supply Chain Analytics	
SCHM 6221	Sustainability and Supply Chain Management	
SCHM 6223	Managing Healthcare Supply Chain Operations	

Or any IE or OR courses

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

Engineering Management, MSEM

Overview

The Master of Science in Engineering Management (https://mie.northeastern.edu/academics/graduate-studies/ms-engm/#_ga=2864457841782761919158431629 3-4047061391578954920) offers graduate students an opportunity to develop both technical expertise and business competence that is in high demand among prospective technology-based employers. Industry leaders are seeking qualified and talented individuals who are not only able to guide research and design teams but also able to direct and supervise development and production processes. The combination of technical proficiency and business skills fostered in the engineering management program is designed to provide a competitive edge for graduates seeking a wide range of positions in technology-based product or service industries, as well as in comparable local, state, and federal agencies and programs.

The program was designed by experienced high-level managers and academic leaders as an option for engineers and scientists to broaden their skill sets to include management tools and techniques that are applicable to technology-based industries. Graduates of the engineering management program work as project managers or leaders of teams in technology-based industries. Upon completion of the program, students find that their acquired skills are applicable to a wide range of industries, primarily those focused upon the development of technical products and the management of technical projects.

Graduates may assist companies in bringing a product from an idea through its development phases to its introduction to the marketplace. They may also be involved in forming and managing teams for assessing cost-effectiveness, formulating strategies to improve production, or analyzing a company's supply chain. Most of these projects cannot be successfully completed without the skills of those possessing a background in management decision making and engineering expertise; therefore, the engineering management graduate is often a technical liaison to all levels of management. As a result, many of the assignments held by engineering management graduates have actually proven to be a gateway to upper-level management positions.

The current program of study can be taken on a part-time or full-time basis on-ground or online. There are four core courses required of all students, which have been formulated to satisfy the foundation requirements of economic decision making, decision-making mathematics, and project management. In addition to these required courses, the curriculum consists of electives that allow students to choose either a broad-based program of study or one centered on a particular concentration. Some students may elect to refresh or enhance their technical skills in engineering-based subjects such as information systems, computer systems engineering, or graduate courses from the traditional engineering disciplines. Other students may prefer to broaden their knowledge base by selecting course work in management subjects such as engineering organizational psychology, financial management, logistics and warehousing, supply chain engineering, or lean systems design. Additionally, students may also elect to complete the Gordon Engineering Leadership Program as part of their engineering management degree.

One recent graduate has observed that "Northeastern's MSEM is like an MBA for engineers, with high-quality, dedicated professors who are proficient in their field yet are able to convey information in a way that's easy to understand." This graduate also noted, "My courses in project management have been key to understanding the subtleties that affect

Project Managers while technical courses provide a strong background in fundamentals as well as specialty topics. My experience with co-op has been outstanding and has truly helped me further my career."

General Degree Requirements

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved course work (exclusive of any preparatory courses) with a minimum grade-point average (GPA) of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: course work option, project option, and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

Academic and Research Advisors

All nonthesis students are advised by the faculty advisor designated for their respective concentration or program. Students willing to pursue the thesis option must first find a research advisor within their first year of study. The research advisor will guide the students' thesis work, and thesis reader(s) may be assigned at the discretion of their research advisor. The research advisor must be a full-time or jointly appointed faculty. If the research advisor is outside the MIE department, before the thesis option can be approved, a faculty member with 51 percent or more appointments in the MIE department must be chosen as co-advisor, and a petition must be filed and approved by the co-advisor and the MIE Graduate Affairs Committee. Thesis option students are advised by the faculty advisor of their concentration before they select their research advisor(s). The research advisor and co-advisor must serve as thesis readers.

Plan of Study and Course Selection

It is recommended that all new students attend orientation sessions held by the MIE department and the Graduate School of Engineering to acquaint themselves with the course work requirements and research activities of the department as well as with the general policies, procedures, and expectations.

In order to receive proper guidance with their course work needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study (PS) to the department before enrolling in second-semester courses. This form not only helps the students manage their course work but it also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Students pursuing study or research under the guidance of a faculty member can choose project option by taking Master's Project (EMGT 7945) . An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

Students pursuing course work option may petition the MIE Graduate Affairs Committee to substitute up to a 4-semester-hour Independent Study (EMGT 7978) . An independent study must be approved by the academic advisor. The petition must clearly state the instructor; the reason for taking the course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme. Students in other options (i.e., thesis or project) are not eligible to take independent study. When taking thesis or project options, the independent study course cannot be taken.

Options for MS Students (course work only, project, or thesis)

Students accepted into any of the MS programs in the MIE department can choose one of the three options: coursework only, project, or thesis. Please see the Program Requirements tab on the top menu of this page for more information. MS students who want to pursue project or thesis options must find, within the first year of their study, a faculty member or a research advisor who will be willing to direct and supervise a mutually agreed research project or MS thesis. Moreover, students who receive financial support from the university in the form of a research, teaching, or tuition assistantship must complete 8-semester-hours of thesis. Students are strongly encouraged to complete their 8-semester-hours of Thesis (EMGT 7990) over two consecutive semesters.

Students who complete the thesis option must make a presentation of their thesis before approval by the department. The MS thesis presentation shall be publicly advertised at least one week in advance and all faculty members and students may attend and participate. If deemed appropriate by the research advisor, other faculty members may be invited to serve as thesis readers to provide technical opinions and judge the quality of the thesis and presentation.

Change of Program/Concentration

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE Graduate Affairs Committee, the student must not be in the first semester of their current program, must have a 3.3 GPA, and have completed at least 8 semester hours of required course work in their sought program at Northeastern.

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 251).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Engineering Management with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Engineering Management in addition to earning a Graduate Certificate in Engineering Leadership (p. 245). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 hours of advisor-approved engineering management technical courses.

ENGINEERING BUSINESS

Master's Degree in Engineering Management with Graduate Certificate in Engineering Business

Students may complete a Master of Science in Engineering Management in addition to earning a Graduate Certificate in Engineering Business. Students must apply and be admitted to the Galante Engineering Business Program in order to pursue this option. The program requires the applicant to have earned or be in a program to earn a Bachelor of Science in Engineering from Northeastern University. The integrated 32-semester-hour degree and certificate will require 16 semester hours

of the engineering management core courses and 16 semester hours from the outlined business-skill curriculum. The course work, along with participation in cocurricular professional development elements, earn the Graduate Certificate in Engineering Business.

Engineering Business (p. 236)

Program Requirements

Core Requirements

Complete all courses and requirements listed below unless otherwise indicated. Students may not register for more than 9 semester hours in the fall, spring, and summer terms.

Code	Title	Hours
Required Courses		
OR 6205	Deterministic Operations Research	4
EMGT 5220	Engineering Project Management	4
EMGT 6225	Economic Decision Making	4
IE 6200	Engineering Probability and Statistics	4

Options

Complete one of the following options:

COURSE WORK OPTION

Code	Title	Hours
Complete 16 semester hours from the course list below. (p. 221)		16

PROJECT OPTION

Code	Title	Hours
EMGT 7945	Master's Project	4
Complete 12 semester hours from the course list below. (p. 221)		12

THESIS OPTION

Code	Title	Hours
EMGT 7990	Thesis	8
Complete 8 semester hours from the course list below. (p. 221)		8

ONLINE OPTION

Code	Title	Hours
Complete 16 semester hours from the course list below. (p. 221)		16
Courses offered online can be found on the online course list below. (p. 222)		

Course List

Code	Title	Hours
CSYE 7280	User Experience Design and Testing	
EMGT 5300	Engineering/Organizational Psychology	
EMGT 6305	Financial Management for Engineers	
EMGT 7978	Independent Study	
ENSY 5000	Fundamentals of Energy System Integration	
GE 5010	Customer-Driven Technical Innovation for Engineers	
GE 5020	Engineering Product Design Methodology	
GE 5030	Iterative Product Prototyping for Engineers	
GE 5100	Product Development for Engineers	
IE 5137	Computational Modeling in Industrial Engineering	
IE 5374	Special Topics in Industrial Engineering	
IE 5390	Structured Data Analytics for Industrial Engineering	
IE 5400	Healthcare Systems Modeling and Analysis	
IE 5500	Systems Engineering in Public Programs	
IE 5617	Lean Concepts and Applications	
IE 5618	Recitation for IE 5617	
IE 5640	Data Mining for Engineering Applications	
IE 6300	Manufacturing Methods and Processes	
IE 6500	Human Performance	
IE 6600	Computation and Visualization for Analytics	
IE 6962	Elective	
IE 7200	Supply Chain Engineering	
IE 7215	Simulation Analysis	
IE 7270	Intelligent Manufacturing	
IE 7275	Data Mining in Engineering	
IE 7280	Statistical Methods in Engineering	
IE 7285	Statistical Quality Control	
IE 7290	Reliability Analysis and Risk Assessment	
IE 7315	Human Factors Engineering	
IE 7374	Special Topics in Industrial Engineering	
IE 7615	Neural Networks and Deep Learning	
INFO 6215	Business Analysis and Information Engineering	
INFO 7245	Agile Software Development	
INFO 7285	Organizational Change and IT	
INFO 7385	Managerial Communications for Engineers	
ME 5645	Environmental Issues in Manufacturing and Product Use	
ME 6200	Mathematical Methods for Mechanical Engineers 1	
OR 6500	Metaheuristics and Applications	
OR 6962	Elective	
OR 7230	Probabilistic Operation Research	
OR 7235	Inventory Theory	
OR 7240	Integer and Nonlinear Optimization	
OR 7245	Network Analysis and Advanced Optimization	
OR 7270	Convex Optimization and Applications	
OR 7310	Logistics, Warehousing, and Scheduling	
OR 7374	Special Topics in Operations Research	
TELE 5330	Data Networking	
or any EMGT, IE or OR courses		

Electives outside the College of Engineering

A maximum of 9 semester hours may be taken from the following list toward the elective requirement:	
DA 5020	Collecting, Storing, and Retrieving Data
ENTR 6200	Enterprise Growth and Innovation
ENTR 6212	Business Planning for New Ventures
ENTR 6218	Business Model Design and Innovation
ENTR 6219	Financing Ventures from Early Stage to Exit
SCHM 6213	Global Supply Chain Strategy
SCHM 6214	Sourcing and Procurement
SCHM 6215	Supply Chain Analytics
SCHM 6221	Sustainability and Supply Chain Management
SCHM 6223	Managing Healthcare Supply Chain Operations
SCHM 6224	Demand Planning and Forecasting
TECE 6222	Emerging and Disruptive Technologies
TECE 6230	Entrepreneurial Marketing and Selling
TECE 6250	Lean Design and Development
TECE 6300	Managing a Technology-Based Business
TECE 6340	The Technical Entrepreneur as Leader

Online Course List

Code	Title	Hours
EMGT 5300	Engineering/Organizational Psychology	
EMGT 6305	Financial Management for Engineers	
ENSY 5000	Fundamentals of Energy System Integration	
IE 5640	Data Mining for Engineering Applications	
IE 6300	Manufacturing Methods and Processes	
IE 7200	Supply Chain Engineering	
IE 7215	Simulation Analysis	
IE 7280	Statistical Methods in Engineering	
IE 7285	Statistical Quality Control	
IE 7290	Reliability Analysis and Risk Assessment	
IE 7315	Human Factors Engineering	
INFO 6215	Business Analysis and Information Engineering	
ME 5645	Environmental Issues in Manufacturing and Product Use	
ME 6200	Mathematical Methods for Mechanical Engineers 1	
OR 7230	Probabilistic Operation Research	
OR 7240	Integer and Nonlinear Optimization	
OR 7310	Logistics, Warehousing, and Scheduling	

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

Energy Systems, MSEneS

Overview

The Master of Science in Energy Systems (https://mie.northeastern.edu/academics/graduate-studies/ms-enes/) (MSEneS) integrates engineering, business, and policy into a high-level signature, multidisciplinary graduate program. Energy systems students have an opportunity to learn how to leverage business skills and public policy knowledge to accomplish their engineering goals. This program is ideal for the engineer or technical business major who is interested in pursuing an industrial or public-planning-based career.

The program's mission is to educate students in current and future energy systems technologies, to integrate energy-related technologies with the economics and financial considerations required to implement them, and to develop leadership and decision-making skills to implement energy systems in either the private or public sectors of the global market. The program will expose students to a combination of academic and corporate experience in energy systems.

The program curriculum features a multidisciplinary range of electives from five different academic colleges at Northeastern. The curriculum is flexibly designed with a set of four core courses in engineering knowledge and finance in addition to four electives. The core courses help relate these electives back to energy-related engineering concepts, including power strategies, energy renewal, sustainable energy solutions, energy storage, energy conversion, and energy efficiency. By integrating concepts across these disciplines, our students learn that implementing energy solutions requires an economic solution as well as an engineering one.

Students are exposed to business educators and practicing professionals and have the opportunity to participate in a six-month co-op experience. Practicing professionals with experience in the industry who have successfully implemented energy systems or devices and policies are actively involved in the program as adjunct professors and invited speakers. Through this curriculum and interaction with practitioners, students should be prepared to effectively integrate energy system development over a broad spectrum of technologies with the financial requirements to successfully implement them and to compete in the global energy market.

Successful graduates of the program will be involved in the decision making or policy planning that will deliver minimally polluting, energy-efficient systems to the global market. They will have the base training necessary to lead efforts within companies to plan and implement new energy-generation investments, realize energy-efficiency improvements specifically at the system level, and participate in energy and environmental markets such as cap-and-trade systems.

General Degree Requirements

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved course work (exclusive of any preparatory courses) with a minimum grade-point average (GPA) of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: course work option, project option, and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

Plan of Study and Course Selection

It is recommended that all new students attend orientation sessions held by the MIE department and the Graduate School of Engineering to acquaint themselves with the course work requirements and research

activities of the department as well as with the general policies, procedures, and expectations.

In order to receive proper guidance with their course work needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study (PS) to the department before enrolling in second-semester courses. This form not only helps the students manage their course work but it also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Students pursuing study or research under the guidance of a faculty member can choose project option by taking Master's Project (ENSY 7945). An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

Students pursuing course work option may petition the MIE Graduate Affairs Committee to substitute up to a 4-semester-hour Independent Study (ENSY 7978). An independent study must be approved by the instructor and the academic advisor. The petition must clearly state the instructor; the reason for taking the course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme. Students in other options (i.e., thesis or project) are not eligible to take independent study. When taking thesis or project options, the independent study course cannot be taken.

Change of Program/Concentration

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE Graduate Affairs Committee, the student must not be in the first semester of their current program, must have a 3.3 GPA, and have completed at least 8 semester hours of required course work in their sought program at Northeastern.

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 251).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Energy Systems with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Energy Systems in addition to earning a Graduate Certificate in Engineering Leadership (p. 245). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour degree and certificate will require 20 hours of advisor-approved energy systems technical courses.

Program Requirements

Core Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Code	Title	Hours
Required Courses		
EMGT 6225	Economic Decision Making	4
ENSY 5000	Fundamentals of Energy System Integration	4
ME 6200	Mathematical Methods for Mechanical Engineers 1	4
EMGT 6305	Financial Management for Engineers	4
or FINA 6309	Foundations of Accounting and Finance	

Restricted Electives

Code	Title	Hours
Complete a minimum of 8 semester hours from the following:		8
ENSY 5100	Hydropower	
ENSY 5200	Energy Storage Systems	
ENSY 5300	Electrochemical Energy Storage	
ENSY 5400	Power Plant Design and Analysis	
ENSY 5500	Smart Grid	
ENSY 5585	Wind Energy Systems	
MATL 6270	Principles, Devices, and Materials for Energy Storage and Energy Harvesting	
ME 5685	Solar Thermal Engineering	

Other Electives

Code	Title	Hours
An additional 8 semester hours can either be taken from the list above or from the following list below or by approval of program director.		8
CHEM 5651	Materials Chemistry of Renewable Energy	
EECE 5680	Electric Drives	
EECE 5682	Power Systems Analysis 1	
EECE 5684	Power Electronics	
EMGT 5220	Engineering Project Management	
ENGR 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage	
ENSY 7374	Special Topics in Energy Systems	
ENSY 7945	Master's Project	
ENSY 7978	Independent Study	
ME 5690	Gas Turbine Combustion	
ME 7270	General Thermodynamics	
ME 7300	Combustion and Air Pollution	
ME 7305	Fundamentals of Combustion	
PPUA 5264	Energy Democracy and Climate Resilience: Technology, Policy, and Social Change	
SBSY 5200	Sustainable Engineering Systems for Buildings	
or any other ENSY course		

Online Course List

All required courses and many electives are offered as online courses.

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

Energy Systems, MSEneS—Academic Link Program

For program contact information, please visit this website (https://mie.northeastern.edu/academics/graduate-studies/ms-enes/).

Designing and implementing optimal methods to produce and utilize energy is one of the most pressing global issues today. Finding ways to implement these solutions that are sustainable and marketable is key. The energy systems Academic Link (AL) program is meant to provide students of non–STEM disciplines (such as English, sociology, business, etc.) with the foundation skills necessary to gain the skills needed to create and implement energy solutions. Students will begin the program by taking two core courses that cover topics across thermal sciences and math along with the general energy systems curriculum.

The Academic Link core courses will provide students with an introduction to the fundamentals that are necessary to be successful in the energy system program. Academic Link courses are integrated with our multidisciplinary energy system curriculum that integrates engineering, business, and policy. Our curriculum is flexibly designed with a set of core courses in engineering and finance complemented by a range of electives across five different academic colleges. Our core and elective courses are designed to help to prepare students to lead the efforts to implement energy systems solutions that have a long-term positive effect on businesses and communities.

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 251).

Program Requirements

General Requirements

A minimum of 40 semester hours must be earned toward completion of the MSEneS-AL degree. A minimum grade-point average of 3.000 is required over all courses applied toward the degree.

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Complete 20 semester hours from the following:		20
ENSY 5050	Fundamentals of Thermal Science 1	
ENSY 5060	Fundamentals of Thermal Science 2	
EMGT 6225	Economic Decision Making	
ENSY 5000	Fundamentals of Energy System Integration	
ME 6200	Mathematical Methods for Mechanical Engineers 1	
Complete 4 semester hours from the following:		4
EMGT 6305	Financial Management for Engineers	
FINA 6309	Foundations of Accounting and Finance	

Restricted Electives List

Code	Title	Hours
Complete a minimum of 8 semester hours from the following:		8
ENSY 5100	Hydropower	
ENSY 5200	Energy Storage Systems	
ENSY 5300	Electrochemical Energy Storage	
ENSY 5400	Power Plant Design and Analysis	
ENSY 5500	Smart Grid	
ENSY 5585	Wind Energy Systems	
MATL 6270	Principles, Devices, and Materials for Energy Storage and Energy Harvesting	
ME 5685	Solar Thermal Engineering	

Other Electives List

Code	Title	Hours
An additional 8 semester hours can either be taken from the list above or from the list below or by approval of the program director:		8
CHEM 5651	Materials Chemistry of Renewable Energy	
EECE 5680	Electric Drives	
EECE 5682	Power Systems Analysis 1	
EECE 5684	Power Electronics	
EMGT 5220	Engineering Project Management	
ENGR 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage	
ENSY 7374	Special Topics in Energy Systems	
ENSY 7440	Energy Systems Engineering Leadership Challenge Project 1	
ENSY 7442	Energy Systems Engineering Leadership Challenge Project 2	
ENSY 7945	Master's Project	
ENSY 7978	Independent Study	
ME 5690	Gas Turbine Combustion	
ME 7270	General Thermodynamics	
ME 7300	Combustion and Air Pollution	
ME 7305	Fundamentals of Combustion	
PPUA 5264	Energy Democracy and Climate Resilience: Technology, Policy, and Social Change	
SBSY 5200	Sustainable Engineering Systems for Buildings	
or any other ENSY course		

Online Course List

All required courses and many electives are offered as online courses.

Program Credit/GPA Requirements

40 total semester hours required
Minimum 3.000 GPA required

Mechanical Engineering with Concentration in General Mechanical Engineering, MSME

Overview

While pursuing a Master of Science (MS) in Mechanical Engineering (https://mie.northeastern.edu/academics/graduate-studies/ms-mece/), students may choose no concentration or what is referred to as general mechanical engineering.

GENERAL DEGREE REQUIREMENTS

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved coursework (exclusive of any preparatory courses) with a minimum grade-point average (GPA) of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: coursework option, project option, and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

ACADEMIC AND RESEARCH ADVISORS

All nonthesis students are advised by the faculty advisor designated for their respective concentration or program. Students willing to pursue the thesis option must first find a research advisor within their first year of study. The research advisor will guide the students' thesis work, and thesis reader(s) may be assigned at the discretion of their research advisor. The research advisor must be a full-time or jointly appointed faculty. If the research advisor is outside the MIE department, before the thesis option can be approved, a faculty member with 51 percent or more appointments in the MIE department must be chosen as co-advisor, and a petition must be filed and approved by the co-advisor and the MIE Graduate Affairs Committee. Thesis option students are advised by the faculty advisor of their concentration before they select their research advisor(s). The research advisor and co-advisor must serve as thesis readers.

PLAN OF STUDY AND COURSE SELECTION

It is recommended that all new students attend orientation sessions held by the MIE department and the Graduate School of Engineering to acquaint themselves with the coursework requirements and research activities of the department as well as with the general policies, procedures, and expectations.

In order to receive proper guidance with their coursework needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study (PS) to the department before enrolling in second-semester courses. This form not only helps the students manage their coursework but it also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Students pursuing study or research under the guidance of a faculty member can choose project option by taking Master's Project (ME 7945). An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

Students pursuing coursework option may petition the MIE Graduate Affairs Committee to substitute up to a 4-semester-hour Independent Study (ME 7978). An independent study must be approved by the academic advisor. The petition must clearly state the instructor; the reason for taking the course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme. When taking thesis or project options, the independent study course cannot be taken.

OPTIONS FOR MS STUDENTS (COURSEWORK ONLY, PROJECT, OR THESIS)

Students accepted into any of the MS programs in the MIE department can choose one of the three options: coursework only, project, or thesis. Please see the Program Requirements tab on the top menu of this page for more information. MS students who want to pursue project or thesis options must find, within the first year of their study, a faculty member or a research advisor who will be willing to direct and supervise a mutually agreed research project or MS thesis. Moreover, students who receive financial support from the university in the form of a research, teaching, or tuition assistantship must complete 8 semester hours of thesis. Students are strongly encouraged to complete their 8 semester hours of Thesis (ME 7990) over two consecutive semesters.

Students who complete the thesis option must make a presentation of their thesis before approval by the department. The MS thesis presentation shall be publicly advertised at least one week in advance and all faculty members and students may attend and participate. If deemed appropriate by the research advisor, other faculty members may be invited to serve as thesis readers to provide technical opinions and judge the quality of the thesis and presentation.

CHANGE OF PROGRAM/CONCENTRATION

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE Graduate Affairs Committee, the student must not be in the first semester of their current program, must have a 3.300 GPA, and have completed at least 8 semester hours of required coursework in their sought program at Northeastern.

GRADUATE CERTIFICATE OPTIONS

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 251).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Mechanical Engineering with Concentration in General Mechanical Engineering with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Mechanical Engineering with Concentration in General Mechanical Engineering in addition to earning a Graduate Certificate in Engineering Leadership (p. 245). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 hours of advisor-approved mechanical engineering technical courses.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Mathematics Competency		
ME 6200	Mathematical Methods for Mechanical Engineers 1	4
Thermofluids Competency		
Complete 4 semester hours from the following:		4
ME 5685	Solar Thermal Engineering	
ME 5690	Gas Turbine Combustion	
ME 5695	Aerodynamics	

ME 7295	Multiscale Flow and Transport Phenomena	
ME 7300	Combustion and Air Pollution	
ME 7305	Fundamentals of Combustion	
ME 7310	Computational Fluid Dynamics with Heat Transfer	
Mechanics/Mechatronics Combined Competency		
Complete 4 semester hours from the following:		4
EECE 5610	Digital Control Systems	
EECE 5666	Digital Signal Processing	
ME 5245	Mechatronic Systems	
ME 5250	Robot Mechanics and Control	
ME 5650	Advanced Mechanics of Materials	
ME 5655	Dynamics and Mechanical Vibration	
ME 5657	Finite Element Method	
ME 5659	Control Systems Engineering	
ME 7210	Elasticity and Plasticity	
ME 7238	Advanced Finite Element Method	
Materials Competency		
Complete 4 semester hours from the following:		4
ME 5600	Materials Processing and Process Selection	
ME 5645	Environmental Issues in Manufacturing and Product Use	
or any MATL courses		

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete 16 semester hours in the following subject areas:		16
ME, MATL		

PROJECT OPTION

Code	Title	Hours
ME 7945	Master's Project	4
Electives		
Complete 12 semester hours in the following subject areas:		12
ME, MATL		

THESIS OPTION

Code	Title	Hours
ME 7990	Thesis (required for all students who receive financial support from the university in the form of a research, teaching, or tuition assistantship)	8
Electives		
Complete 8 semester hours in the following subject areas:		8
ME, MATL		

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

Mechanical Engineering with Concentration in Materials Science, MSME

For program contact information, please visit this website (https://mie.northeastern.edu/academics/graduate-studies/ms-mece/).

Overview

While pursuing a Master of Science (MS) in Mechanical Engineering, students may choose materials science as a concentration. Materials science has been the key enabler in virtually all engineering breakthroughs that have occurred from early metal ages to the present nano age. In step with the scientific development and discovery of materials, members of the mechanical and industrial engineering (MIE) faculty are involved in interdisciplinary research to further materials processing, synthesis, and design. Research areas are aligned with Northeastern University's broad initiatives of sustainability, security, and health, as well as national initiatives in manufacturing and nanotechnology. Investigations in the areas of metals/alloys, polymers, biomaterials (including biomimetics), and composites incorporating nanoscale materials make use of experimental, theoretical, and computational techniques to tailor structure-processing-property relationships in materials for specific applications. Current areas of research include controlling synthesis and assembly processes to produce well-defined atomic structures; defect engineering; manipulating atomic/microstructures and the chemistry of materials to optimize properties for next-generation structural, electronic, and energy applications; solidification and deformation processing, nanomanufacturing; and life-cycle assessments for nanocomposites/materials. Northeastern faculty and students are committed to creative thinking and engineering innovation to propel materials development to the forefront of scientific research.

GENERAL DEGREE REQUIREMENTS

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved coursework (exclusive of any preparatory courses) with a minimum grade-point average (GPA) of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: coursework option, project option, and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

ACADEMIC AND RESEARCH ADVISORS

All nonthesis students are advised by the academic advisor designated for their respective concentration or program. Students willing to pursue the thesis option must first find a research advisor within their first year of study. The research advisor will guide the students' thesis work, and thesis reader(s) may be assigned at the discretion of their research advisor. The research advisor must be a full-time or jointly appointed faculty. If the research advisor is outside the MIE department, before the thesis option can be approved, a faculty member with 51 percent or more appointments in the MIE department must be chosen as co-advisor, and a petition must be filed and approved by the co-advisor and the MIE Graduate Affairs Committee. Thesis option students are advised by the faculty advisor of their concentration before they select their research advisor(s). The research advisor and co-advisor must serve as thesis readers.

PLAN OF STUDY AND COURSE SELECTION

It is recommended that all new students attend orientation sessions held by the MIE department and the Graduate School of Engineering to acquaint themselves with the coursework requirements and research activities of the department as well as with the general policies, procedures, and expectations.

In order to receive proper guidance with their coursework needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study (PS) to the department before enrolling in second-semester courses. This form not only helps the students manage their coursework but it also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Students pursuing study or research under the guidance of a faculty member can choose project option by taking Master's Project (ME 7945). An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

Students pursuing coursework option may petition the MIE Graduate Affairs Committee to substitute up to a 4-semester-hour Independent Study (ME 7978). An independent study must be approved by the instructor and the academic advisor. The petition must clearly state the instructor; the reason for taking the course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme. When taking thesis or project options, the independent study course cannot be taken.

OPTIONS FOR MS STUDENTS (COURSEWORK ONLY, PROJECT, OR THESIS)

Students accepted into any of the MS programs in the MIE department can choose one of the three options: coursework only, project, or thesis. Please see the Program Requirements tab on the top menu of this page for more information. MS students who want to pursue project or thesis options must find, within the first year of their study, a faculty member or a research advisor who will be willing to direct and supervise a mutually agreed research project or MS thesis. Moreover, students who receive financial support from the university in the form of a research, teaching, or tuition assistantship must complete 8 semester hours of thesis. Students are strongly encouraged to complete their 8 semester hours of Thesis (ME 7990) over two consecutive semesters.

Students who complete the thesis option must make a presentation of their thesis before approval by the department. The MS thesis presentation shall be publicly advertised at least one week in advance and all faculty members and students may attend and participate. If deemed appropriate by the research advisor, other faculty members may be invited to serve as thesis readers to provide technical opinions and judge the quality of the thesis and presentation.

CHANGE OF PROGRAM/CONCENTRATION

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE Graduate Affairs Committee, the student must not be in the first semester of their current program, must have a 3.300 GPA, and have completed at least 8 semester hours of required coursework in their sought program at Northeastern.

GRADUATE CERTIFICATE OPTIONS

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 251).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Mechanical Engineering with Concentration in Materials Science with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Mechanical Engineering with Concentration in Materials Science in addition to earning a Graduate Certificate in Engineering Leadership (p. 245). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 hours of advisor-approved materials science technical courses.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Complete 16 semester hours from the following:		16
MATL 5380	Particulate Materials Processing	
MATL 6250	Soft Matter	
MATL 6270	Principles, Devices, and Materials for Energy Storage and Energy Harvesting	
MATL 6285	Structure, Properties, and Processing of Polymeric Materials	
MATL 7350	Mechanical Behavior and Strengthening Mechanisms	
MATL 7355	Thermodynamics of Materials	
MATL 7360	Kinetics of Phase Transformations	
MATL 7365	Properties and Processing of Electronic Materials	
MATL 7374	Special Topics in Materials Engineering	
MATL 7395	Fundamentals of Solidification	
ME 5600	Materials Processing and Process Selection	
ME 5620	Fundamentals of Advanced Materials	
ME 5645	Environmental Issues in Manufacturing and Product Use	

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Electives		
Complete 16 semester hours in the following subject areas:		16
ME, MATL		

PROJECT OPTION

Code	Title	Hours
MATL 7945	Master's Project	4
Electives		
Complete 12 semester hours in the following subject areas:		12
ME, MATL		

THESIS OPTION

Code	Title	Hours
ME 7990	Thesis [1]	8
Electives		
Complete 8 semester hours in the following subject areas:		8
ME, MATL		

Program Credit/GPA Requirements

32 total semester hours required

[1] Required for all students who receive financial support from the university in the form of a research, teaching, or tuition assistantship.

Mechanical Engineering with Concentration in Mechanics and Design, MSME

Overview

While pursuing a Master of Science (MS) in Mechanical Engineering with Concentration in Mechanics and Design (https://mie.northeastern.edu/academics/graduate-studies/ms-mece/), the students will study the motion, deformation, and failure of solid materials in response to the action of direct forces and external fields. The students will also get a chance to conduct research with faculty and observe how these studies will lead to key engineering innovations and designs. Using complementary analytical, computational, experimental, and design tools, the M&D faculty members conduct research in the design and analysis of engineered functional materials/structures, in mechanics of adhesion and contact, and in biomechanics and mechanobiology. For example, in our biomechanics research, we strive to close the gap between function, form, and disease in the bone by using experimental and computational techniques; also, we explore the mechanics of lipid-based drug delivery vesicles. At the small length scales, we are creating a new understanding of nanomechanics, contact mechanics, tribology, MEMS, and the application of nanomaterials for energy storage systems. Our research and teaching together are designed to prepare students to understand and exploit mechanics to enable their future engineering innovations.

General Degree Requirements

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved coursework (exclusive of any preparatory courses) with a minimum grade-point average (GPA) of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: coursework option, project option, and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

Academic and Research Advisors

All nonthesis students are advised by the faculty advisor designated for their respective concentration or program. Students willing to pursue the thesis option must first find a research advisor within their first year of study. The research advisor will guide the students' thesis work, and thesis reader(s) may be assigned at the discretion of their research advisor. The research advisor must be a full-time or jointly appointed faculty. If the research advisor is outside the MIE department, before the thesis option can be approved, a faculty member with 51 percent or more appointments in the MIE department must be chosen as co-advisor, and a petition must be filed and approved by the co-advisor and the MIE Graduate Affairs Committee. Thesis option students are advised by the faculty advisor of their concentration before they select their research advisor(s). The research advisor and co-advisor must serve as thesis readers.

Plan of Study and Course Selection

It is recommended that all new students attend orientation sessions held by the MIE department and the Graduate School of Engineering to acquaint themselves with the coursework requirements and research activities of the department as well as with the general policies, procedures, and expectations.

In order to receive proper guidance with their coursework needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study (PS) to the department before enrolling in second-semester courses. This form not only helps the students manage their coursework but it also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Students pursuing study or research under the guidance of a faculty member can choose project option by taking Master's Project (ME 7945). An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

Students pursuing coursework option may petition the MIE Graduate Affairs Committee to substitute up to a 4-semester-hour Independent Study (ME 7978). An independent study must be approved by the academic advisor. The petition must clearly state the instructor; the reason for taking the course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme. When taking thesis or project options, the independent study course cannot be taken.

Options for MS Students (coursework only, project, or thesis)

Students accepted into any of the MS programs in the MIE department can choose one of the three options: coursework only, project, or thesis. Please see the Program Requirements tab on the top menu of this page for more information. MS students who want to pursue project or thesis options must find, within the first year of their study, a faculty member or a research advisor who will be willing to direct and supervise a mutually agreed research project or MS thesis. Moreover, students who receive financial support from the university in the form of a research, teaching, or tuition assistantship must complete 8 semester hours of thesis. Students are strongly encouraged to complete their 8 semester hours of Thesis (ME 7990) over two consecutive semesters.

Students who complete the thesis option must make a presentation of their thesis before approval by the department. The MS thesis presentation shall be publicly advertised at least one week in advance and all faculty members and students may attend and participate. If deemed appropriate by the research advisor, other faculty members may be invited to serve as thesis readers to provide technical opinions and judge the quality of the thesis and presentation.

Change of Program/Concentration

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE Graduate Affairs Committee, the student must not be in the first semester of their current program, must have a 3.300 GPA, and have

completed at least 8 semester hours of required coursework in their sought program at Northeastern.

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 251).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Mechanical Engineering with a Concentration in Mechanics and Design with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Mechanical Engineering with a Concentration in Mechanics and Design in addition to earning a Graduate Certificate in Engineering Leadership (p. 245). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 hours of advisor-approved mechanics and design technical courses.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Mathematics Competency		
Complete the following course:		
ME 6200	Mathematical Methods for Mechanical Engineers 1	4
Mechanics Competency		
Complete 12 semester hours from the following:		12
ME 5650	Advanced Mechanics of Materials	
ME 5655	Dynamics and Mechanical Vibration	
ME 5657	Finite Element Method	
ME 5659	Control Systems Engineering	
ME 7210	Elasticity and Plasticity	

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete 16 semester hours from the course list.		16

PROJECT OPTION

Code	Title	Hours
ME 7945	Master's Project	4
Complete 12 semester hours from the course list.		12

THESIS OPTION

Code	Title	Hours
ME 7990	Thesis [1]	8
Complete 8 semester hours from the course list.		8

COURSE LIST

Code	Title	Hours
ME 5240	Computer Aided Design and Manufacturing	
ME 5374	Special Topics in Mechanical Engineering (Fracture Mechanics and Adhesion in Biological Science)	
ME 5374	Special Topics in Mechanical Engineering (Inelasticity)	
ME 5665	Musculoskeletal Biomechanics	
ME 6260	Introduction to Microelectromechanical Systems (MEMS)	
ME 7232	Theory of Plates and Shells	
ME 7238	Advanced Finite Element Method	
ME 7255	Continuum Mechanics and Nonlinear FEM	
ME 7374	Special Topics in Mechanical Engineering	
Any other ME or MATL course		

PROGRAM CREDIT/GPA REQUIREMENTS

32 total semester hours required
Minimum 3.000 GPA required

[1] Required for all students who receive financial support from the university in the form of a research, teaching, or tuition assistantship.

Mechanical Engineering with Concentration in Mechatronics, MSME

While pursuing a Master of Science (MS) in Mechanical Engineering (https://mie.northeastern.edu/academics/graduate-studies/ms-mece/), students may choose mechatronics as a concentration. The term mechatronics is a combination of the words mechanics and electronics. Mechatronics is a multidisciplinary approach to product design and development, merging the principles of electrical, mechanical, computer, material, chemical, and industrial engineering. The mechatronics and systems research cluster in the MIE department is concerned with systems that are typically composed of traditional mechanical and electrical components but are rendered "intelligent" by the incorporation of sensors, actuators, and computer control systems. Our primary focus in mechatronics and systems is on intelligent and integrated systems and machines along with their practical applications ranging from manufacturing systems and robotic platforms to biological systems. Our research and teaching together are designed to prepare students to understand and exploit mechatronics to enable their future engineering innovations.

GENERAL DEGREE REQUIREMENTS

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved coursework (exclusive of any preparatory courses) with a minimum grade-point average (GPA) of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: coursework option, project option, and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

ACADEMIC AND RESEARCH ADVISORS

All non-thesis students are advised by the faculty advisor designated for their respective concentration or program. Students willing to pursue the thesis option must first find a research advisor within their first year of study. The research advisor will guide the students' thesis work, and thesis reader(s) may be assigned at the discretion of their research advisor. The research adviser must be a full-time or jointly appointed faculty. If the research advisor is outside the MIE department, before the thesis option can be approved, a faculty member with 51 percent or more appointments in the MIE department must be chosen as co-advisor, and a petition must be filed and approved by the co-advisor and the MIE Graduate Affairs Committee. Thesis option students are advised by the faculty advisor of their concentration before they select their research advisor(s). The research advisor and co-advisor must serve as thesis readers.

PLAN OF STUDY AND COURSE SELECTION

It is recommended that all new students attend orientation sessions held by the MIE department and the Graduate School of Engineering to acquaint themselves with the coursework requirements and research activities of the department as well as with the general policies, procedures, and expectations.

In order to receive proper guidance with their coursework needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study (PS) to the department before enrolling in second-semester courses. This form not only helps the students manage their coursework but it also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Students pursuing study or research under the guidance of a faculty member can choose project option by taking Master's Project (ME 7945). An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

Students pursuing coursework option may petition the MIE Graduate Affairs Committee to substitute up to a 4-semester-hour Independent Study (ME 7978). An independent study must be approved by the academic advisor. The petition must clearly state the instructor; the reason for taking the course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme. When taking thesis or project options, the independent study course cannot be taken.

OPTIONS FOR MS STUDENTS (COURSEWORK ONLY, PROJECT, OR THESIS)

Students accepted into any of the MS programs in the MIE department can choose one of the three options: coursework only, project, or thesis. Please see the Program Requirements tab on the top menu of this page for more information. MS students who want to pursue project or thesis options must find, within the first year of their study, a faculty member or a research advisor who will be willing to direct and supervise a mutually agreed research project or MS thesis. Moreover, students who receive financial support from the university in the form of a research, teaching, or tuition assistantship must complete 8 semester hours of thesis. Students are strongly encouraged to complete their 8 semester hours of Thesis (ME 7990) over two consecutive semesters.

Students who complete the thesis option must make a presentation of their thesis before approval by the department. The MS thesis presentation shall be publicly advertised at least one week in advance and all faculty members and students may attend and participate. If deemed appropriate by the research advisor, other faculty members may be invited to serve as thesis readers to provide technical opinions and judge the quality of the thesis and presentation.

CHANGE OF PROGRAM/CONCENTRATION

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE Graduate Affairs Committee, the student must not be in the first semester of their current program, must have a 3.300 GPA, and have completed at least 8 semester hours of required course work in their sought program at Northeastern.

GRADUATE CERTIFICATE OPTIONS

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 251).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Mechanical Engineering with a Concentration in Mechatronics with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Mechanical Engineering with a Concentration in Mechatronics in addition to earning a Graduate Certificate in Engineering Leadership (p. 245). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour degree and certificate will require 20 hours of advisor-approved mechatronics technical courses.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Mathematics Competency		
Complete the following course:		
ME 6200	Mathematical Methods for Mechanical Engineers 1	4
Mechanics Competency		
Complete 4 semester hours from the following or other advisor-approved courses:		4
ME 5250	Robot Mechanics and Control	
ME 5650	Advanced Mechanics of Materials	
ME 5655	Dynamics and Mechanical Vibration	
ME 5657	Finite Element Method	
Mechatronics Concentration		
Complete 8 semester hours from the following or other advisor-approved courses:		8
ME 5245	Mechatronic Systems	
ME 5659	Control Systems Engineering	
Electrical Competency		
Complete 4 semester hours from the following or other advisor-approved courses:		4
EECE 5610	Digital Control Systems	
EECE 5666	Digital Signal Processing	

EECE 5680 and EECE 5681	Electric Drives and Lab for EECE 5680
EECE 5684 and EECE 5685	Power Electronics and Lab for EECE 5684
ME 6260	Introduction to Microelectromechanical Systems (MEMS)

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete 12 semester hours from the course list.		12

PROJECT OPTION

Code	Title	Hours
ME 7945	Master's Project	4
Complete 8 semester hours from the course list.		8

THESIS OPTION

Code	Title	Hours
ME 7990	Thesis [1]	8
Complete 4 semester hours from the course list.		4

Course List

Code	Title	Hours
CIVE 5373	Transportation Systems: Analysis and Planning	
CIVE 5699	Special Topics in Civil Engineering (Vibration-Based Structural Health Monitoring)	
CIVE 7342	System Identification	
CS 5335	Robotic Science and Systems	
CS 5340	Computer/Human Interaction	
CS 7150	Deep Learning	
EECE 5115	Dynamical Systems in Biological Engineering	
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
EECE 5576	Wireless Communication Systems	
EECE 5606	Micro- and Nanofabrication	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7242	Integrated Circuits for Mixed Signals and Data Communication	
IE 5640	Data Mining for Engineering Applications	
IE 6700	Data Management for Analytics	
IE 7315	Human Factors Engineering	
IE 7615	Neural Networks and Deep Learning	
ME 5240	Computer Aided Design and Manufacturing	
ME 5250	Robot Mechanics and Control	
ME 5665	Musculoskeletal Biomechanics	
ME 7247	Advanced Control Engineering	
Or any other ME or MATL course		

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

[1] Required for all students who receive financial support from the university in the form of a research, teaching, or tuition assistantship.

Mechanical Engineering with Concentration in Thermofluids, MSME

While pursuing a Master of Science (MS) in Mechanical Engineering (https://mie.northeastern.edu/academics/graduate-studies/ms-mece/), students may choose thermofluids as a concentration. Some of the representative research areas under this concentration may include thermodynamics, fluid dynamics, kinetic theory of gases, and thermophoresis of aerosols; microscale heat transfer phenomena and its effects on laser beam propagation; fundamentals of combustion such as burning speed and onset of auto-ignition measurement and flame stability analysis; development of chemistry reduction such as rate-controlled constrained-equilibrium method; formation and control of combustion-generated pollutants and greenhouse gases; chemistry, transport, and abatement of air pollution; alternative energy sources; combustion-based synthesis of materials; fire propagation, containment, and extinction; nonequilibrium thermodynamics; energy and gas turbine cooling technology; turbine blade cooling; and energy-related and calorimeter studies related to pharmaceutical developments. Our research and teaching together seek to prepare students to understand and exploit thermofluids to enable their future engineering innovations.

General Degree Requirements

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved course work (exclusive of any preparatory courses) with a minimum grade-point average (GPA) of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: course work option, project option, and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

Academic and Research Advisors

All nonthesis students are advised by the faculty advisor designated for their respective concentration or program. Students willing to pursue the thesis option must first find a research advisor within their first year of study. The research advisor will guide the students' thesis work, and thesis reader(s) may be assigned at the discretion of their research advisor. The research advisor must be a full-time or jointly appointed faculty. If the research advisor is outside the MIE department, before the thesis option can be approved, a faculty member with 51 percent or more appointments in the MIE department must be chosen as co-advisor, and a petition must be filed and approved by the co-advisor and the MIE Graduate Affairs Committee. Thesis option students are advised by the faculty advisor of their concentration before they select their research advisor(s). The research advisor and co-advisor must serve as thesis readers.

Plan of Study and Course Selection

It is recommended that all new students attend orientation sessions held by the MIE department and the Graduate School of Engineering to acquaint themselves with the course work requirements and research

activities of the department as well as with the general policies, procedures, and expectations.

In order to receive proper guidance with their course work needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study (PS) to the department before enrolling in second-semester courses. This form not only helps the students manage their course work but it also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Students pursuing study or research under the guidance of a faculty member can choose project option by taking Master's Project (ME 7945). An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

Students pursuing course work option may petition the MIE Graduate Affairs Committee to substitute up to a 4-semester-hour Independent Study (ME 7978). An independent study must be approved by the academic advisor. The petition must clearly state the instructor; the reason for taking the course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme. When taking thesis or project options, the independent study course cannot be taken.

Options for MS Students (course work only, project, or thesis)

Students accepted into any of the MS programs in the MIE department can choose one of the three options: course work only, project, or thesis. Please see the Program Requirements tab on the top menu of this page for more information. MS students who want to pursue project or thesis options must find, within the first year of their study, a faculty member or a research advisor who will be willing to direct and supervise a mutually agreed research project or MS thesis. Moreover, students who receive financial support from the university in the form of a research, teaching, or tuition assistantship must complete 8 semester hours of thesis. Students are strongly encouraged to complete their 8 semester hours of Thesis (ME 7990) over two consecutive semesters.

Students who complete the thesis option must make a presentation of their thesis before approval by the department. The MS thesis presentation shall be publicly advertised at least one week in advance and all faculty members and students may attend and participate. If deemed appropriate by the research advisor, other faculty members may be invited to serve as thesis readers to provide technical opinions and judge the quality of the thesis and presentation.

Change of Program/Concentration

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE Graduate Affairs Committee, the student must not be in the first semester of their current program, must have a 3.3 GPA, and have completed at least 8 semester hours of required course work in their sought program at Northeastern.

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 251).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Mechanical Engineering with a Concentration in Thermofluids with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Mechanical Engineering with a Concentration in Thermofluids in addition to earning a Graduate Certificate in Engineering Leadership (p. 245). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour degree and certificate will require 20 hours of advisor-approved thermofluids technical courses.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

General Requirements

Code	Title	Hours
Required Core Courses		
ME 6200	Mathematical Methods for Mechanical Engineers 1	4
ME 7270	General Thermodynamics	4
ME 7275	Essentials of Fluid Dynamics	4
ME 7285	Heat Conduction and Thermal Radiation	4
or ME 7290	Convective Heat Transfer	
Thermofluids Concentration Course		
Complete 4 semester hours from the following:		4
ME 5685	Solar Thermal Engineering	
ME 5690	Gas Turbine Combustion	
ME 5695	Aerodynamics	
ME 7295	Multiscale Flow and Transport Phenomena	
ME 7300	Combustion and Air Pollution	
ME 7305	Fundamentals of Combustion	
ME 7310	Computational Fluid Dynamics with Heat Transfer	

Options

Complete one of the following options:

COURSE WORK OPTION

Code	Title	Hours
Complete 12 semester hours from the course list.		12

PROJECT OPTION

Code	Title	Hours
ME 7945	Master's Project	4
Complete 8 semester hours from the course list.		8

THESIS OPTION

Code	Title	Hours
ME 7990	Thesis [1]	8
Complete 4 semester hours from the course list.		4

COURSE LIST

Code	Title	Hours
ME 5685	Solar Thermal Engineering	
ME 5690	Gas Turbine Combustion	
ME 5695	Aerodynamics	
ME 7295	Multiscale Flow and Transport Phenomena	
ME 7300	Combustion and Air Pollution	
ME 7305	Fundamentals of Combustion	
ME 7310	Computational Fluid Dynamics with Heat Transfer	
Or any ME or MATL course		

PROGRAM CREDIT/GPA REQUIREMENTS

32 total semester hours required
Minimum 3.000 GPA required

[1] Required for all students who receive financial support from the university in the form of a research, teaching, or tuition assistantship.

Operations Research, MSOR

Website (https://mie.northeastern.edu/academics/graduate-studies/ms-opre/)

Overview

The Department of Mechanical and Industrial Engineering (MIE) offers comprehensive research and educational programs for students pursuing the Master of Science (MS) in Operations Research (OR). OR deals with the application of scientific method to decision making. Its practitioners develop and solve mathematical and computer models of systems using optimization and statistical methods. OR methodologies are being used to improve efficiency, reduce costs, and increase profitability in all organizations whether in manufacturing, transportation, logistics and supply chains, healthcare, or financial institutions. Upon graduation, students who pursue this program may work in industry or may continue their studies by pursuing the PhD in Industrial Engineering. These extensive programs and coursework allow for the selection of a degree that meets a wide range of personal and professional goals.

GENERAL DEGREE REQUIREMENTS

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved coursework (exclusive of any preparatory courses) with a minimum grade-point average (GPA) of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: coursework option, project option, and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

ACADEMIC AND RESEARCH ADVISORS

All nonthesis students are advised by the faculty advisor designated for their respective concentration or program. Students willing to pursue the thesis option must first find a research advisor within their first year of study. The research advisor will guide the students' thesis work, and thesis reader(s) may be assigned at the discretion of their research advisor. The research advisor must be a full-time or jointly appointed faculty. If the research advisor is outside the MIE department, before the thesis option can be approved, a faculty member with 51 percent or more appointments in the MIE department must be chosen as co-advisor, and a petition must be filed and approved by the co-advisor and the MIE Graduate Affairs Committee. Thesis option students are advised by the faculty advisor of their concentration before they select their research advisor(s). The research advisor and co-advisor must serve as thesis readers.

PLAN OF STUDY AND COURSE SELECTION

It is recommended that all new students attend orientation sessions held by the MIE department and the Graduate School of Engineering to acquaint themselves with the coursework requirements and research activities of the department as well as with the general policies, procedures, and expectations.

In order to receive proper guidance with their coursework needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study (PS) to the department before enrolling in second-semester courses. This form not only helps the students manage their coursework but it also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Students may also petition to waive a core course by demonstrating evidence of their having passed a similar approved IE or OR graduate course. In such situations, the students must first obtain approval from their academic advisor for the course(s) they are planning to substitute.

Students pursuing study or research under the guidance of a faculty member can choose project option by taking Master's Project (OR 7945). An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

Students pursuing coursework option may petition the MIE Graduate Affairs Committee to substitute up to a 4-semester-hour Independent Study (OR 7978). An independent study must be approved by the academic advisor. The petition must clearly state the instructor; the reason for taking the course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme. Students in other options (i.e., thesis or project) are not eligible to take independent study. When taking thesis or project options, the independent study course cannot be taken.

OPTIONS FOR MS STUDENTS (COURSEWORK ONLY, PROJECT, OR THESIS)

Students accepted into any of the MS programs in the MIE department can choose one of the three options: coursework only, project, or thesis. Please see the Program Requirements tab on the top menu of this page for more information. MS students who want to pursue project or thesis options must find, within the first year of their study, a faculty member or a research advisor who will be willing to direct and supervise a mutually agreed research project or MS thesis. Moreover, students who receive financial support from the university in the form of a research, teaching, or tuition assistantship must complete 8 semester hours of Thesis (ME 7990). Students are strongly encouraged to complete their 8 semester hours of Thesis (ME 7990) over two consecutive semesters.

Students who complete the thesis option must make a presentation of their thesis before approval by the department. The MS thesis presentation shall be publicly advertised at least one week in advance, and all faculty members and students may attend and participate. If deemed appropriate by the research advisor, other faculty members may be invited to serve as thesis readers to provide technical opinions and judge the quality of the thesis and presentation.

CHANGE OF PROGRAM/CONCENTRATION

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE Graduate Affairs Committee, the student must not be in the first semester of their current program, must have a 3.300 GPA, and have completed at least 8 semester hours of required coursework in their sought program at Northeastern.

GRADUATE CERTIFICATE OPTIONS

Students enrolled in a graduate degree program in the College of Engineering have the opportunity to pursue an engineering graduate certificate in addition to or in combination with the MS degree. For more information please refer to Graduate Certificate Programs (p. 251).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Operations Research with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Operations Research in addition to earning a Graduate Certificate in Engineering Leadership (p. 245). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 hours of advisor-approved operations research technical courses.

ENGINEERING BUSINESS

Master's Degree in Operations Research with Graduate Certificate in Engineering Business

Students may complete a Master of Science in Operations Research in addition to earning a Graduate Certificate in Engineering Business (p. 236). Students must apply and be admitted to the Galante Engineering Business Program in order to pursue this option. The program requires the applicant to have earned or be in a program to earn a Bachelor of Science in Engineering from Northeastern University. The integrated 32-semester-hour degree and certificate will require 16 semester hours of the operations research core courses and 16 semester hours from the outlined business-skill curriculum. The coursework, along with participation in co-curricular professional development elements, earn the Graduate Certificate in Engineering Business.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
IE 6200	Engineering Probability and Statistics	4
or MATH 7241	Probability 1	
OR 6205	Deterministic Operations Research	4
OR 7245	Network Analysis and Advanced Optimization	4
or MATH 7234	Optimization and Complexity	
OR 7230	Probabilistic Operation Research	4
or MATH 7341	Probability 2	

Options

Select one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete 16 semester hours from the course list below.		16

PROJECT OPTION

Code	Title	Hours
OR 7945	Master's Project	4
Complete 12 semester hours from the course list below.		12

THESIS OPTION

Code	Title	Hours
OR 7990	Thesis (required for all students who receive financial support from the university in the form of a research, teaching, or tuition assistantship)	8
Complete 8 semester hours from the course list below.		8

Course List

Code	Title	Hours
Civil Engineering and Environmental Engineering		
CIVE 7100	Time Series and Geospatial Data Sciences	
Computer Science		
CS 5800	Algorithms	
CS 6140	Machine Learning	
CS 7805	Complexity Theory	
Computer Systems Engineering		
CSYE 7280	User Experience Design and Testing	
Data Science		
DS 5220	Supervised Machine Learning and Learning Theory	
DS 5230	Unsupervised Machine Learning and Data Mining	
General Engineering		
GE 5010	Customer-Driven Technical Innovation for Engineers	
GE 5100	Product Development for Engineers	
Electrical and Computer Engineering		
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
Engineering Management		
EMGT 5220	Engineering Project Management	
EMGT 5300	Engineering/Organizational Psychology	
EMGT 6225	Economic Decision Making	
EMGT 6305	Financial Management for Engineers	
Industrial Engineering		
IE 5374	Special Topics in Industrial Engineering (Data Visualization Engineering)	
IE 5374	Special Topics in Industrial Engineering (Human Performance in Sociotechnical Systems)	
IE 5400	Healthcare Systems Modeling and Analysis	
IE 5500	Systems Engineering in Public Programs	
IE 5617	Lean Concepts and Applications	
IE 6300	Manufacturing Methods and Processes	

IE 7200	Supply Chain Engineering
IE 7215	Simulation Analysis
IE 7275	Data Mining in Engineering
IE 7280	Statistical Methods in Engineering
IE 7285	Statistical Quality Control
IE 7290	Reliability Analysis and Risk Assessment
IE 7315	Human Factors Engineering
Mathematics	
MATH 7233	Graph Theory
MATH 7342	Mathematical Statistics
MATH 7346	Time Series
MATH 7349	Stochastic Calculus and Introduction to No-Arbitrage Finance
Operations Research	
OR 6500	Metaheuristics and Applications
OR 7235	Inventory Theory
OR 7240	Integer and Nonlinear Optimization
OR 7270	Convex Optimization and Applications
OR 7310	Logistics, Warehousing, and Scheduling

Or any other IE, OR, MATH, CS, and graduate engineering courses

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

Data Analytics Engineering, Graduate Certificate

The Data Analytics Engineering Graduate Certificate program focuses on fundamental concepts, tools and techniques to extract information from large data sets in order to support effective decision making. This program is designed to provide opportunities for students to master high-demand data intelligence skills through hands-on experience on data storage, data retrieval, data visualization and prediction.

This four-course graduate certificate enables the students to apply the fundamentals of engineering knowledge and skills to database design, data pre- and post-processing for further analysis, data visualization for impactful infographics, statistical concepts for quantitative analysis and data mining techniques and algorithms for knowledge discovery.

Note: MS in Data Analytics students are not eligible for this graduate certificate.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Required Courses		
DAMG 6210	Data Management and Database Design	4
IE 6600	Computation and Visualization for Analytics	4
IE 7275	Data Mining in Engineering	4
IE 7280	Statistical Methods in Engineering	4

Program Credit/GPA Requirements

16 total semester hours required
Minimum 3.000 GPA required

Energy Systems, Graduate Certificate

The Graduate Certificate in Energy Systems focuses on the combination of analysis and integration of energy systems engineering technology with financial planning and attention to business aspects and effective implementation.

This four-course graduate certificate seeks to offer students opportunities to apply the fundamentals of engineering knowledge and skills to analyze energy systems to propose effective and efficient technology solutions based on data-driven and economic-based decisions.

Note: Students enrolled in the master's in energy systems program are not eligible for this graduate certificate.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
EMGT 6225	Economic Decision Making	4
EMGT 6305	Financial Management for Engineers	4
ENSY 5000	Fundamentals of Energy System Integration	4

Elective

Code	Title	Hours
Complete one of the following:		4
ENSY 5100	Hydropower	
ENSY 5200	Energy Storage Systems	
ENSY 5300	Electrochemical Energy Storage	
ENSY 5400	Power Plant Design and Analysis	
ENSY 5500	Smart Grid	
ENSY 5585	Wind Energy Systems	
ME 5645	Environmental Issues in Manufacturing and Product Use	
ME 5685	Solar Thermal Engineering	

Program Credit/GPA Requirements

16 total semester hours required
Minimum 3.000 GPA required

Energy Systems Management, Graduate Certificate

The Graduate Certificate in Energy Systems Management focuses on the combination of analysis and integration of energy systems engineering technology with a focus on the art and the science of planning, organizing, allocating, directing, and controlling the activities and resources of organizations engaged in engineering activities and technology development.

This four-course graduate certificate seeks to provide students with opportunities to apply the fundamentals of engineering knowledge and skills in a management setting to analyze energy systems and to propose

effective and efficient technology solutions based on data-driven and economic-based decisions.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
ENSY 5000	Fundamentals of Energy System Integration	4
EMGT 5220	Engineering Project Management	4

Electives

Code	Title	Hours
Complete one of the following:		4
EMGT 6225	Economic Decision Making	
EMGT 6305	Financial Management for Engineers	
Complete one of the following:		4
ENSY 5100	Hydropower	
ENSY 5200	Energy Storage Systems	
ENSY 5300	Electrochemical Energy Storage	
ENSY 5400	Power Plant Design and Analysis	
ENSY 5500	Smart Grid	
ENSY 5585	Wind Energy Systems	
ME 5685	Solar Thermal Engineering	

Program Credit/GPA Requirements

16 total semester hours required
Minimum 3.000 GPA required

Engineering Business, Graduate Certificate

The Graduate Certificate in Engineering Business is part of the Galante Engineering Business Program. The Galante Engineering Business Program offers a progressive opportunity for engineering students to complement their technical engineering education with business skills. Galante is founded on the values of student engagement and leadership to strengthen interpersonal and professional skills.

The certificate seeks to provide students opportunities to apply the technical aspects of an engineering skill foundation in corporate settings through both academic and programmatic elements. Programmatic elements include workshops, speaker series, site visits, seminars, and other related personal and professional development activities as a connected cohort. These activities equip students to manage projects, lead people, make data-driven and market-based decisions, and advance economically sound initiatives.

The Galante Engineering Business Program can be completed alongside a Master of Science in Engineering Management, Industrial Engineering, Operations Research, Data Analytics Engineering, Civil Engineering with a Concentration in Construction Management, and Chemical Engineering. There are two possible paths to earning the Graduate Certificate in Engineering Business. The first option is to begin an eligible PlusOne program and then apply for the Galante Engineering Business Program. The second option is for those who have completed their BS in engineering in good standing and have been admitted to a master's program listed above. Please note that the BS in engineering needs to be completed at Northeastern.

The Graduate Certificate in Engineering Business involves 15 semester hours from four courses across three categories. These four courses count as the electives required for each of the master's programs above. Students need to ensure that these four courses are cross-listed with the master's program.

Refer to the Galante Engineering Business Program webpage (http://www.coe.neu.edu/galante/) for additional details and description.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Complete four courses from at least three of the following categories. Students can only take one class from outside the College of Engineering.		15
Business Innovation Development		
ENTR 6200	Enterprise Growth and Innovation	
ENTR 6212	Business Planning for New Ventures	
ENTR 6218	Business Model Design and Innovation	
GE 5010	Customer-Driven Technical Innovation for Engineers	
GE 5020	Engineering Product Design Methodology	
GE 5030	Iterative Product Prototyping for Engineers	
GE 5100	Product Development for Engineers	
TECE 6230	Entrepreneurial Marketing and Selling	
TECE 6300	Managing a Technology-Based Business	
TECE 6340	The Technical Entrepreneur as Leader	
Organizational Excellence		
EMGT 5300	Engineering/Organizational Psychology	
EMGT 6600	Engineering Team Performance	
IE 5617	Lean Concepts and Applications	
SCHM 6201	Operations and Supply Chain Management	
SCHM 6223	Managing Healthcare Supply Chain Operations	
TECE 6250	Lean Design and Development	
Financial Analysis		
ACCT 6200	Financial Reporting and Managerial Decision Making 1	
EMGT 6225	Economic Decision Making	
EMGT 6305	Financial Management for Engineers	
ENTR 6219	Financing Ventures from Early Stage to Exit	
Information and Business Analysis		
CS 6140	Machine Learning	
CS 6220	Data Mining Techniques	
DA 5030	Introduction to Data Mining/Machine Learning	
DAMG 6210	Data Management and Database Design	
DAMG 7290	Data Warehousing and Business Intelligence	

DS 5110	Introduction to Data Management and Processing
IE 5640	Data Mining for Engineering Applications
IE 6600	Computation and Visualization for Analytics
INFO 6215	Business Analysis and Information Engineering

Program Credit/GPA Requirements

15 total semester hours required
Minimum 3.000 GPA required

Engineering Economic Decision Making, Graduate Certificate

The Graduate Certificate in Engineering Economic Decision Making focuses on developing economic decision-making skills in the context of engineering operations and projects with attention to decision-making models, causes of risk and uncertainty, decisions under uncertainty, and ways to change and influence the degree of risk and uncertainty.

This four-course graduate certificate seeks to provide students with opportunities to apply the fundamentals of engineering knowledge and skills in a management setting to build decision-making models and to make data-driven, financial-based, and economic-based decisions.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
EMGT 6225	Economic Decision Making	4
EMGT 6305	Financial Management for Engineers	4
IE 6200	Engineering Probability and Statistics	4
OR 6205	Deterministic Operations Research	4

Program Credit/GPA Requirements

16 total semester hours required
Minimum 3.000 GPA required

Engineering Management, Graduate Certificate

The Graduate Certificate in Engineering Management focuses on bridging the gaps between the fields of engineering, technology, and business with a focus on the art and the science of planning, organizing, allocating, directing, and controlling the activities and resources of organizations engaged in engineering activities and technology development.

This four-course graduate certificate seeks to provide students with opportunities to apply the fundamentals of engineering knowledge and skills in a management setting to build decision-making models and make data-driven and/or economic-based decisions.

Note: Students enrolled in the master's in engineering management program are not eligible for this graduate certificate.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Required Courses		
EMGT 5220	Engineering Project Management	4
EMGT 6225	Economic Decision Making	4
IE 6200	Engineering Probability and Statistics	4

Elective

Code	Title	Hours
Complete one of the following:		4
EMGT 5300	Engineering/Organizational Psychology	
EMGT 6305	Financial Management for Engineers	
OR 6205	Deterministic Operations Research	

Program Credit/GPA Requirements

16 total semester hours required
Minimum 3.000 GPA required

Lean Six Sigma, Graduate Certificate

The Graduate Certificate in Lean Six Sigma focuses on enhancing engineering knowledge and skills with the fundamentals of lean manufacturing thinking and six sigma concepts to improve business processes through optimizing flow, eliminating waste, and emphasizing quality.

This four-course graduate certificate seeks to provide students with opportunities to apply the fundamentals of lean six sigma concepts across an enterprise to contribute to an organization's continuous improvement initiatives by identifying and employing lean and quality tools and techniques, along with utilizing statistical methods to achieve quality control.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
IE 5617	Lean Concepts and Applications	4
IE 6200	Engineering Probability and Statistics	4
IE 7280	Statistical Methods in Engineering	4
IE 7285	Statistical Quality Control	4

Program Credit/GPA Requirements

16 total semester hours required
Minimum 3.000 GPA required

Renewable Energy, Graduate Certificate

The Graduate Certificate in Renewable Energy focuses on the combination of analysis and integration of energy systems engineering technology with key renewable engineering technology, including solar and wind generation, with environmental protection and manufacturing considerations.

This four-course graduate certificate seeks to provide students with opportunities to apply the fundamentals of engineering knowledge and skills to analyze energy systems with a specific focus on renewable energy technologies along with EPA regulatory structure, including the

LEED certification program, as well as industrial ecology, including life-cycle analysis and technical cost modeling.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
ENSY 5000	Fundamentals of Energy System Integration	4
ENSY 5585	Wind Energy Systems	4
ME 5685	Solar Thermal Engineering	4

Elective

Code	Title	Hours
Complete one of the following:		4
ENSY 5100	Hydropower	
ENSY 5200	Energy Storage Systems	
ENSY 5300	Electrochemical Energy Storage	
ENSY 5500	Smart Grid	

Program Credit/GPA Requirements

16 total semester hours required
Minimum 3.000 GPA required

Sustainable Energy Systems, Graduate Certificate

The Graduate Certificate in Sustainable Energy Systems focuses on the integration of energy systems engineering technology with sustainable building systems, including the design and operation of buildings with minimal energy and environmental impact.

This four-course graduate certificate seeks to provide students with opportunities to apply the fundamentals of engineering knowledge and skills to analyze energy systems as they relate to sustainable engineering building design with a focus on renewable energy with LEED certification or with a focus on industrial ecology, including life-cycle analysis and technical cost modeling.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
SBSY 5200	Sustainable Engineering Systems for Buildings	4
ENSY 5000	Fundamentals of Energy System Integration	4

Electives

Code	Title	Hours
Complete two of the following:		8
ENSY 5100	Hydropower	
ENSY 5200	Energy Storage Systems	
ENSY 5300	Electrochemical Energy Storage	
ENSY 5585	Wind Energy Systems	
ME 5685	Solar Thermal Engineering	

Program Credit/GPA Requirements

16 total semester hours required
Minimum 3.000 GPA required

Supply Chain Engineering Management, Graduate Certificate

The Graduate Certificate in Supply Chain focuses on acquiring and applying the knowledge and skills associated with designing, analyzing, managing, and improving supply chains within technology companies with attention on optimizing parts of a supply chain for effective and efficient functioning.

This four-course graduate certificate seeks to provide students with opportunities to apply the fundamentals of engineering knowledge and skills to supply chains using deterministic and probabilistic decision-making models, lean concepts, mass customization principles, and methods of manufacturing including logistics, warehousing, and scheduling.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
IE 5617	Lean Concepts and Applications	4
IE 7200	Supply Chain Engineering	4

Electives

Code	Title	Hours
Complete two of the following:		8
EMGT 5300	Engineering/Organizational Psychology	
IE 6200	Engineering Probability and Statistics	
IE 6300	Manufacturing Methods and Processes	
OR 7310	Logistics, Warehousing, and Scheduling	

Program Credit/GPA Requirements

16 total semester hours required
Minimum 3.000 GPA required

Technology Systems Management, Graduate Certificate

The Graduate Certificate in Technology Systems Management focuses on bridging the fields of technology, engineering, and business with a focus on the art and the science of managing organizational activities, including project and human resources engaged in engineering and technology development.

This four-course graduate certificate seeks to provide students with opportunities to apply technological knowledge and skills in a management setting to make data-driven, financial-based, and economic-based decisions.

Note: This certificate is for graduate engineering students as well as non-engineers and non-graduate engineering students.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
EMGT 5220	Engineering Project Management	4
EMGT 5300	Engineering/Organizational Psychology	4
EMGT 6225	Economic Decision Making	4
EMGT 6305	Financial Management for Engineers	4

Program Credit/GPA Requirements

16 total semester hours required
Minimum 3.000 GPA required

Multidisciplinary Programs

Website (http://www.coe.neu.edu/graduate-school/multidisciplinary/)

Dana Research Center, 5th Floor

617.373.5424

The multidisciplinary graduate engineering Master of Science (MS) programs integrate engineering solutions from the fields of technology and business by developing technical and engineering skills through advanced coursework and complex technical projects. Each program focuses on the application of knowledge and skills to business and industrial settings. The software, data, and network systems programs blend academic and corporate experience to enable students to enhance their professional capabilities, thereby facilitating career transformation. Given an applied focus, each program provides learning opportunities to develop the skills needed to create innovative, practical, and effective solutions that can be easily applied to current professional challenges.

The multidisciplinary graduate engineering programs are designed to prepare students for direct entry into the workforce. Students who are seeking preparation for entry into PhD programs should consider specific department MS programs (p. 141) aligned with their research interests.

Graduate Certificate Options

Students enrolled in a graduate degree program in the College of Engineering have the opportunity to pursue an engineering graduate certificate in addition to or in combination with the MS degree. For more information please refer to Graduate Certificate Programs (p. 251).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP OPTION

Students have the opportunity to pursue the Gordon Engineering Leadership Program (p. 527) in combination with the MS degree.

Programs

Master of Science in Information Systems (MSIS)

- Information Systems (p. 239)

Master of Science (MS)

- Cyber-Physical Systems (p. 241)
- Data Architecture and Management (p. 242)
- Software Engineering Systems (p. 242)
- Telecommunication Networks (p. 243)

Graduate Certificates

- Blockchain and Smart Contract Engineering (p. 244)
- Broadband Wireless Systems (p. 245)
- Engineering Leadership (p. 245)
- IP Telephony Systems (p. 246)
- Software Engineering Systems (p. 246)

Information Systems, MSIS

We offer cutting-edge expertise in a variety of courses that combine technological advances and business practices. We stress creative and inventive approaches to problem solving, which necessitates empowering students so that they can take charge of their own software projects to become originally productive. Our Information Systems program (https://coe.northeastern.edu/academics-experiential-learning/academic-departments/mgen/ms-insy/) is as much an art as a science. It bypasses mechanical learning and highlights the value and excitement of engineering thinking that gets things done efficiently as well as imaginatively. We balance theory and practice, on the premise that they are always intertwined and interdependent.

We seek to provide a basic foundation for our students and then seek to push them to new heights to advance their information technology skills in a way that keeps up and, better yet, exceeds the necessarily fast pace of this progressive field. It is not for us just a question of not being left behind; we strive to be at the forefront of software innovation in an effort to transform contemporary society even more radically than technology has already done—to take gigantic strides in business, medicine, education, and security.

The program offers a wide range of courses that reflect current and future industry trends:

- Cryptocurrency and Smart Contract Engineering
- Engineering of Big-Data Systems
- Business Intelligence and Data Analytics
- Cyber-Security Engineering and Development
- Digital Business
- Full-Stack Software Engineering
- User Experience Design
- Data Science and Machine Learning Systems Engineering

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Information Systems with Graduate Certificate in Engineering Leadership

Students may complete a master's degree in Information Systems in addition to earning a Graduate Certificate in Engineering Leadership (p. 245). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16 semester-hour-curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry based challenge project with multiple mentors. The integrated 32 semester hour degree and certificate will require 16 hours of advisor-approved Information Systems technical courses.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated. Students may not register for more than 9 semester hours in the fall, spring, and summer terms. All 32 credits must be completed from the IS, CSYE, and DAMG program coursework specified. The MSIS program does not accept any transfer credit.

Core Requirements

Code	Title	Hours
INFO 5100 and INFO 5101	Application Engineering and Development and Lab for INFO 5100	4

Concentrations

Seattle and Silicon Valley students will complete the General Information Systems (p. 240) concentration.

Students on the Boston campus may complete one of the following concentrations:

- General Information Systems (p. 240)
- User Experience (p. 240)
- Big Data Systems and Analytics (p. 240)
- Smart Contracts (p. 240)
- Intelligent Systems (p. 240)

GENERAL INFORMATION SYSTEMS

Code	Title	Hours
Seattle and Silicon Valley Students		
Complete 16 semester hours from the respective lists below (Seattle Campus List or Silicon Valley Campus List)		16
Boston Campus Students		
Complete 16 semester hours in INFO subject code.		16

USER EXPERIENCE

Code	Title	Hours
CSYE 7280	User Experience Design and Testing	4
INFO 6150	Web Design and User Experience Engineering	4
INFO 6245	Planning and Managing Information Systems Development	4
INFO 6350	Smartphones-Based Web Development	4

BIG DATA SYSTEMS AND ANALYTICS

Code	Title	Hours
CSYE 6225	Network Structures and Cloud Computing	4
DAMG 7245	Big-Data Systems and Intelligence Analytics	4
INFO 7250	Engineering of Big-Data Systems	4
INFO 7390	Advances in Data Sciences and Architecture	4

SMART CONTRACTS

Code	Title	Hours
Complete four from the following:		16
INFO 7500	Cryptocurrency and Smart Contract Engineering	
INFO 7510	Smart Contract Application Engineering and Development	
INFO 7520	Engineering of Advanced Cryptocurrency Systems	
INFO 7525	Regulatory Aspects of Smart Contract Automation	
INFO 7535	Digital Smart Contracts Product Innovations	

INTELLIGENT SYSTEMS

Code	Title	Hours
CSYE 7280	User Experience Design and Testing	4
INFO 7375	Special Topics in Artificial Intelligence Engineering and Applications	4
INFO 7390	Advances in Data Sciences and Architecture	4
INFO 7610	Special Topics in Natural Language Engineering Methods and Tools	4

Electives

Complete 12 semester hours from the respective course list.

BOSTON CAMPUS ELECTIVES

Code	Title	Hours
Complete 12 semester hours from the following subject codes:		12
INFO		
CSYE (except CSYE 6220)		
DAMG		

SEATTLE CAMPUS ELECTIVES

Code	Title	Hours
CSYE 6225	Network Structures and Cloud Computing	
CSYE 6230	Operating Systems	
CSYE 6305	Introduction to Quantum Computing with Applications	
CSYE 7280	User Experience Design and Testing	
DAMG 6105	Data Science Engineering with Python	
DAMG 6210	Data Management and Database Design	
DAMG 7370	Designing Advanced Data Architectures for Business Intelligence	
INFO 6105	Data Science Engineering Methods and Tools	
INFO 6150	Web Design and User Experience Engineering	
INFO 6205	Program Structure and Algorithms	
INFO 6215	Business Analysis and Information Engineering	
INFO 6250	Web Development Tools and Methods	
INFO 6350	Smartphones-Based Web Development	
INFO 7245	Agile Software Development	
INFO 7250	Engineering of Big-Data Systems	
INFO 7390	Advances in Data Sciences and Architecture	

SILICON VALLEY CAMPUS ELECTIVES

Code	Title	Hours
CSYE 6225	Network Structures and Cloud Computing	
INFO 6105	Data Science Engineering Methods and Tools	
INFO 6205	Program Structure and Algorithms	
INFO 6215	Business Analysis and Information Engineering	
INFO 6250	Web Development Tools and Methods	

INFO 6350	Smartphones-Based Web Development
INFO 7500	Cryptocurrency and Smart Contract Engineering
INFO 7510	Smart Contract Application Engineering and Development

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

Cyber-Physical Systems, MS

The Master of Science in Cyber-Physical Systems with a concentration in the Internet of Things (IoT) (https://coe.northeastern.edu/academics-experiential-learning/academic-departments/mgen/ms-cyps/) prepares our graduates for a world of connected devices. This innovative multidisciplinary program is designed to meet the demand for a new kind of specialist, one who can engineer and develop new interactive services; acquire, fuse, and process the data collected from sensors, actuators, controllers, and other devices; and develop architectures to interconnect these elements as part of larger, more diverse systems. It is expected that careers in this rapidly evolving area will encompass industry sectors ranging from energy, healthcare, transportation, infrastructure, to manufacturing.

This concentration integrates the study of wireless networking, protocols, sensor networks, security, software development, embedded systems, data analytics, and big data to provide students with the knowledge and tools to develop IoT applications, to analyze and design IoT architectures for different application domains, and to develop data analytic tools to analyze the large amounts of data generated by the massive deployment of IoT devices.

Degree Requirements

The program requires that a mix of core required courses and elective courses be taken—16 semester hours of core course work and a minimum of 16 semester hours of elective course work. Although there are some dependencies among the core courses, the program may be started in either the fall or spring semester.

Special topics courses, as well as other courses not in the list of electives, may be used as electives with prior approval of the program director. A maximum of two courses from the Khoury College of Computer Sciences may be used as electives. Before taking any course from Khoury, prior approval is required from the program director.

Independent Study (TELE 5978), usually 1 or 2 semester hours, or a Master's Project in Cyber Physical Systems (TELE 7945) must be carried out under the supervision of a professor and must have prior approval of the program director. Proposals for independent study or a master's project need to be submitted at least one month before the start of the semester.

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 251).

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated. Students may not register for more than 9 semester hours in the fall and spring terms and 4 semester hours in each of the three summer terms. Any exceptions must be approved by the program director.

Core Requirements

Code	Title	Hours
TELE 6510	Fundamentals of the Internet of Things	4
TELE 6530	Connected Devices	4
Choose two of the following three courses:		8
CSYE 6200	Concepts of Object-Oriented Design	
INFO 6105	Data Science Engineering Methods and Tools	
TELE 5330 and TELE 5331	Data Networking and Lab for TELE 5330	

Electives

Code	Title	Hours
Any core course not used to meet the required core course requirement may be taken as an elective. Otherwise, complete four of the following. A maximum of 8 semester hours of nontechnical electives may be taken. Students may take elective coursework outside these lists only with the prior approval of the program director. A maximum of 9 semester hours may be taken outside of the College of Engineering.		16
Technical Electives		
CSYE 6205	Concepts of Object-Oriented Design with C++	
CSYE 6225	Network Structures and Cloud Computing	
CSYE 6230	Operating Systems	
CSYE 7215	Foundations of Parallel, Concurrent, and Multithreaded Programming	
CSYE 7370	Deep Learning and Reinforcement Learning in Game Engineering	
DAMG 6210	Data Management and Database Design	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 5155	Wireless Sensor Networks and the Internet of Things	
EECE 7352	Computer Architecture	
EECE 7390	Computer Hardware Security	
EECE 7397	Advanced Machine Learning	
IE 7275	Data Mining in Engineering	
INFO 6150	Web Design and User Experience Engineering	
INFO 6205	Program Structure and Algorithms	
TELE 5360	Internet Protocols and Architecture	
TELE 6550	IoT Embedded System Design	
TELE 7374	Special Topics in the Internet of Things	
Nontechnical Electives		
EMGT 5220	Engineering Project Management	
INFO 6660	Business Ethics and Intellectual Property for Engineers	

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

Data Architecture and Management, MS

For program contact information, please visit this website (https://coe.northeastern.edu/academics-experiential-learning/academic-departments/mgen/ms-daam/).

Many MS programs in the data area deal with data collection and analysis but do not however address a crucial activity that data scientists, data analysts, business analysts and many software engineers need to perform to make that data valuable, namely, data integration. That activity may also be referred to as data preparation, data curation, application integration and data engineering based on the integration of use cases and integration persona. The MS program in Data Architecture and Management focuses on these activities.

Data systems engineering occurs because data is fragmented and usually scattered across many data sources. However, even if all the data one needed were in one place, there is still an intensive need for integration. Information is data in context and the context of data as collected is different than the many ways it needs to be transformed so as to generate useful information.

Data engineering field could be thought of as a superset of business intelligence and data warehousing that brings in more elements from software engineering. This discipline also integrates specialization around the operation of so called "big data" distributed systems, along with concepts around the extended Hadoop ecosystem, stream processing, and in computation at scale.

The MS in Data Architecture and Management program offers a multitude of courses in data engineering in addition to supplementary courses that are required to deliver the data results in a meaningful way to management. We plan to cover data management, advanced data management, data warehousing and business intelligence, column data bases, data science engineering, and big-data engineering. On the software engineering side, we offer advanced big-data programming using the powerful Scala language and a course on advanced data science as well as cloud computing. Multi-thread concurrent computing is also offered as it is important for synchronizing a huge set of servers working in parallel to do large scale analytics to make things run faster by 100's fold increase in speed. Due to the high-level mathematical operations required to make these programs run, only software engineers have the capacity to work in these complicated areas. Only they can make the necessary mathematical algorithms execute quickly enough to get the finest results.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
DAMG 6105	Data Science Engineering with Python	4
DAMG 6210	Data Management and Database Design	4
DAMG 7250	Big Data Architecture and Governance	4
DAMG 7370	Designing Advanced Data Architectures for Business Intelligence	4

Electives

Code	Title	Hours
Complete 16 semester hours from the following:		16
CSYE 7200	Big-Data System Engineering Using Scala	
DAMG 7245	Big-Data Systems and Intelligence Analytics	
DAMG 7275	Advanced Database Management Systems	
DAMG 7290	Data Warehousing and Business Intelligence	
DAMG 7325	Introduction to Information Technology Auditing	
DAMG 7350	Systems and Cybersecurity Fundamentals	
INFO 6215	Business Analysis and Information Engineering	
INFO 6245	Planning and Managing Information Systems Development	
INFO 6255	Software Quality Control and Management	
INFO 6660	Business Ethics and Intellectual Property for Engineers	
INFO 7250	Engineering of Big-Data Systems	
INFO 7255	Advanced Big-Data Applications and Indexing Techniques	
INFO 7390	Advances in Data Sciences and Architecture	

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

Software Engineering Systems, MS

Website (http://www.coe.neu.edu/degrees/ms-cse/)

The Software Engineering Systems program takes a sociotechnical, engineering approach to software. This engineering foundation is designed to enable students to embrace real-world complexity as a golden opportunity, especially for the more technically advanced student. We are committed to shaping our students to be intuitive problem solvers, experienced engineering architects, and result leaders who will have a great impact at the exciting three-way intersection of computer science, engineering, and ethics.

Our program offers a multitude of courses in big-data engineering and analytics in addition to supplementary courses that are required to deliver the data-analytics results in a meaningful way to management. We cover data management, advanced data management, business intelligence, column databases, data science, and big-data engineering. We offer advanced functional programming using the powerful Scala language and a course on advanced data science as well as cloud computing. Multi-thread concurrent computing is also offered as it is important for synchronizing a huge set of servers working in parallel to do large-scale analytics to make things run faster by a hundredfold increase in speed. Due to the high-level mathematical operations required to run these programs, only software engineers have the capacity to work in such

complicated areas. Only they can make the necessary mathematical algorithms execute quickly enough to get the finest results.

Our engineers become fluent in data science for the sake of building the actual system. They study how to write machine-learning algorithms on top of statistical packages.

- Students study the fundamentals of logical computing formulation and program construction as well as the mathematical modeling and analysis of algorithms—an essential aspect of data science analytics.
- Students study clustering techniques, along with topic modeling and classification and logical regression techniques, as well as Bayesian statistics.
- Students study how to configure and operate a Hadoop environment (large clusters of commodity hardware) and in the process how to integrate data from diverse sources, to move and manage data through big-data platforms (in-house or in the cloud). Data ingestion, the filtering and firing of millions of operations to run over large clusters of commodity hardware, is a software-engineering technique that we teach our students how to perform through Scala, multi-threading, Spark programming, and "map-reduce" techniques.
- We show students how to make the business case for analytics projects and how to follow an execution road map that involves understanding the architectures underpinning such gigantic platforms as well as the resourcing and cost issues.

Graduate Certificate Options

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Software Engineering Systems with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Software Engineering Systems in addition to earning a Graduate Certificate in Engineering Leadership (p. 245). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 hours of advisor-approved software design engineering technical courses.

Program Requirements

This program does not accept any transfer credit. All 32 credits must be completed from the CSYE, DAMG, and IS program coursework specified.

Core Requirements

Code	Title	Hours
CSYE 6200	Concepts of Object-Oriented Design	4
INFO 6205	Program Structure and Algorithms	4

Options

Complete one of the following options:

COURSE WORK OPTION

Code	Title	Hours
Complete 24 semester hours from the following lists toward the elective requirement:		24
CSYE		
A maximum of 8 semester hours may be taken from the following list toward the elective requirement:		
DAMG or INFO (INFO 6250 excluded)		

THESIS OPTION [1]

Code	Title	Hours
CSYE 7990	Thesis	8
Complete 16 semester hours from the following lists toward the elective requirement:		16
CSYE		
A maximum of 8 semester hours may be taken from the following list toward the elective requirement:		
DAMG or INFO (INFO 6250 excluded)		

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

[1] Students who elect to pursue the thesis option must first propose a topic and adviser for their thesis and receive approval from the program director.

Telecommunication Networks, MS

For program contact information, please visit this website (https://coe.northeastern.edu/academics-experiential-learning/academic-departments/mgen/ms-tnet/).

The Master of Science in Telecommunication Networks is designed for professionals currently in the telecommunications or networking field who either wish to enhance their technical skills and credentials or who wish to make a transition to the business side of telecommunications or networking. We also welcome applications from prospective students with limited industry experience. This program, which may be pursued on a full- or part-time basis, is one of only a very few master's programs in telecommunications and networking in the United States that is truly multidisciplinary, giving students the flexibility to tailor the curriculum to their specific interests, backgrounds, and career goals.

Degree Requirements

The program requires that a mix of core required courses and elective courses be taken—16 semester hours of core course work and a minimum of 16 semester hours of elective course work. Although there are some dependencies among the core courses, the program may be started in either the fall or spring semester. The four core courses each carry 4 semester hours of credit.

The technical electives include courses on network and communications technology and on the development of software systems and applications. The business electives are focused on engineering management and entrepreneurship. Electives come from approved lists of courses supplied by the colleges of engineering, business, and computer sciences. Students may take elective course work outside these lists only with the prior approval of the program director.

It is expected that students beginning this program will have an adequate background in the following areas: C, C++, or Java programming languages; probability and statistics; and differential and integral calculus.

Special topics courses, as well as other courses from outside the program, may be used as electives with prior approval of the program director.

Independent Study, usually 1 or 2 semester hours, or a Master's Project must be carried out under the supervision of a professor and must have prior approval of the program director. Proposals for Independent Study

or a Master's Project need to be submitted at least one month before the start of the semester.

Directed Study, also for 1 or 2 semester hours, is sometimes available for students. For directed study projects, a student follows a prescribed curriculum, usually with some form of an exam at the end of the semester.

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 251).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Telecommunication Networks with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Telecommunications Networks in addition to earning a Graduate Certificate in Engineering Leadership (p. 245). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate require 12 hours of technical core courses from the telecommunication networks program and 4 hours from the technical course list provided for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated. Students may not register for more than 10 semester hours in the fall and spring terms and 4 semester hours in each of the three summer terms. Any exceptions must be approved by the program director.

Core Requirements

Code	Title	Hours
TELE 5330 and TELE 5331	Data Networking and Lab for TELE 5330	4
TELE 5340	Telecommunications Public Policy and Business Management	4
TELE 5350	Telecom and Network Infrastructure	4
TELE 5360	Internet Protocols and Architecture	4

Electives

Code	Title	Hours
Complete a minimum of 16 semester hours from the course lists below. At least one elective course must be taken from the technical course list. (p. 244)		16

BUSINESS COURSE LIST

Code	Title	Hours
EMGT 5220	Engineering Project Management	
EMGT 6225	Economic Decision Making	
EMGT 6305	Financial Management for Engineers	
ENTR 6200	Enterprise Growth and Innovation	
ENTR 6212	Business Planning for New Ventures	
ENTR 6218	Business Model Design and Innovation	
ENTR 6219	Financing Ventures from Early Stage to Exit	
HRMG 6200	Managing People and Organizations	
INFO 6245	Planning and Managing Information Systems Development	
MGMT 6214	Negotiations	
MKTG 6200	Creating and Sustaining Customer Markets	
TECE 6222	Emerging and Disruptive Technologies	
TECE 6230	Entrepreneurial Marketing and Selling	
TECE 6250	Lean Design and Development	
TECE 6300	Managing a Technology-Based Business	

TECHNICAL COURSE LIST

Code	Title	Hours
CS 5520	Mobile Application Development	
CS 6710	Wireless Network	
CY 5150 and CY 5151	Network Security Practices and Lab for CY 5150	
CY 6740	Network Security	
CSYE 6200	Concepts of Object-Oriented Design	
CSYE 6225	Network Structures and Cloud Computing	
EECE 5155	Wireless Sensor Networks and the Internet of Things	
EECE 5576	Wireless Communication Systems	
EECE 7364	Mobile and Wireless Networking	
INFO 6205	Program Structure and Algorithms	
INFO 6350	Smartphones-Based Web Development	
TELE 5600	Linux/UNIX Systems Management for Network Engineers	
TELE 6350	Unified Communications and Collaboration	
TELE 6400	Software-Defined Networking	
TELE 6510	Fundamentals of the Internet of Things	
TELE 6603	Special Topics—Networking	

Program Credit/GPA Requirements

Minimum of 32 total semester hours required
Minimum 3.000 GPA required

Blockchain and Smart Contract Engineering, Graduate Certificate

The Graduate Certificate in Blockchain and Smart Contract Engineering addresses the rapidly growing and revolutionary field of distributed ledger (blockchain) technology. Companies from different industries are preparing to enhance their business practices through cryptocurrency, decentralized computing, digital security, smart contracts, and more. The certificate program covers blockchain platforms such as Ethereum that bring about transparency and trust to all participants in complex multiparty relationships. The implication is tremendous—from new currency and incentive systems to faster, less expensive, and more efficient transactions of all kinds, from banking to healthcare. Students have an opportunity to learn how blockchain platforms and their underlying trust models will impact the future of legally binding multiparty contracts. In addition, students also have an opportunity to learn how crypto-engineering techniques can be used to create digital trust fabrics that could safely facilitate the movement of any kind of transactions.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Required Courses		
INFO 7500	Cryptocurrency and Smart Contract Engineering	4
INFO 7510	Smart Contract Application Engineering and Development	4
INFO 7520	Engineering of Advanced Cryptocurrency Systems	4
INFO 7525	Regulatory Aspects of Smart Contract Automation	2
INFO 7535	Digital Smart Contracts Product Innovations	2

Program Credit/GPA Requirements

16 total semester hours required
Minimum 3.000 GPA required

Broadband Wireless Systems, Graduate Certificate

The broadband wireless systems graduate certificate program focuses on the fundamentals of wireless communications, IP networks and protocols, and telecommunications infrastructure as preparation for developing expertise in ongoing developments in mobile networking, broadband wireless communications, and mobile apps.

The four-course graduate certificate requires that two TNET core technical courses be taken along with two other specified courses. With the approval of the certificate director, one of the core courses may be waived with another technical course taken in its place. Mobile Wireless Communications and Networking (TELE 6100) may not be waived under any circumstances.

Note: Master of Science in Telecommunication Networks students are eligible for this graduate certificate.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
TELE 5330 and TELE 5331	Data Networking and Lab for TELE 5330	4
TELE 5350	Telecom and Network Infrastructure	4
TELE 6100	Mobile Wireless Communications and Networking	4
EECE 5576	Wireless Communication Systems	4

Program Credit/GPA Requirements

16 total semester hours required
Minimum 3.000 GPA required

Engineering Leadership, Graduate Certificate

The Gordon Engineering Leadership Program is a transformational, technical, and challenging graduate-level learning experience targeted for engineering professionals.

The Gordon Institute offers a **Graduate Certificate in Engineering Leadership** as formal recognition of midlevel engineers' leadership acumen and broadened cross-functional capabilities.

Pursuing the graduate certificate allows participants to:

- Take part in a hands-on curriculum taught by industry-experienced professors
- Work with peers from across engineering fields on leadership skills development
- Receive one-on-one mentoring from industry experts and faculty

The Gordon Engineering Leadership Program anchors around an intense, market-worthy challenge project based on your organization's strategic needs. This is a unique opportunity to apply your classroom experience in a professional setting, potentially further accelerating your career.

How to Earn a Graduate Certificate in Engineering Leadership

If you already have a Master of Science, then you can complete the one-year program to earn a Graduate Certificate in Engineering Leadership.

If you do not have a Master of Science, then you can still be considered for the Graduate Certificate in Engineering Leadership if you have at least three years of engineering work experience.

Additional Information can be found on the Gordon Engineering Leadership Program website. (http://www.northeastern.edu/gordonleadership/)

Beyond a Graduate Certificate

Most candidates pursue the Gordon Engineering Leadership Program as part of a Master of Science degree in the engineering discipline of their choice. Upon completion, they earn both the Master of Science degree and a Graduate Certificate in Engineering Leadership.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
ENLR 5121	Engineering Leadership 1	2
ENLR 5122	Engineering Leadership 2	2
ENLR 5131	Scientific Foundations of Engineering 1	2
ENLR 5132	Scientific Foundations of Engineering 2	2
ENLR 7440	Engineering Leadership Challenge Project 1	4
ENLR 7442	Engineering Leadership Challenge Project 2	4

Students can enroll in the Engineering Leadership Graduate Certificate while pursuing the following degrees:

- MSBioE Bioengineering (http://www.northeastern.edu/gordonleadership/degree/ms-in-bioengineering/)
- MS Biotechnology (http://www.northeastern.edu/gordonleadership/degree/ms-in-biotechnology/)

- MSChE Chemical Engineering (http://www.northeastern.edu/gordonleadership/degree/chemical-engineering/)
- MSCivE Civil Engineering (select concentration) (https://provost.northeastern.edu/gordon/certificate-and-degree-options/college-of-engineering/ms-in-civil-engineering/)
- MSCSE Computer Systems Engineering (https://provost.northeastern.edu/gordon/certificate-and-degree-options/college-of-engineering/ms-in-computer-systems-engineering/)
- MS Cybersecurity (https://provost.northeastern.edu/gordon/certificate-and-degree-options/khoury-college-of-computer-sciences/ms-in-information-assurance-and-cyber-security/)
- MS Data Analytics Engineering (https://provost.northeastern.edu/gordon/certificate-and-degree-options/college-of-engineering/ms-in-data-analytics-engineering/)
- MSECE Electrical and Computer Engineering (select concentration) (https://provost.northeastern.edu/gordon/certificate-and-degree-options/college-of-engineering/ms-in-electrical-and-computer-engineering/)
- MSECEL Electrical and Computer Engineering Leadership (https://provost.northeastern.edu/gordon/certificate-and-degree-options/college-of-engineering/ms-in-electrical-and-computer-engineering-leadership/)
- MSENE Energy Systems (https://provost.northeastern.edu/gordon/certificate-and-degree-options/college-of-engineering/ms-in-energy-systems/)
- MSEM Engineering Management (https://provost.northeastern.edu/gordon/certificate-and-degree-options/college-of-engineering/ms-in-engineering-management/)
- MS Engineering and Public Policy (select concentration) (https://provost.northeastern.edu/gordon/certificate-and-degree-options/college-of-engineering/ms-in-engineering-and-public-policy/)
- MSEnvE Environmental Engineering (http://www.northeastern.edu/gordonleadership/degree/ms-in-environmental-engineering/)
- MSIE Industrial Engineering (https://provost.northeastern.edu/gordon/certificate-and-degree-options/college-of-engineering/ms-in-industrial-engineering/)
- MSIS Information Systems (http://www.northeastern.edu/gordonleadership/degree/ms-in-information-systems/)
- MSME Mechanical Engineering (select concentration) (https://provost.northeastern.edu/gordon/certificate-and-degree-options/college-of-engineering/ms-in-mechanical-engineering/)
- MSOR Operations Research (https://provost.northeastern.edu/gordon/certificate-and-degree-options/college-of-engineering/ms-in-operations-research/)
- MSSBS Sustainable Building Systems (http://www.northeastern.edu/gordonleadership/degree/ms-in-sustainable-building-systems/)
- MS Telecommunication Networks (http://www.northeastern.edu/gordonleadership/degree/ms-in-telecommunication-networks/)

Program Credit/GPA Requirements

16 total semester hours required
Minimum 3.000 GPA required

IP Telephony Systems, Graduate Certificate

The Graduate Certificate in IP Telephony Systems focuses on the fundamental knowledge in communications, IP networks and protocols, media transport, and signaling as preparation to developing expertise into ongoing developments in VoIP networks and services, the IP Multimedia Subsystem (IMS), unified communications, and video networks.

The four-course graduate certificate requires that three TNET core technical courses be taken along with a specified fourth course. With the approval of the certificate director, one of the core courses may be waived with another technical course taken in its place. Unified Communications and Collaboration (TELE 6350) may not be waived under any circumstance.

Note: Master of Science in Telecommunication Systems Management/Telecommunication Networks students are not eligible for this graduate certificate.

Program Requirements

Core Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Code	Title	Hours
TELE 5330 and TELE 5331	Data Networking and Lab for TELE 5330	4
TELE 5350	Telecom and Network Infrastructure	4
TELE 5360	Internet Protocols and Architecture	4
TELE 6350	Unified Communications and Collaboration	4

Program Credit/GPA Requirements

16 total semester hours required
Minimum 3.000 GPA required

Software Engineering Systems, Graduate Certificate

The Graduate Certificate in Software Engineering Systems focuses on the sociotechnical approach to software engineering with attention on using engineering tools and considering real-world complexities to design and construct practical and viable software solutions.

This four-course graduate certificate is designed to provide students with opportunities to apply the fundamentals of engineering knowledge and skills to software development with attention on enterprise design and integration, secure systems design and creation, and data integration and architecture.

Note: Master of Science in Software Engineering Systems students are not eligible for this graduate certificate.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Required Courses		
CSYE 6200	Concepts of Object-Oriented Design	4
INFO 6205	Program Structure and Algorithms	4

Electives

Code	Title	Hours
Complete two of the following:		8
CSYE 6225	Network Structures and Cloud Computing	

CSYE 7215	Foundations of Parallel, Concurrent, and Multithreaded Programming
CSYE 7280	User Experience Design and Testing

Program Credit/GPA Requirements

16 total semester hours required
Minimum 3.000 GPA required

Interdisciplinary PhD Programs

Doctor of Philosophy (PhD)

- Cybersecurity (p. 125)
- Interdisciplinary Engineering (p. 247)

Interdisciplinary Engineering, PhD

130 Snell Engineering Center
617.373.2711

The College of Engineering (COE) offers an interdisciplinary Doctor of Philosophy degree involving substantial work in two or more academic departments or disciplines. This is an individually designed program for the student who wishes to pursue graduate studies in an area that substantially overlaps two or more units. In such cases, that student may design, in consultation with his or her faculty advisor(s), an interdisciplinary program. The program will correspond in scope and depth to Northeastern's established degree standards but need not agree exactly with the regulations of individual units. Individually designed interdisciplinary degree programs must be approved by the appropriate graduate office(s).

Program Requirements

In order to pursue an individually designed interdisciplinary graduate program, a student must have been accepted into an approved graduate program that will serve as the administrative home unit for the interdisciplinary program. Students who have been dismissed from any of the COE departments will not be able to enroll into the interdisciplinary PhD program with the department from which they were dismissed as either home or participating department. Successful application for admission to an individually designed interdisciplinary program consists of a written proposal describing the areas of proposed study and research. Part of this proposal will be a list of courses to be taken, a description of the qualifying and comprehensive examination process to be used, a timeline, and any other requirements of the program.

The interdisciplinary PhD requires the commitment by a faculty member at Northeastern University to be the advisor of the student and chair of the interdisciplinary committee for the student. This faculty member may or may not be a member of the administrative home unit. The committee must be assembled within the first semester of the program and must include faculty members from all of the participating units. At least two units must be represented on the committee. This committee will be responsible for overseeing the completion of the degree requirements. It will also be responsible for the administrative elements of the program, such as the monitoring of satisfactory progress; the design and grading of the preliminary and comprehensive exams, if applicable; graduation clearance; etc. This interdisciplinary committee is also responsible for an annual review of the progress of the student and for reporting this progress to the administrative home unit on an annual basis.

Qualifying Examination and Degree Candidacy

Interdisciplinary PhD students must register for and pass the doctoral qualifying examination of their home department. In some cases, if deemed necessary by the interdisciplinary committee, students may be required to take some part of the doctoral qualifying examinations of the other department(s) involved with the student's program of study. To qualify as an interdisciplinary doctoral candidate, students must successfully complete the doctoral qualifying examinations in addition to all their required coursework.

Dissertation

Students must present their dissertation proposal no more than 12 months after successfully completing their doctoral qualifying examinations. In addition, the presentation of the dissertation proposal and the actual dissertation defense shall be no less than six months apart. Interdisciplinary PhD students must follow the dissertation guidelines of their home department.

Residency Requirement

After achieving PhD candidacy, students must complete at least two successive semesters of full-time study on campus to establish residency. The total effort for a PhD program involves a minimum of three years of full-time work beyond the bachelor's degree. Students who enter the doctoral program with a Master of Science degree may complete the requirements in less time but should anticipate at least two years of full-time effort.

Language Requirement

Each doctoral candidate must be proficient in technical writing and oral presentation in the English language. The qualifying examination committee may require additional coursework in the case of any deficiency in these areas.

Cybersecurity, PhD

A research-based, interdisciplinary Doctor of Philosophy (PhD) in Cybersecurity combines a strong security technical foundation with a security policy and social sciences perspective. It seeks to prepare graduates to advance the state of the art of security in systems, networks, and the internet in industry, academia, and government. The interdisciplinary nature of the program distinguishes it from traditional doctoral degree programs in computer science, engineering, or social sciences and makes it unique in the Boston area.

Students who choose the PhD in Cybersecurity program have a strong desire to pursue academic research solving critical cybersecurity challenges facing today's society. The PhD program is a natural path for students in the college's Master of Science in Cybersecurity (http://www.ccs.neu.edu/graduate/degree-programs/m-s-in-information-assurance/)program who want to pursue research and students with bachelor's degrees and an interest in research-focused careers. Students who pursue careers in advancing the state of the art of cybersecurity have an opportunity to gain:

- A strong technical foundation in cybersecurity and an interdisciplinary perspective based on policy and social science
- A path to a research-focused career coupled with depth in information assurance research at a leading institution, one of the earliest designees by NSA/DHS as a National Center of Academic Excellence in Information Assurance Research, Information Assurance/Cyber Defense, and Cyber Operations

- The opportunity to work with and learn from faculty who are recognized internationally for their expertise and contributions in information assurance from Northeastern's Khoury College of Computer Sciences, the Department of Electrical and Computer Engineering, and the College of Social Sciences and Humanities
- Access to research projects at Northeastern's research centers focused on security:
  - The Cybersecurity and Privacy Institute (https://cyber.ccis.northeastern.edu/about/): The mission of Northeastern's Cybersecurity and Privacy Institute (the Institute) is to safeguard critical technology. Forging partnerships with experts in industry, government, and academia worldwide, the Institute's faculty and students develop, protect, and enhance technologies on which the world relies—from mobile devices and "smart" IoT applications to tomorrow's self-driving cars and delivery drones. Their expertise spans algorithm auditing; cloud security; cryptography; differential privacy; embedded device security; internet-scale security measurements; machine learning; big data; security, malware, and advanced threats; network protocols and security; web and mobile security; and wireless network security.
  - The International Secure Systems Lab (http://www.iseclab.org/), affiliated with Northeastern, a collaborative effort of European and U.S. researchers focused on web security, malware, and vulnerability analysis; intrusion detection; and other computer security issues.
  - The ALERT Center (http://www.northeastern.edu/alert/), where Northeastern is the lead institution, a multiuniversity Department of Homeland Security Center of Excellence involved in research, education, and technology related to threats from explosives.

The benefits of the Boston area:

- World-renowned for academic and research excellence, the Boston area is also home to some of the nation's largest Department of Defense contractors and government and independent labs such as MIT Lincoln Lab, MITRE, and Draper Lab.

Degree Requirements

The PhD in Cybersecurity degree requires completion of at least 48 semester credit hours beyond a bachelor's degree. Students who enter with an undergraduate degree will typically need four to five years to complete the program, and they will be awarded a master's degree en route to the PhD.

Doctoral Degree Candidacy

A student is considered a PhD degree candidate after completing the core courses with at least a 3.500 grade-point average (GPA), with no grades lower than a B in the core courses, and either publishing a paper in a strong conference or journal or passing an oral exam that is conducted by a committee of three cybersecurity faculty members and based on paper(s) written by the student.

RESIDENCY

One year of continuous full-time study is required after admission to the PhD candidacy. During this period, the student will be expected to make substantial progress in preparing for the comprehensive examination.

TEACHING REQUIREMENT

All cybersecurity PhD students must satisfy the teaching requirement in order to graduate. This requirement is fulfilled when the student works as a teaching assistant (TA) or instructor of record (IoR) for one semester and during this semester:

- Teaches at least three hours of classes
- Prepares at least one assignment or quiz or equivalent

PhD students are expected to satisfy the teaching requirement some time after completing their first year and at least one semester prior to scheduling their PhD defense.

DISSERTATION ADVISING

The doctoral dissertation advising team for each student consists of two cybersecurity faculty members, one in a technical area. When appropriate, the second faculty advisor will be from the policy/social science area.

DISSERTATION COMMITTEE

A PhD student's dissertation committee consists of the two members of the dissertation advising team plus two others: One is a member of the cybersecurity faculty, and the other is an external examiner who is knowledgeable about the student's research topic.

COMPREHENSIVE EXAMINATION

A PhD student must submit a written dissertation proposal and present it to the dissertation committee. The proposal should identify the research problem, the research plan, and the potential impact of the research on the field. The presentation of the proposal will be made in an open forum, and the student must successfully defend it before the dissertation committee after the public presentation.

DISSERTATION DEFENSE

A PhD student must complete and defend a dissertation that involves original research in cybersecurity.

AWARDING OF MASTER'S DEGREES

Students who enter the PhD in Cybersecurity program with a bachelor's degree have the option of obtaining a master's degree from one of the departments participating in the program. To do so, they must meet all of the department's degree requirements.

Program Requirements

Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Qualifying exam and area exam
Annual review
Dissertation proposal
Dissertation committee
Dissertation defense

Core Requirements

A grade of B or higher is required in each core course. A cumulative 3.500 GPA is required for the core requirement.

Code	Title	Hours
Foundations		
CY 5770	Software Vulnerabilities and Security	4
or EECE 5641	Introduction to Software Security	
CY 6740	Network Security	4
or EECE 5699	Computer Hardware and System Security	

CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	4

Electives and Tracks

Code	Title	Hours
Note: Consult faculty advisor for other acceptable courses.		
Select at least two courses from one track:		8
Hardware Security		
CS 6410	Compilers	
CS 6710	Wireless Network	
EECE 5666	Digital Signal Processing	
EECE 7352	Computer Architecture	
EECE 7364	Mobile and Wireless Networking	
EECE 7390	Computer Hardware Security	
Machine Learning		
CS 6140	Machine Learning	
CS 7150	Deep Learning	
CY 6720	Machine Learning in Cybersecurity and Privacy	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7397	Advanced Machine Learning	
Network Security		
CS 5700	Fundamentals of Computer Networking	
CS 6710	Wireless Network	
CS 7610	Foundations of Distributed Systems	
CY 5130	Computer System Security	
CY 6750	Cryptography and Communications Security	
EECE 5155	Wireless Sensor Networks and the Internet of Things	
EECE 5576	Wireless Communication Systems	
EECE 7336	Digital Communications	
EECE 7364	Mobile and Wireless Networking	
EECE 7374	Fundamentals of Computer Networks	
EECE 7393	Analysis and Design of Data Networks	
Systems Security		
CS 6410	Compilers	
CS 7600	Intensive Computer Systems	
CS 7610	Foundations of Distributed Systems	
CY 5130	Computer System Security	
EECE 7352	Computer Architecture	
Theory		
CS 7800	Advanced Algorithms	
CS 7805	Complexity Theory	
EECE 7337	Information Theory	
Usable Security and Privacy		
CS 6350	Empirical Research Methods	
CS 6760	Privacy, Security, and Usability	
CS 7260	Visualization for Network Science	
CS 7340	Theory and Methods in Human Computer Interaction	
INSH 6300	Research Methods in the Social Sciences	
INSH 6302	Qualitative Methods	
INSH 6500	Statistical Analysis	
INSH 7400	Quantitative Analysis	
Cybersecurity Policy		
CRIM 6200	Criminology	
CRIM 6262	Evidence-Based Crime Policy	
CY 5200	Security Risk Management and Assessment	
CY 5210	Information System Forensics	
CY 5250	Decision Making for Critical Infrastructure	
POLS 7341	Security and Resilience Policy	
POLS 7441	Cyberconflict	
Electives		
Selected in consultation with advisor from the graduate-level CS, ECE, and CSSH courses.		20

Dissertation

Code	Title	Hours
CY 9990	Dissertation Term 1	
CY 9991	Dissertation Term 2	
Complete the following (repeatable) course until graduation:		
CY 9996	Dissertation Continuation	

Program Credit/GPA Requirements

48 total semester hours required
Minimum 3.000 GPA required

Advanced Entry PhD Program Requirements

Degree Requirements

Incoming PhD in cybersecurity students who have already completed a Master of Science in an adjacent field may petition to the graduate program administration for advanced entry. Advanced entry petitions are reviewed by the program administration on a case-by-case basis. Please note that advanced entry does not waive by itself any part of the PhD coursework requirements. As a degree conferral requirement, a minimum of 16 semester hours of coursework beyond the 32 semester hours of the master's degree is required of advanced entry PhD students (48 semester hours is required of standard entry PhD students). A grade of B or higher is required in each course. A cumulative 3.500 GPA is required for the core requirement.

Doctoral Degree Candidacy

Refer to the PhD Cybersecurity overview (p. 125) for admission to candidacy requirements.

Residency

Refer to the PhD Cybersecurity overview (p. 125) for residency requirements.

Teaching Requirement

Refer to the PhD Cybersecurity overview (p. 125) for teaching requirements.

Dissertation Advising

Refer to the PhD Cybersecurity overview (p. 125) for dissertation advising requirements.

Dissertation Committee

Refer to the PhD Cybersecurity overview (p. 125) for dissertation committee requirements.

Comprehensive Examination

Refer to the PhD Cybersecurity overview (p. 125) for comprehensive examination requirements.

Dissertation Defense

Refer to the PhD Cybersecurity overview (p. 125) for dissertation defense and completion requirements.

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Qualifying exam and area exam
Annual review
Dissertation proposal
Dissertation committee
Dissertation defense

Core Requirement

Students are required to take all core courses unless otherwise determined by the program. Students must maintain a minimum GPA of 3.500 as well as earn a grade of B or better in each core course.

Code	Title	Hours
Foundations		
CY 5770	Software Vulnerabilities and Security	4
or EECE 5641	Introduction to Software Security	
CY 6740	Network Security	4
or EECE 5699	Computer Hardware and System Security	
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	4

Electives and Tracks

Students are required to take all courses unless otherwise determined by the program.

Code	Title	Hours
Note: Consult faculty advisor for other acceptable courses.		
Select at least two courses from one track:		8
Hardware Security		
CS 6410	Compilers	
CS 6710	Wireless Network	
EECE 5666	Digital Signal Processing	
EECE 7352	Computer Architecture	
EECE 7364	Mobile and Wireless Networking	
EECE 7390	Computer Hardware Security	
Machine Learning		
CS 6140	Machine Learning	
CS 7150	Deep Learning	
CY 6720	Machine Learning in Cybersecurity and Privacy	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7397	Advanced Machine Learning	
Network Security		
CS 5700	Fundamentals of Computer Networking	
CS 6710	Wireless Network	
CS 7610	Foundations of Distributed Systems	
CY 5130	Computer System Security	
CY 6750	Cryptography and Communications Security	
EECE 5155	Wireless Sensor Networks and the Internet of Things	
EECE 5576	Wireless Communication Systems	
EECE 7336	Digital Communications	
EECE 7364	Mobile and Wireless Networking	
EECE 7374	Fundamentals of Computer Networks	
EECE 7393	Analysis and Design of Data Networks	
Systems Security		
CS 6410	Compilers	
CS 7600	Intensive Computer Systems	
CS 7610	Foundations of Distributed Systems	
CY 5130	Computer System Security	
EECE 7352	Computer Architecture	
Theory		
CS 7800	Advanced Algorithms	
CS 7805	Complexity Theory	
EECE 7337	Information Theory	
Usable Security and Privacy		
CS 6350	Empirical Research Methods	
CS 6760	Privacy, Security, and Usability	
CS 7260	Visualization for Network Science	
CS 7340	Theory and Methods in Human Computer Interaction	
INSH 6300	Research Methods in the Social Sciences	
INSH 6302	Qualitative Methods	
INSH 6500	Statistical Analysis	
INSH 7400	Quantitative Analysis	
Cybersecurity Policy		
CRIM 6200	Criminology	
CRIM 6262	Evidence-Based Crime Policy	
CY 5200	Security Risk Management and Assessment	
CY 5210	Information System Forensics	
CY 5250	Decision Making for Critical Infrastructure	
POLS 7341	Security and Resilience Policy	
POLS 7441	Cyberconflict	
Electives		
Selected in consultation with advisor from the graduate-level CS, ECE, and CSSH courses.		20

Dissertation

Code	Title	Hours
CY 9990	Dissertation Term 1	
CY 9991	Dissertation Term 2	

Complete the following (repeatable) course until graduation:

CY 9996	Dissertation Continuation

Program Credit/GPA Requirements

Minimum 16 semester hours required
Minimum 3.000 GPA required

Graduate Certificate Programs

Graduate School of Engineering Certificates

The College of Engineering offers numerous graduate engineering certificates for professionals at every career stage. These certificates may be completed as stand-alone credentials or in combination with a graduate degree. They typically consist of 16 to 20 credits and allow the learner to quickly gain a credential to advance their skills and knowledge, meet an emerging career market need, or add to their professional preparation. In many cases, graduate coursework completed as part of a certificate program may be applied toward a graduate degree in the College of Engineering. Whether you are a working professional seeking new career opportunities, or a full-time graduate student looking to enhance your credentials, our broad and continuously expanding range of certificates are ready to help move your preparation forward.

Programs

The College of Engineering offers numerous graduate certificates that may be completed alone or in combination with an MS degree. Please see the Overview tab for Certificate Policies and Procedures (p. 251) for detailed information regarding College of Engineering graduate certificates.

Chemical Engineering

- Process Safety Engineering (p. 157)

Mechanical and Industrial Engineering

- Energy Systems (p. 235)
- Energy Systems Management (p. 235)
- Renewable Energy (p. 237)
- Sustainable Energy Systems (p. 238)

Engineering Business

- Engineering Business (p. 236)

Engineering Management

- Engineering Economic Decision Making (p. 237)
- Engineering Management (p. 237)
- Lean Six Sigma (p. 237)
- Supply Chain Engineering Management (p. 238)
- Technology Systems Management (p. 238)

Gordon Institute of Engineering Leadership

- Engineering Leadership (p. 245)

Multidisciplinary

- Blockchain and Smart Contract Engineering (p. 244)
- Software Engineering Systems (p. 246)

Telecommunication Networks

- IP Telephony Systems (p. 246)
- Broadband Wireless Systems (p. 245)

Bouvé College of Health Sciences

Website (https://bouve.northeastern.edu/)

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The Bouvé College of Health Sciences strongly supports the mission of Northeastern University as a practice-oriented, student-centered, experiential research institution. The college is committed to the goals of the university, which include excellence in education, research, scholarship, clinical practice, experiential learning, access to educational opportunities, and a strong professional orientation.

Bouvé offers students an education in health, health profession fields, and public health that features a curriculum of highly relevant, closely integrated, basic and applied courses in the physical, biological, behavioral, social, environmental, and health systems sciences. Students engage in interprofessional patient care, interdisciplinary translational research, and experiential learning opportunities through service-learning, research, and global experiences.

Bouvé leverages interdisciplinary and interprofessional collaboration to tackle the world's most pressing health challenges. The college seeks to prepare students to become clinicians, researchers, and leaders in healthcare and in the promotion of health of individuals and populations.

Students are provided a broad range of services and programs to ensure their academic success and professional development. Faculty are deeply committed to student success, as students interact with world-class healthcare and educational institutions nationally and globally, to advance health for all.

Academic Policies and Procedures

I. General Information and Overview

- Academic and Professional Conduct
- Scientific or Research Misconduct
- Accommodations for Students with Disabilities

II. Experiential Education

- Background Checks
- Health Requirements (p. 252)
- Liability Insurance
- Experiential PhD Opportunities (https://phd.northeastern.edu/experientialphd/)
- Requirements for Clinical, Internships, and Practicum Courses

III. Financial Awards

- Financial Awards
- PhD Funding

IV. Advising

- Academic Advising and Student Advisement Responsibilities

V. Courses and Grades

- Grading Policies (see Academic Progression)
- Course Substitution
- Transfer of Credit

VI. Program Status and Progression

- Academic Affairs Appeals Process
- Academic Dismissal
- Academic Probation Policy
- Academic Progression
- Academic Standing (p. 257)
- Graduation Policies
- Leave of Absence (see Academic Progression)
- Program Extension Procedures (p. 256) (see Academic Progression)
- Provisional and Conditional Acceptances (see Academic Progression)
- Withdrawal Procedures (p. 256) (see Academic Progression)

VII. Current Student Resources

- BCHS Student Forms
- BCHS Student Handbooks (https://northeastern.sharepoint.com/sites/BouveCurrentStudentResources/SitePages/Handbooks.aspx)

Background Checks

Clinical education sites, on a case-by-case basis, require background checks and/or drug screenings for employees, as well as for students who come to their facilities. A Northeastern University student will need to have background checks/drug screenings completed if their assigned clinical placement requires it. The college contracts with a national company (e.g., CastleBranch, (https://www.castlebranch.com/)Certifi, etc.) to perform these checks/screenings. The company charges fees to conduct background checks/screenings, depending on the type of background check/screening needed. Students are responsible for any fees charged by companies conducting background checks/ screenings.

All background check information is confidential. Results are posted to the company website in a secure, tamperproof environment. A student may view their results online using a password. A student will be contacted by the on-campus clinical coordinator only if there is a question about the results. Neither a student nor the company is required to reveal the actual results of the background check to the clinical site. However, a student may be unable to be placed at that clinical site based on the site's requirements.

If an assigned clinical site requires a student to have a background check/screening, the on-campus clinical coordinator/clinical placement office will post the requirements and provide instructions and a deadline for completing the check. To assure adequate processing time prior to the start of the clinical experience, it is crucial that the check be completed in advance of the deadline given. Failure to complete the check in a timely manner could jeopardize progression in the academic program.

These policies and/or procedures apply to Bouvé's undergraduate and graduate students.

Health Requirements

Students must comply with any university-wide health requirements. See Health Requirements—University Health and Counseling Services (UHCS) (http://catalog.northeastern.edu/undergraduate/information-entering-students/health-requirements-uhcs/).

As a condition of matriculation at Northeastern University, all students are required to submit the completed University Health Report form. Consult the UHCS website (https://www.northeastern.edu/uhcs/forms/university-health-report/) for instructions and deadlines to submit the University Health Report form. UHCS may block the registration of those students who do not file the required form(s).

Based on clinical education site requirements and associated clinical affiliation agreements, some programs in the Bouvé College of Health Sciences will require additional medical documentation and health certification. Additional requirements may include, but are not limited to, exam or statement of good health prior to registration, annual proof of physical examination, and/or proof of additional immunities. This "clinical clearance" may be required by some programs prior to engaging in clinical, internship, or fieldwork. Students should review the UHCS website (https://www.northeastern.edu/uhcs/forms/clinical-clearance/) for general information about clinical clearance as well as consult their major/program handbook and/or consult their program's director or clinical placement coordinator for more information.

These policies and/or procedures apply to Bouvé's undergraduate and graduate students.

Liability Insurance

Students on clinicals, clinical practicum, or clinical internships, under a clinical agreement with the university, are covered by Northeastern University's liability insurance program for claims arising out of the student performing assigned duties in the scope of their studies. Students should consult their clinical placement office, program director, and program policies for more information about liability insurance. If students have questions about their placement and the insurance provided, they may contact Risk Services (http://www.northeastern.edu/risk_services/).

Requirements for Clinical, Internships, and Practicum Courses

- Some Bouvé programs require courses with clinical, internship, or fieldwork components. Such components are offered at affiliated hospitals, clinics, schools, medical facilities, or other institutions and involve contractual agreements with these institutions or sites.
- Some Bouvé programs have cooperative education (co-op) requirements. Students secure co-ops through a job search

process and are employees of an institution while on co-op. Co-op students are subject to the policies, procedures, and requirements of their employers.

- The university is affiliated with numerous clinical sites across the country and around the world. Depending on the program, students may be required to travel outside of Massachusetts to complete clinical courses. Students are responsible for any costs associated with transportation and/or housing.
- Evaluation for clinical courses will be based on established guidelines and policies that students will receive prior to and/or during the clinical component. Periodic performance evaluations will take place during the course of the academic term. See specific program clinical policies and procedures, handbooks, or course syllabi for details.
- In order to enroll students in university-sponsored accidental injury insurance, elements of students' demographic information (including date of birth, address, and phone number) will be communicated via a university-contracted third-party clinical database to Risk Services and to the company providing the coverage. In addition, programs may use elements of a student's demographic information in the process of site onboarding. Students may refer to the university privacy policy (https://www.northeastern.edu/privacy-information/) and contact their program director or clinical placement office for more details.

Student Conduct

- Students assigned to an institution or site for instruction are expected to adhere to the rules and regulations of that institution. Failure to adhere to these rules may result in dismissal from that institution or site.
- Students should be aware that, while participating in any form of clinical practice, they continue to be under the jurisdiction of the university. Any breaches of conduct committed by a student in a clinical setting that would be a violation of the university Code of Student Conduct (http://www.northeastern.edu/osccr/code-of-student-conduct/) or relevant unit specific to the Professional Code of Conduct shall also be considered a cause for disciplinary action against the student.
- All students are required by federal and state law to respect the confidentiality of the patients' and/or students' records under the Health Insurance Portability and Accountability Act (HIPAA) and/or Family Educational Rights and Privacy Act (FERPA), respectively, to which they may be privy. This includes, but is not limited to, patient/student identity and identifiers, diagnostic tests performed, medical history, special needs, and medications prescribed. For more information, students should contact their on-campus clinical education coordinator and/or clinical education site coordinator.

Health Clearance, Background Check, and Training Requirements

- Evidence of health clearance is required for experiential courses (including clinicals, internships, and practicums) in their field of study. All students, regardless of age, must have a current physical exam, tuberculin test, and documentation of immunity on file at University Health and Counseling Services (UHCS (https://www.northeastern.edu/uhcs/)) and provide such documentation to their on-campus clinical coordinator/clinical placement office as requested.
- Students must meet the health clearance requirements of their academic program and any site-specific requirements prior to entering the clinical setting. This means that students must make arrangements for their physical exams and immunizations months before they are scheduled for a clinical course or rotation. Students who do not present the appropriate health certification will be blocked from registering for, or attending, a clinical course or rotation until satisfactory evidence is provided.
- More specific guidelines are available from University Health and Counseling Services in 135 Forsyth, online at UHCS (https://www.northeastern.edu/uhcs/forms/clinical-clearance/), or from the individual program's clinical placement office. Guidelines are updated periodically and students must meet the most current guidelines or they will not be allowed into a clinical area.
- School of Nursing students must provide evidence of health documentation utilizing an immunization tracker in order to ensure that documents are updated on a yearly basis. All fees required for the immunization tracking will be paid by the student directly to the tracking service.
- In preparation for clinical education experiences, all students will complete on-site training in universal precautions and safe practices offered by the Office of Environmental Health and Safety (https://www.northeastern.edu/ehs/) or training vetted and approved by the Office of Environmental Health and Safety and offered by their program. Students must also complete an annual online refresher course in blood-borne pathogens exposure.
- Students may be required to complete background checks/drug screening prior to engaging in clinical, internship, or fieldwork courses as outlined in this catalog (p. 252).

POLICIES FOR INTERNATIONAL STUDENTS

- Students in F-1 visa status must consult with the university's Office of Global Services (https://international.northeastern.edu/ogs/) before enrolling in clinical, internship, practicum, off-campus directed study, or capstone courses in order to discuss proper documentation for these curriculum requirements (see also F-1 Curricular Practical Training (CPT) (https://international.northeastern.edu/ogs/employment/curricular-practical-training-cpt-f1/)).
- Graduate international nursing students must have a current U.S. nursing license.

Academic, Professional, or Research Misconduct

The healthcare professions represented by the programs in Bouvé College require more of their members than simple mastery of technical knowledge and skills. Equally important is the ability to earn the respect and confidence of those who seek medical care. The nearly universal existence of codes of conduct and standards of professional ethics and behavior in these disciplines is evidence that certain types of conduct are expected in order to promote this respect and confidence. Fundamental to most of these codes is an understanding that healthcare professions require individuals who conduct their activities in a manner that reflects a total concern for the well-being of the patient. Violations of ethical conduct may be grounds for dismissal from the program. Students are expected to learn and practice the conduct that is appropriate to their professions and promotes the physical and mental well-being of the patient.

Bouvé students are expected to adhere to the highest academic and professional standards. The university Code of Student Conduct (http://www.northeastern.edu/osccr/code-of-student-conduct/) sets forth the university's expectations of behavior that promotes the safety and welfare of the Northeastern University community. The university Code of Student Conduct defines various aspects of academic misconduct, such as cheating and plagiarism. Lack of knowledge of these definitions does

not negate the student's responsibility for upholding them. Academic misconduct is regarded as a serious violation of ethical standards and may result in the student's immediate dismissal from the program.

Failure to meet these standards, including misconduct in academic, professional, or research activities, will result in disciplinary action. Such actions may include a lowered or failing grade in the course, probation, suspension, or immediate dismissal from the program. **Students found responsible for academic, professional, or research misconduct will have a letter placed in their permanent file stating the pertinent findings of their case.** No student may withdraw from a course in which they have been notified that they will fail for a specific finding of academic dishonesty.

In addition to maintaining complete honesty in all academic work, students admitted to clinical or professional programs in the Bouvé College of Health Sciences are expected to familiarize themselves with the code of ethical conduct of the professional discipline they are entering and to agree to uphold these principles.

Similarly, students who participate in research programs are expected to familiarize themselves with the code of ethics in research. Such a code is outlined in Guidelines for the Conduct of (https://oir.nih.gov/sourcebook/ethical-conduct/research-ethics/nih-guidelines/)*Research.* Ethical codes of conduct for researchers are also presented in the National Academy of Sciences' (https://www.nap.edu/catalog/12192/on-being-a-scientist-a-guide-to-responsible-conduct-in/) On Being a Scientist, A Guide to Responsible Conduct in Research (https://www.nap.edu/catalog/12192/on-being-a-scientist-a-guide-to-responsible-conduct-in/). Violations of research ethics can include, but are not limited to, falsification or fabrication of data, plagiarism, malicious allegations of misconduct in science, covering up or failing to report misconduct, obstructing due process in investigations of misconduct, and reprisals against those revealing misconduct.

See also the *Scientific or Research Misconduct* section of the Academic Appeals Policies and Procedures (p. 23) page in this catalog.

These policies and/or procedures apply to Bouvé's undergraduate and graduate students, unless specifically indicated otherwise in this section of the catalog.

Financial Awards

Northeastern University and the Bouvé College of Health Sciences offer a variety of financial awards to graduate students. For further information about awards, please refer to the Financial Aid Assistance (p. 20) section of this catalog and the Student Financial Services (https://studentfinance.northeastern.edu/applying-for-aid/graduate/) website.

If a student is offered other grant aid from the university, he or she will only receive the scholarship of higher value.

Advising

The unit director or another faculty member will be appointed by the program director to serve as the student's academic advisor throughout their course of study at the Bouvé graduate school.

The advisor will assist the student in understanding program requirements and in defining career goals and objectives of graduate work. The advisor will also monitor the student's progress toward successful completion of the degree.

Student Advisement Responsibilities

Students share responsibility with their advisor for successful matriculation and progression in their graduate program. In many programs, students are required to make appointments for academic advisement at least twice a year and must regularly update their curriculum plan with their advisor. The curriculum plan is kept on file in the respective program's office. Both student and advisor retain a copy of the curriculum plan. Students must contact their academic advisor prior to making changes to their curriculum plan and must seek assistance regarding academic issues in a timely manner.

Course Substitution

A student must obtain approval from the student's academic advisor and the Bouvé Office of Student Services to substitute a graduate course completed for a prior degree for the student's program requirement. The student must provide official transcripts of completed coursework, accompanied by the respective course syllabi, to the advisor in order to verify its equivalency to the proposed course substitution. The student then must submit the signed Course Substitution (https://northeastern.sharepoint.com/sites/BouveCurrentStudentResources/SitePages/Forms.aspx) form and the official transcript to the Bouvé Office of Student Services. If the *Course Substitution* form is approved, the student must still complete a course of equivalent number of credits as a replacement for the substituted course to fulfill the program's academic requirements. The course must be listed in this catalog as either a core or elective course for the program.

Transfer of Credit

For general regulations concerning transfer credit in Northeastern's graduate degree programs, please visit Regulations Applying to All Degree Programs (p. 9).

Students who wish to take a course for transfer at another institution while enrolled at Bouvé should first receive preapproval from their academic advisor and the Bouvé Office of Student Services. The Graduate Petition to Transfer Credit form can be found at the Office of the University Registrar (https://registrar.northeastern.edu/article/transfer-credit/).

A Bouvé student may not complete coursework at another institution during the last term of the student's program intending to transfer back to Northeastern to complete the student's program.

Academic Affairs Appeals Process

Purpose of the Bouvé College Academic Affairs Committee

- The college Academic Affairs Committee (AAC) acts on matters relating to the academic and professional standing of all Bouvé students in the college who have already appeared before the unit's Academic Standing Committee (ASC) and school dean, department chair, or designee.
- Issues pertaining to academic and co-op status and professional behaviors violations, including but not limited to warning, probation, permission to resume studies, changes in requirements, and repeating courses, fall within the jurisdiction of the AAC. The AAC also considers student appeals relative to academic or cooperative

education judgments by faculty, coordinators, or others acting on behalf of the university, when such appeals arise from a violation, misinterpretation, or inequitable application of the academic provisions outlined in the University Catalog, Cooperative Education Handbook, or student handbooks.

- Appeals arising from allegations of discrimination or harassment on the basis of a protected category should be referred to the Office for University Equity and Compliance. The Disability Resource Center (http://www.northeastern.edu/drc/) provides an appeal process for students with disabilities who believe their accommodation requests were unduly denied. If other allegations remain at the conclusion of those inquiries, then the student may refer them to the dean for review by the AAC of the college.

Graduate Student Academic Appeals Procedures

The university policy on graduate student appeals of academic standing or other academic decisions may be found in the graduate sections of this catalog. Academic, professional, scientific, and research misconduct is addressed in the Academic Appeals Policies and Procedures (p. 23) page as well as on the Requirements for Clinical, Internships, and Practicum Courses page in this catalog.

Levels of the Appeal Process

Please see the Academic Appeals Policies and Pro (http://catalog.northeastern.edu/graduate/academic-policies-procedures/appeals/)cedures (http://catalog.northeastern.edu/graduate/academic-policies-procedures/appeals/) page in the graduate catalog for the process steps involved in graduate student appeals.

Step 1:

Discuss concerns with instructor and/or administrator.

Step 2:

If the concern remains unresolved after discussions in step 1, prepare and submit an appeal statement. Students are encouraged to contact their academic advisor for guidance.

Step 3A: BCHS Unit-Level Appeal

The first step in an appeal in the Bouvé College of Health Sciences (BCHS) is to the unit-level Academic Standing Committee (ASC) of the unit offering the course. Such appeals should be submitted within 28 calendar days of the day when the student learns of the academic determination. The unit's ASC must provide the student and involved faculty member with a written report of the finding(s) and decision within 10 business days.

Step 3B: Department Chair- or School Dean-Level Appeal

If the student believes they have been erroneously, capriciously, or otherwise unfairly treated with the unit-level committee's decision, they may pursue a secondary appeal to the next level as specified below:

School of Clinical and Rehabilitation Sciences: department chair of the unit offering the course or program

School of Community Health and Behavioral Sciences: department chair of the unit offering the course or program

School of Nursing: school dean

School of Pharmacy: school dean

The student must request the appeal by contacting the specified office in writing via email within 10 business days of receiving the report from the previous step. After consideration, the department chair or school dean, or their representative, shall provide the student and involved faculty member with a written report of their finding(s) and decision within 10 business days of receiving the appeal request.

Step 3C: College-Level Appeal

If the student is not satisfied with the disposition of the matter at the previous step, they may proceed with the appeal through the BCHS Academic Affairs Committee (BCHS AAC). The BCHS AAC hears cases that have been unsatisfactorily resolved at the prior school and unit levels for "students who believe that they have been erroneously, capriciously, or otherwise unfairly treated" or may directly hear appeals concerning final course grades or when a unit does not have a unit-level committee.

The student must request an appeal hearing in writing (via email) within 10 business days of receiving the report from the previous step. After consideration, the college dean or their representative shall provide the student and involved faculty member with a written report of their finding(s) and decision within 10 business days of receiving the appeal request.

Processes for College-Level Appeals to the BCHS AAC

- Students wishing to bring an appeal before the college AAC should first consult with their appointed academic advisor, or when the appeal involves the academic advisor, with the assistant dean of student services.
- The chair of the college AAC will convene the college appeals panel from among the regular members of the BCHS AAC. The appeals panel will include three voting members of the BCHS AAC that appropriately represent the breadth and depth of programs within the college. At minimum, two schools will be represented on the panel and at least one member who teaches within a similar degree-level program. Members of the panel shall have no known conflicts of interest with the student. The assistant dean of student services and the chair of the AAC will attend the appeal panel hearing as nonvoting members.
- The chair for the appeal panel shall be selected from among the panel members and is responsible for producing a formal recommendation of the committee for communication to the college dean.
- The chair of the AAC will be responsible for scheduling the meeting, notifying the student and other participants in a timely manner so they may attend, and keeping and archiving records of the proceedings according to committee procedures.
- The chair of the appeal panel will notify the college dean of the findings and recommended decision. The college dean will have the final decision.
- The college dean will notify the student and other relevant parties of the decision in writing no later than 10 business days after the decision.

Step 4: University Level

If the student is not satisfied with the college's disposition of the matter or if the appeal is not resolved within the timeline outlined in the

Academic Appeals Policies and Procedures, the student may appeal to the university level, as outlined in this catalog.

Academic Dismissal

A student may be dismissed from a graduate program when he or she has failed to maintain academic requirements or has violated a policy that specifies immediate dismissal. All students shall have an opportunity to correct academic deficiencies during an appropriate probationary period before dismissal is instituted, except when the policy specifies "immediate dismissal."

Students may be subject to dismissal under the following conditions. (Note: Additional requirements that are not included in this list, but are specific to the student's major, may also apply.)

- The student exhibits unethical behavior or misconduct in their academic program, practicum, internship, or research.
- The faculty instructor and/or the clinical supervisor determines that the student has demonstrated unsafe or inappropriate behavior in a clinical setting.
- The student does not register for at least one class for two consecutive semesters and does not have an approved leave of absence.
- The student has a cumulative grade-point average below 3.000 at the end of the probationary period specified by the action plan.
- The student does not demonstrate satisfactory performance in achieving the objectives of a clinical course.
- The student fails to meet all the requirements of the program within the specified time limit mandated by the program and has not been approved for a formal extension.
- The student in a PhD program fails to successfully complete the PhD qualifying/comprehensive exams as stipulated by the program.
- The student fails to progress satisfactorily in research or fails to identify a committee for their thesis or dissertation within the time specified by the policies of the specific program.
- The student has failed to file an action plan within one month of notification of probation.
- The student has failed to meet the requirements of the action plan, including requirements that are specific to the student's major.
- The student has failed three courses or has failed the same course twice.

Dismissal Procedures

Dismissal of a student is initiated by the program director once the basis for the dismissal is provided to and reviewed by the Bouvé Office of Student Services. The program director will then notify the student of the dismissal. Students may then appeal the dismissal via the Bouvé College Academic Affairs Appeals Process (p. 254).

Academic Probation Policy

Academic probation is a period of time when a student must address and remediate academic deficiencies. An action plan to clear the deficiency must be developed by the student, the student's academic advisor, and the specific program graduate committee (if applicable). A student placed on probation will receive written notification from the Bouvé Office of Student Services. The student's program advisor will also receive notification of probationary status. It is the student's responsibility to write an action plan with the student's academic advisor. The plan should document how the deficiency will be remediated. This action plan must be signed by the advisor and the student and placed in the student's file in the Bouvé Office of Student Services within one month from the date of the written notification of probation. The student's failure to file an action plan may be cause for dismissal from the program. The action plan must specify the date by which the deficiency will be cleared.

A Bouvé graduate student may repeat a course only once to achieve a passing grade and may repeat only two courses during the entire program of study. A student may be on probation for only two semesters, or until the course is offered again, unless the advisor approves an action plan that specifies a longer (but definite) period. A student may only be placed on probation twice during enrollment in Bouvé and must correct all deficiencies, as specified, in each respective action plan during the applicable probationary period. Failure to remediate the deficiency within the agreed time may result in dismissal from the program. During the period of probation, the student must earn a GPA of 3.000 or better each semester, or the student is subject to dismissal from Bouvé. Note that individual graduate programs may have additional requirements that must be included in the probation action plan.

A student will be removed from academic probation after the student has attained a cumulative GPA of 3.000, earned a passing grade in a repeated course, and/or demonstrated satisfactory performance in a clinical course.

Academic Progression

Program Status and Progression

All degree requirements must be completed within a maximum of seven years of matriculation, although individual academic programs may require completion in a shorter time frame. Each student is responsible for reviewing the requirements for the student's particular program. A student's failure or inability to register does not extend the amount of time allowed to complete the program. Students should be registered by the first week of each semester (fall, spring, and, where indicated, summer). Course credits earned in programs of graduate study are valid for a maximum of seven years, unless an extension is granted by the program director and the Bouvé associate dean for academic affairs.

After establishment of candidacy for the PhD degree, a maximum of five years will be allowed for completion of the degree requirements, unless an extension is granted. In order to progress in clinical courses that are sequenced, a student must receive a passing grade in all prior courses in the sequence. In the event that a student fails a clinical course that is not part of a sequence, progression is at the discretion of the student's academic advisor and/or the program director. When a student fails a clinical course that is part of a sequence of courses, the course instructor must notify the Bouvé Office of Student Services. Course material related to the student's failure (e.g., examination reports, clinical reports) must be made available to the student for review.

PROVISIONAL AND CONDITIONAL ACCEPTANCES

A student who is accepted *conditionally* to a graduate program at Bouvé College of Health Sciences must meet the conditions set in the acceptance letter *before* the student matriculates into the program and prove that he or she has fulfilled the stated condition(s). Examples of conditions include receipt of official verification of previous degree completion, completion of missing prerequisite courses, receipt of a missing recommendation, receipt of standardized test scores, and translation of international documents.

A matriculated student who is accepted *provisionally* to a graduate program at Bouvé College of Health Sciences must meet the conditions set forth in the acceptance letter. Examples of provisions

include maintenance of a GPA of 3.000 and completion of all prerequisites as outlined in the acceptance letter.

Students who fail to meet the conditions or provisions of their acceptance may be subject to dismissal from the program.

PROGRAM EXTENSION PROCEDURES

Students may seek extension beyond the seven years to complete their program of study only under documented extenuating circumstances. The student must complete the *Graduate Program Status Change* Form and an action plan to complete the degree requirements. The form and the proposed action plan must be submitted to the program director and to the Bouvé Office of Student Services for approval. After the form is reviewed, a program extension may be granted.

LEAVE OF ABSENCE

Students planning on taking a leave of absence should first meet with their academic advisor to discuss their intention to submit a request for a leave of absence one month prior to the start of the semester during which they plan to take the leave. After meeting with their academic advisor, the student should then submit the leave of absence petition through the myNortheastern (https://my.northeastern.edu/) portal. Students returning from a leave of absence should notify the Bouvé Office of Student Services of their intent to return at least one month prior to the start of the semester. Students with an approved leave of absence who do not return at the end of the leave of absence period will be withdrawn by the university. Please refer to the Graduate Schools Academic Policies (p. 32) section of this catalog for more information and policies on leaves of absence. Individual programs may have additional procedures related to leaves of absence. Consult the program's overview and requirements page in this catalog in addition to the information above.

WITHDRAWAL PROCEDURES

Students can withdraw from the university only through the myNortheastern (https://my.northeastern.edu/) portal. *Students are responsible for dropping any courses in which they are currently registered and should have an exit interview with their financial aid advisor.* Faculty members are not responsible to notify the university of a student's withdrawal. For more information on withdrawal procedures, please refer to the Graduate Schools Academic Policies (p. 32) page. For information concerning refund policies, please refer to the Student Financial Services website (http://www.northeastern.edu/financialaid/policies/).

GRADING POLICIES

Requirements for fulfillment of a degree in the Bouvé College of Health Sciences graduate school vary by program. Students must consult their individual academic program's requirements page in this catalog, as well as program directors *(if applicable),* for specific credit and noncredit requirements necessary to earn a specific degree. See also Student Records, Transcripts, and Related Policies (p. 36) for more information.

Academic Standing

Academic standing in Bouvé is determined by the student's cumulative grade-point average (GPA) and performance in academic and clinical courses that are required by the student's program. All Bouvé students are expected to maintain a cumulative GPA of 3.000 each semester to remain in good academic standing and to progress toward graduation. Students who do not maintain a cumulative GPA of 3.000 each semester will be placed on academic probation (p. 256).

Each program has its own minimum grade requirements. Please review the program's requirements page in this catalog for details.

Academic Standing Petitions

Students must submit petitions to their program's academic standing committee, graduate committee, or program director (as applicable) to request:

- A leave of absence (https://registrar.northeastern.edu/article/leaves-of-absence/)
- A waiver of policy
- A change in probationary status (requires a formal letter to the program director)
- A change in program (see Graduate Program Status Change form (https://northeastern.sharepoint.com/sites/BouveCurrentStudentResources/SitePages/Forms.aspx))
- A change of status in program (e.g., full-time to part-time or vice versa; see Graduate Program Status Change form (https://northeastern.sharepoint.com/sites/BouveCurrentStudentResources/SitePages/Forms.aspx))
- A different course of action regarding their academic standing, progression, probation, or dismissal (requires a formal letter to the program director)
- An extension of degree completion time (see Graduate Program Status Change form (https://northeastern.sharepoint.com/sites/BouveCurrentStudentResources/SitePages/Forms.aspx))
- A transfer or waiver of credits (see Graduate Petition to Transfer Credit (https://registrar.northeastern.edu/article/transfer-credit/))
- Preapproval for course to be taken for transfer (requires a formal letter to the program director)
- Directed study (see Individual Instruction Registration (https://registrar.northeastern.edu/article/individual-instruction-registration/))

The petition must include all relevant information. Students may be required to provide extra documentation such as official transcripts and/or course descriptions. A copy of this action is filed in the student's permanent record in the Bouvé College of Health Sciences Office of Student Services.

Graduation Policies

Eligibility to Graduate

Students are eligible for graduation under the following conditions:

- The student is in good academic standing with a cumulative grade-point average of 3.000 or above.
- The student has earned at least the minimum number of credits required to complete the student's program of study.
- The student has fulfilled other program requirements and any outstanding issues.

Apply to Graduate

Students must apply to graduate through the Student Hub, review their degree audit for accuracy, and may choose to meet with their academic advisor for academic clearance.

Issuance of Diplomas and Certificates

Diplomas and certificates are issued three times a year (December, May, and August), but there is only a spring Commencement ceremony. Please visit the Commencement Office website (https://www.northeastern.edu/commencement/) to confirm eligibility to participate in the spring Commencement ceremony.

Completing a Thesis for a Master's Program

Students completing a thesis as part of the program's academic requirements are required to complete the following **at least five business days before the final grade submission deadline for the academic term:**

- Upon successful defense of the thesis, the student must have the *Thesis Approval* form signed by the members of the thesis committee.
- The student must submit an electronic copy of the thesis to ProQuest, following the directions outlined at the University Library (http://library.northeastern.edu/get-help/theses-dissertations/submit-your-thesis-or-dissertation/) website.
- The student must have the *Thesis Approval* form approved by a representative from the Bouvé Office of Student Services.

PhD Program Completion

PhD degree completion has additional requirements.

- The PhD hooding and degree conferral ceremony is only held during the spring semester. PhD students may not be hooded until they have successfully defended their dissertations and completed all academic requirements.
- Students completing a dissertation must complete the following **at least five business days before the final grade submission deadline for the academic term:**
    - Upon successful defense of the dissertation, the student must have the *Dissertation Approval* form signed by the dissertation committee members.
    - The student must submit an electronic copy of the dissertation to ProQuest, following the directions outlined in the University Library (http://library.northeastern.edu/get-help/theses-dissertations/submit-your-thesis-or-dissertation/) website.
    - The student must complete an exit survey, at which time the *Dissertation Approval* form will be approved.
    - Students must submit a copy of the Survey of Earned Doctorates Certification of Completion (https://sed-ncses.org/login.aspx) (SED) to the Bouvé Office of Student Services before graduation. Instructions for submission of the survey will be sent to the student prior to the end of the student's last term.

Interdisciplinary

Doctor of Philosophy (PhD)

- Network Science (p. 135)
- Personal Health Informatics (p. 132)

Master of Science (MS)

- Health Informatics (p. 134)

Dual Degree

- Law, JD / Public Health, MPH (p. 263)
- Pharmacy, PharmD / Public Health, MPH (p. 291)
- Physician Assistant Studies, MS / Health Informatics, MS (http://catalog.northeastern.edu/graduate/health-sciences/medical-sciences/physician-assistant-studies-ms-health-informatics-ms/)
- Physician Assistant Studies, MS / Public Health, MPH (http://catalog.northeastern.edu/graduate/health-sciences/medical-sciences/physician-assistant-studies-ms-public-health-mph/)
- Public Health, MPH / Exercise Science with Concentration in Physical Activity, MS (p. 264)
- Public Health, MPH / Health Informatics, MS (p. 264)

Graduate Certificate

- Early Intervention (p. 265)
- Health Informatics Management and Exchange (p. 265)
- Health Informatics Privacy and Security (p. 266)
- Health Informatics Software Engineering (p. 266)

Network Science, PhD

Website (http://www.networkscienceinstitute.org)

The PhD program in network science aims to enhance our understanding of networks arising from the interplay of human behavior, sociotechnical infrastructures, information diffusion, and biological agents. This is an intrinsically multidisciplinary activity, with members of the network science community representing a wide range of fields including computer science, information science, complexity, physics, sociology, communication, organizational behavior, political science, and epidemiology. This is an interdisciplinary doctoral program focused on training students in network science across several colleges—including the College of Social Sciences and Humanities, the College of Science, the Khoury College of Computer Sciences, and Bouvé College of Health Sciences—with several research areas, including computational sciences, information sciences, health and life sciences, social sciences, and theoretical physics. See other collaborating colleges' catalog sections for possible elective courses.

Coursework is dependent on a student's area of research and subject to prior approval by their faculty advisor. Required coursework includes 20 semester hours of core courses in network science, plus an additional 20 semester hours of courses relevant to the students' area of research. A minimum of 40 credit hours of coursework is required, though the graduate program committee may recommend additional coursework based on student research interests.

Satisfactory progress in the program will be ongoing and formally evaluated at the end of both the first and second years of the program. Students are expected to maintain a cumulative GPA of 3.000 or better in all coursework. Students are not allowed to retake courses. A student who does not maintain the 3.000 GPA, or is not making satisfactory progress on their dissertation research, may be recommended for termination by the graduate program committee.

Each student will have one primary research advisor from the network science doctoral program faculty.

Students will be expected to select their research advisor by the end of the spring semester of their second year in the program.

The dissertation committee consists of at least four members: the dissertation advisor, one additional network science doctoral program faculty member, one member expert in the specific topic of research (can be from outside the university), and one additional tenured/tenure-track faculty member from the concentration department/conferring college. The dissertation advisor must be a full-time tenured or tenure-track member of the Northeastern University faculty. Students may repeat the comprehensive examination once if they are unsuccessful.

Degree Candidacy

A student is considered a PhD candidate upon completion of all required coursework with a minimum cumulative GPA of 3.000, satisfactory completion of the qualification exam, and satisfactory completion of the comprehensive exam.

Qualifying Examination

The qualification exam will be an oral examination of the material during the students' coursework. The exam will be an hour in length and consist of questions selected by network science faculty who comprise the qualifying examination and dissertation committee. Students will receive 50 to 80 potential questions, which they must be prepared to answer, one month before the exam. The exam will consist of a subset of these questions. The qualifying exam will be offered twice annually, in the fall and spring term. All students are required to initially sit for the exam in the fall, typically in their third year of the PhD program. Students who do not pass the qualifying exam on their first attempt are expected to retake the exam in the spring term. Students may sit for the qualifying exam no more than twice.

Students who fail to complete the qualifying examination but who have completed all the PhD program's required coursework with a cumulative GPA of 3.000 or better will be awarded a terminal Master of Science in Network Science degree. Note that no students will be admitted directly into the network science program for receipt of a master's degree.

Comprehensive Examination

Students must submit a written dissertation proposal to the Dissertation Committee. The proposal (with the aid and approval of their dissertation advisor) will outline a plan to carry out new and original research. The proposal should identify relevant literature, the research problem, the research plan, and the potential impact on the field. An oral presentation of the proposal will be made in an open forum before a public audience and the Dissertation Committee, followed by questions from non-committee members. The written proposal must be given to committee member at least two weeks prior to the oral presentation. After the presentation,the student will meet with the dissertation committee to address any concerns raised in either the written proposal or the presentation.The Comprehensive Exam must precede the final dissertation defense by at least one year.

Dissertation Defense

A PhD student must complete and defend a dissertation that involves original research in network science. The dissertation defense must adhere to Northeastern University academic policies.

Students who do not qualify for the doctoral degree, but who have completed required coursework with a cumulative GPA of 3.000 or better, may be eligible to receive a terminal MS Network Science (p. 523)*degree. Note that no students will be admitted directly into the Network Science program to pursue a master's degree.*

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review
Qualifying exam
Dissertation committee
Dissertation proposal
Dissertation defense

Core Requirements

Code	Title	Hours
PHYS 5116	Complex Networks and Applications	4
NETS 6116	Complex Networks and Applications 2	4
PHYS 7332	Network Science Data 2	4
or NETS 7332	Machine Learning with Graphs	
POLS 7334	Social Networks (NETS)	4
PHYS 7335	Dynamical Processes in Complex Networks	4

Specializations

Choose one of the following specializations or 20 semester hours of elective coursework from the electives course list:

- Computer Science (p.)
- Social Science (p.)
- Epidemiology (p. 136)
- Physics/Theory (p. 137)
- Math (p. 137)
- Coursework (p.)

COMPUTER SCIENCE

Code	Title	Hours
CS 5800	Algorithms	4
CS 6140	Machine Learning	4
or CS 6220	Data Mining Techniques	
Complete 12 semester hours of elective courses from the elective list below. Students who wish to take courses outside of the electives list below must do so in consultation with their adviser.		12

SOCIAL SCIENCE

Code	Title	Hours
NETS 7350	Bayesian and Network Statistics	4
NETS 7360	Research Design for Social Networks	4
Complete 12 semester hours of elective courses from the elective list below. Students who wish to take courses outside of the electives list below must do so in consultation with their adviser.		12

EPIDEMIOLOGY

Code	Title	Hours
PHTH 5202	Introduction to Epidemiology	3
PHTH 6202	Intermediate Epidemiology	3

Complete 14 semester hours of elective courses from the elective list below. Students who wish to take courses outside of the electives list below must do so in consultation with their adviser.	14

PHYSICS/THEORY

Code	Title	Hours
MATH 7233	Graph Theory	4
PHYS 7337	Statistical Physics of Complex Networks	4
Complete 12 semester hours of elective courses from the elective list below. Students who wish to take courses outside of the electives list below must do so in consultation with their adviser.		12

MATH

Code	Title	Hours
CS 5800	Algorithms	4
MATH 7233	Graph Theory	4
Complete 12 semester hours of elective courses from the elective list below. Students who wish to take courses outside of the electives list below must do so in consultation with their adviser.		12

COURSEWORK

Code	Title	Hours
Complete 20 semester hours of elective courses from the elective list below. Students who wish to take courses outside of the electives list below must do so in consultation with their adviser.		20

ELECTIVES LIST

Common electives include the following:

Code	Title	Hours
CS 5800	Algorithms	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	
CS 6220	Data Mining Techniques	
CS 7180	Special Topics in Artificial Intelligence	
CS 7260	Visualization for Network Science	
CS 7295	Special Topics in Data Visualization	
NETS 7341	Network Economics	
NETS 7350	Bayesian and Network Statistics	
NETS 7976	Directed Study	
NETS 7983	Topics	
MATH 7233	Graph Theory	
MATH 7243	Machine Learning and Statistical Learning Theory	
PHYS 7305	Statistical Physics	
PHYS 7321	Computational Physics	
PHYS 7337	Statistical Physics of Complex Networks	

Dissertation

Code	Title	Hours
NETS 9990	Dissertation Term 1	
NETS 9991	Dissertation Term 2	

Program Credit/GPA Requirements

40 total semester hours required
Minimum 3.000 GPA required

Plan of Study

Year 1

Fall	Hours	Spring	Hours
PHYS 5116	4	PHYS 7332	4
PHYS 7331 or INSH 5301 (If required, may be substituted with an elective)	4	NETS 6116	4
		POLS 7334	4
	8		12

Year 2

Fall	Hours	Spring	Hours
PHYS 7335	4	Two Elective Courses	8
Two Elective Courses	8		
	12		8

Year 3

Fall	Hours	Spring	Hours
NETS 9990	0	NETS 9991	0
	0		0

Year 4

Fall	Hours
NETS 9996	0
	0

Total Hours: 40

Personal Health Informatics, PhD

Northeastern's Doctor of Philosophy (PhD) in Personal Health Informatics (PHI) is a transdisciplinary doctoral program focused on educating top researchers in the theoretical underpinnings, design, evaluation, and dissemination of consumer- and patient-focused health systems. Personal health technologies are those that non–health professionals interact with *directly*, both in and out of a clinical setting and in various life stages of illness and wellness.

Examples include:

- Assistive technologies that aid persons with disabilities
- Consumer wellness promotion technologies
- Patient education and counseling systems
- Interfaces for reviewing personal health records
- Advanced ambulatory monitoring for supporting health
- Automated elder care systems that monitor health and support independent living
- Social networking systems connecting families and their social and medical support networks

Developing personal health interface technologies requires that professionals have skills and experience designing systems for individual patients and consumers with a wide range of backgrounds in different contexts using a variety of media, while ensuring that fielded technologies are effective, reliable, and responsive to the needs of

at-risk and patient populations. Critical skills and knowledge include needs assessment, theories of interface design and health behavior, rapid prototyping and implementation, experimental design with human subjects in challenging settings, and statistical data analysis and validation. Moreover, these skills must be deployed while working with, or leading, transdisciplinary teams.

The interdisciplinary nature of the program targets students who are interested in improving health and wellness using novel technologies that directly impact the lives of consumers and patients. This is a program for students who are not only technically strong but also socially conscious, design oriented, and interested in rigorously evaluating the technologies they imagine and build. The program provides a path for technical students to acquire more experience in the deployment and evaluation of health technologies in the field but also a path for students with health backgrounds to develop the technical skills needed to prototype and assess creative ideas they envision for improving care. The expected length of study is five years after the bachelor's degree.

Admission Requirements

Students will be accepted with either of the following:

- A bachelor's or higher degree in a technical discipline (e.g., computer science or information science, computer systems engineering) with either academic or work experience demonstrating a commitment to working in health.
- A bachelor's or higher degree in a health science discipline (e.g., nursing, medicine, physical therapy, pharmacy, public health) with either some academic coursework in technology, such as a course in programming or design, or work experience where the applicant participated in the development, adaptation, or evaluation of consumer- or patient-facing health technology. (Otherwise outstanding applicants without programming skills may be advised to take an introductory programming course prior to entry, and otherwise outstanding applicants without any formal experience working in health settings may be advised to spend some time volunteering in a medical or community health setting prior to entry.)

Applicants will be expected to have:

- A minimum 3.000 undergraduate grade-point average (GPA)
- A minimum total GRE score of 300 or equivalent
- A minimum GRE academic writing score of 3.5
- For international applicants, a minimum TOEFL score of 105

Minimum Academic Standards and Requirements

RESIDENCY REQUIREMENT

The residency requirement will follow the University Graduate Council By-Law policy.

TEACHING REQUIREMENT

All personal health informatics PhD students must satisfy the teaching requirement in order to graduate. This requirement is fulfilled when the student works as a teaching assistant (TA) or instructor of record (IoR) for one semester and during this semester:

- Teaches at least three hours of classes
- Prepares at least one assignment, or quiz, or equivalent

PhD students are expected to satisfy the teaching requirement some time after completing their first year and at least one semester prior to scheduling their PhD defense.

DISSERTATION ADVISING

Each student will have one primary adviser from the personal health informatics doctoral program faculty.

DISSERTATION COMMITTEE

The committee will consist of at least three members: the dissertation adviser, one additional personal health informatics doctoral program faculty member, and one member external to Northeastern who is an expert in the specific personal health informatics topic of research. The dissertation committee shall include experts with both health and technology backgrounds. The dissertation adviser must be a full-time member of the Northeastern University faculty.

QUALIFYING EXAMINATION

The qualifying examination consists of a three-part exam conducted by a committee of three personal health informatics doctoral program faculty members, each overseeing one part of the exam. The research core of the exam is fulfilled with submission of a high-quality paper to a strong peer-reviewed conference or journal. The health component of the exam is fulfilled when the student passes a written exam developed by a faculty member with a health sciences background, and the technical component of the exam is fulfilled when the student passes an exam developed by a faculty member with a technical background. The content of the written exams and the paper topic are developed in consultation with each faculty member.

DEGREE CANDIDACY

A student is considered a PhD degree candidate upon meeting these conditions:

- Completion of core courses with a minimum GPA of 3.000 overall on the core courses
- Completion of the qualifying examination

COMPREHENSIVE EXAM

A PhD student must submit a written dissertation proposal to the dissertation committee. The proposal should identify the research problem, the research plan, and its potential impact on the field. A presentation of the proposal will be made in an open forum, and the student must successfully defend it before the dissertation committee.

DISSERTATION DEFENSE

A PhD student must complete and defend a dissertation that involves original research in personal health informatics.

Curriculum Requirements

REQUIRED AND ELECTIVE COURSES

The curriculum is designed to provide all PhD students with a strong foundation in principles critical to the design and evaluation of personal health interfaces. All students take six core courses (24 semester hours) and the user-interface practicum (1 semester hour).The student must maintain a minimum GPA of 3.500 among the six core courses and receive a grade of B or better in each of these courses. All students must also fulfill the programming fundamentals requirement (4 semester hours) and the statistics fundamentals requirement (4 semester hours), where some flexibility in course selection allows tailoring based on background and experience. Two additional research electives (8 semester hours) are selected based on research interests from the personal health informatics electives list. Students are also expected to participate in the personal health informatics seminar series each semester.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Qualifying examinations (3)
Annual review
Dissertation proposal
Dissertation committee
Dissertation defense

Core Requirements

A grade of B or higher is required in each course. A cumulative 3.500 GPA is required for the core requirement.

Code	Title	Hours
Foundations		
HINF 5200	Theoretical Foundations in Personal Health Informatics	4
Program Design and Development		
CS 5010	Programming Design Paradigm (or another programming course)	4
CS 7340	Theory and Methods in Human Computer Interaction	4
HINF 5300	Personal Health Interface Design and Development	4
Methods and Statistics		
CS 6350	Empirical Research Methods	4
Choose one:		*3-4*
CAEP 7712	Intermediate Statistical Data Analysis Techniques	
CS 7200	Statistical Methods for Computer Science	
PHTH 5210	Biostatistics in Public Health	
PHTH 6440	Advanced Methods in Biostatistics	
Evaluation		
HINF 5301	Evaluating Health Technologies	4
HINF 8982	Readings	1-8

Electives

Code	Title	Hours
Complete 12-17 semester hours in the following subject areas to fulfill the minimum program hours:		12-17
(Note: Please see faculty advisor for other acceptable elective courses.)		
CAEP		
CS		
HINF		
PHTH		

Dissertation

Code	Title	Hours
CS 9990	Dissertation Term 1	
CS 9991	Dissertation Term 2	

Program Credit/GPA Requirements

48 total semester hours required
Minimum 3.000 GPA required

Plan of Study

Sample Curriculum

Year 1

Fall	Hours	Spring	Hours
HINF 5200	4	CS 5010 or 5520	4
CS 7340	4	CS 6350	4
		Additionally, students should participate in the Personal Health Informatics Usability Evaluation Practicum	1
	8		9

Year 2

Fall	Hours	Spring	Hours
HINF 5300	4	HINF 5301	4
PHTH 5210, 6440, CAEP 7712, or CS 7200	3-4	PHI elective	3-4
	7-8		7-8

Year 3

Fall	Hours	Spring	Hours
CS 9990	0	CS 9991	0
HINF 8982	1-8	PHI electives	7-8
	1-8		7-8

Year 4

Fall	Hours	Spring	Hours
HINF 9996	0	HINF 9996	0
	0		0

Year 5

Fall	Hours	Spring	Hours
HINF 9996	0	HINF 9996	0
	0		0

Total Hours: 39-49

Health Informatics, MS

Northeastern's interdisciplinary Master of Science in Health Informatics was the first MS in the field. The program seeks to prepare students to address the combined clinical, technical, and business needs of health-related professionals. Successful students graduate with the knowledge of how technology, people, health, and the healthcare system interrelate; the ability to use technology and information management to improve healthcare delivery and outcomes; and the skills to communicate effectively among healthcare practitioners, administrators, and information technology professionals.

With approval from the health informatics program director, selected students can substitute one course from the Graduate Certificate in Data Analytics for a technical core requirement in the MS in Health Informatics degree, and up to two more courses from the Graduate Certificate in Data Analytics can be counted as electives for the MS in Health Informatics degree.

Northeastern also offers graduate certificate programs in health informatics. Three certificate programs enable you to choose the one that

addresses your specific goals. These programs are listed separately in this catalog:

- Graduate Certificate in Health Informatics Management and Exchange
- Graduate Certificate in Health Informatics Privacy and Security
- Graduate Certificate in Health Informatics Software Engineering

Courses in the certificate program also apply toward master's degree requirements. This gives you the flexibility to complete a certificate and be well on your way to earning a degree if you decide later to continue your education.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of B– or higher is required in each course.

Code	Title	Hours
Required Core		
HINF 5101	Introduction to Health Informatics and Health Information Systems	3
HINF 5105	The American Healthcare System	3
HINF 7701	Health Informatics Capstone Project	3
Business Management		
Complete two courses from the following:		6
HINF 6201	Organizational Behavior, Work Flow Design, and Change Management	
HINF 6202	Business of Healthcare Informatics	
HINF 6215	Project Management	
HINF 6335	Management Issues in Healthcare Information Technology	
HINF 6240	Improving the Patient Experience through Informatics	
PHTH 5226	Strategic Management and Leadership in Healthcare	
Health Informatics		
Complete two courses from the following:		6
HINF 5102	Data Management in Healthcare	
HINF 5110	Global Health Information Management	
HINF 5200	Theoretical Foundations in Personal Health Informatics	
HINF 5300	Personal Health Interface Design and Development	
HINF 5301	Evaluating Health Technologies	
HINF 6205	Creation and Application of Medical Knowledge	
HINF 6350	Public Health Surveillance and Informatics	
HINF 6404	Patient Engagement Informatics and Analytics	
HINF 6405	Quantifying the Value of Informatics	
PHTH 5232	Evaluating Healthcare Quality	
Technical		
Complete two courses from the following:		6
HINF 6220	Database Design, Access, Modeling, and Security	
HINF 6355	Interoperability Key Standards in Health Informatics	
HINF 6400	Introduction to Health Data Analytics	
PHTH 5202	Introduction to Epidemiology	
PHTH 5210	Biostatistics in Public Health	
PHTH 6210	Applied Regression Analysis	
PHTH 6400	Principles of Population Health 1	
PHTH 6440	Advanced Methods in Biostatistics	
One course from the following may count toward the technical core requirement:		
DA 5020	Collecting, Storing, and Retrieving Data	
DA 5030	Introduction to Data Mining/Machine Learning	
INSH 5301	Introduction to Computational Statistics	
INSH 5302	Information Design and Visual Analytics	

Electives

Code	Title	Hours
Complete two courses from the following. Any course not taken to complete a core requirement may be taken as an elective.		6
HINF 6345	Design for Usability in Healthcare	
DA 5020	Collecting, Storing, and Retrieving Data	
DA 5030	Introduction to Data Mining/Machine Learning	
INSH 5301	Introduction to Computational Statistics	
INSH 5302	Information Design and Visual Analytics	

Program Credit/GPA Requirements

Minimum 33 total semester hours required
Minimum 3.000 GPA required

Law, JD / Public Health, MPH

Northeastern University's School of Law and Bouvé College of Health Sciences offer a JD/MPH dual degree. Given the worldwide trend toward urbanization, the Master of Public Health (MPH) recognizes the growing need for professionals trained to respond to unique public health challenges and opportunities facing urban populations. The MPH program brings together interdisciplinary faculty (from the School of Law, D'Amore-McKim School of Business, College of Social Sciences and Humanities, Khoury College of Computer Sciences, and the Bouvé College of Health Sciences) with expertise in collaborating with diverse urban populations to offer students an opportunity to obtain practice-based knowledge, skills, and experience needed to address public health problems.

Up to 9 credit hours of coursework in the JD program may count toward the MPH, while up to 12 credit hours of coursework in the MPH program may count toward the JD. See JD/MPH program page (http://www.northeastern.edu/law/academics/jd/dual-degrees/jdmph-bouve.html) for more information.

All JD students, including FlexJD students, are ordinarily eligible to apply into dual degree pathways.

Health Informatics, MS / Physician Assistant Studies, MS

The Northeastern University health informatics and physician assistant combined program allows qualified and interested students to achieve their goal of obtaining a more robust understanding of healthcare technology while also completing robust clinical training in the physician assistant program. This prepares a select group of exceptionally qualified clinicians to become leaders in healthcare technology application and development and fosters interdisciplinary collaboration in order to address problems in the healthcare and health information environments both locally and across the globe. The joint program is designed to provide students a greater understanding of technological issues in clinical practice, quantitative methods, and the use of scientific evidence and cutting-edge technology to optimize clinical workflows and improve patient outcomes.

This dual degree takes 34 months to complete (as opposed to 48, if each degree were pursued separately), and a total number of 8 credits are shared between both degrees.

Physician Assistant Studies, MS / Public Health, MPH

The Northeastern University Physician Assistant (PA) Program and Department of Health Sciences offer a combined Master of Science in Physician Assistant Studies (MS)/Master of Public Health (MPH). The combined PA/MPH program allows qualified and interested students an opportunity to achieve their goal of obtaining a more robust understanding of public health through an MPH degree, while also completing their Master of Science in Physician Assistant Studies.

The Northeastern University Master of Public Health program is accredited by the Council on Education for Public Health (CEPH) (https://ceph.org/). CEPH is an independent agency recognized by the U.S. Department of Education to accredit schools of public health and public health programs outside of schools of public health. The MPH program has a strong commitment to providing a flexible course of study for working professionals. This flexibility allows for easy incorporation into a dual-degree program.

The combined degree that incorporates both programs is designed to help diversify the public health workforce and improve graduates' ability to approach clinical situations with cultural sensitivity and awareness. Successful graduates of the program benefit from having a greater understanding of public health issues in clinical practice, including the racial and ethnic health disparities prevalent in the U.S. healthcare system, as well as a strong grounding in epidemiology, quantitative and qualitative research methods, and the use of scientific evidence, skills critical to many fields of healthcare practice.

This dual degree takes less than three years to complete (as opposed to four, if each degree were pursued separately), and a total number of 12 credits are shared between both degrees.

For more information, including the application and admissions process, please visit the PA/MPH website here (https://bouve.northeastern.edu/health-sciences/programs/pa-mph/).

Public Health, MPH / Exercise Science with Concentration in Physical Activity, MS

Website (https://bouve.northeastern.edu/health-sciences/programs/ms-exercise-science-mph/)

The Department of Health Sciences at Northeastern University offers a combined Master of Public Health / Master of Science in Exercise Science. This dual degree program allows qualified students to achieve their goal of obtaining a more robust understanding of public health through an MPH degree while also completing their master's in exercise science. Coursework consists of advanced physiology, such as musculoskeletal and cardiopulmonary systems, and the assessment and prescription of exercise and physical activity in the context of the social determinants of health. Graduates of the program will benefit from having a greater understanding of public health issues in the fields of exercise and physical activity, in order to better design exercise prescription programs in the healthcare industry that aim to improve the health of individuals and communities.

The Northeastern University Master of Public Health program is accredited by the Council on Education for Public Health (CEPH) (https://ceph.org/). CEPH is an independent agency recognized by the U.S. Department of Education to accredit schools of public health and public health programs outside of schools of public health.

Up to 15 credits of coursework in the dual-degree program can be counted toward both the MPH degree and the MS degree.

Public Health, MPH / Health Informatics, MS

Website (https://bouve.northeastern.edu/health-sciences/programs/ms-hinf-mph/)

The Master of Public Health and Master of Science in Health Informatics dual degree allows qualified and interested students to prepare to lead healthcare at the nexus between public health and health informatics. Graduates of this program will be well-educated in the complex issues associated with improvements in information technology, as well as changes to the public health and healthcare delivery systems. Recognizing the increasing overlap between health informatics and public health, this program incorporates course work from both the MPH and MSHI curricula for both degrees, reducing tuition costs and saving one year of study compared to obtaining both degrees individually.

The Northeastern University Master of Public Health program is accredited by the Council on Education for Public Health (CEPH). CEPH is an independent agency recognized by the U.S. Department of Education to accredit schools of public health and public health programs outside of schools of public health.

Up to 15 credits of coursework in the dual-degree program can be counted toward both the MPH and MS degrees.

Biopharmaceutical Analytical Sciences, Graduate Certificate

The Graduate Certificate in Biopharmaceutical Analytical Sciences has been designed in response to a need in the biotechnology industry for individuals with an advanced knowledge of the principles and practices of state-of-the-art analyses of protein with focus on the characterization of innovator and biosimilars. Individuals, particularly those who are working in the various sectors of biotechnology including basic research of biological systems, discovery, development, and manufacturing of

biopharmaceuticals, have an opportunity to improve their competency and learn new practical skills that enable them to increase productivity and further contribute to their professions. In addition, the certificate was designed for both individuals with and without experience in biopharmaceuticals and their analysis.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
BIOT 5400	Scientific Information Management for Biotechnology Managers	3
BIOT 6320	Quality Management Systems and Validation	3
CHEM 5550	Introduction to Glycobiology and Glycoprotein Analysis	3
CHEM 5617	Protein Mass Spectrometry Laboratory	3

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

Early Intervention, Graduate Certificate

Northeastern University's Certificate Program in Early Intervention is an interdisciplinary, preservice training program that is designed to fulfill requirements for certification as an early intervention specialist, at the advanced provisional level, as set forth by the Massachusetts Department of Public Health (DPH).

The interdisciplinary nature of the program is facilitated by the interaction of graduate students from several disciplines (including school psychology, counseling psychology, and speech-language pathology); undergraduate students from majors such as speech-language pathology and audiology and psychology; and working professionals in the field. Personnel working in the field may use their work sites for field training.

The program is delivered in a hybrid format. Classes meet on campus one day each month, and additional course content is delivered online.

This graduate certificate program can be completed by non-degree-seeking students or integrated with master's or clinical doctoral degree programs. Application of course work from certain degree programs will be approved to apply to requirements of this graduate certificate; students are encouraged to speak with their academic advisors early in their programs to explore these options.

The goals for the early intervention certificate program are:

- To prepare personnel to provide services to infants and toddlers with disabilities and their families, from linguistically and culturally diverse backgrounds in urban environments
- To prepare personnel who have attained all competencies relative to early intervention, specified by the Massachusetts DPH, and that are consistent with best practice and research
- To prepare personnel in an interdisciplinary manner, drawing from Northeastern University's multidisciplinary resources
- To prepare personnel to function effectively across teams (individualized family service plan teams, community teams, interagency teams) and to understand the roles of their interdisciplinary teammates

Upon graduation, students are eligible for employment in an early intervention service delivery setting.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of B or higher is required in all courses.

Code	Title	Hours
Required Core		
CAEP 5150	Early Intervention: Family Systems	3
CAEP 5151	Early Intervention: Infant and Toddler Development, Risk, and Disability	3
SLPA 5152	Early Intervention: Planning and Evaluating Services	3
CAEP 5153	Early Intervention: Assessment and Intervention	3
Practicum		
SLPA 5154	Early Intervention Practicum 1 (Early Intervention Practicum 1)	2
SLPA 5155	Early Intervention Practicum 2 (Early Intervention Practicum 2)	2

Program Credit/GPA Requirements

16 total semester hours required
Minimum 3.000 GPA required

Health Informatics Management and Exchange, Graduate Certificate

The certificate program in health informatics management and exchange offers you the opportunity to obtain the knowledge needed to support the collection, management, retrieval, and exchange of electronic health data. It is designed to prepare you for a position as a specialist in data management, interoperability standards, and health database design.

- Eight-month program
- Five courses, 15 semester hours

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of B– or higher is required in all course work.

Code	Title	Hours
Required Core		
HINF 5101	Introduction to Health Informatics and Health Information Systems	3
HINF 5102	Data Management in Healthcare	3
Management and Exchange		
HINF 6205	Creation and Application of Medical Knowledge	3
HINF 6220	Database Design, Access, Modeling, and Security	3

HINF 6355	Interoperability Key Standards in Health Informatics	3

Program Credit/GPA Requirements

15 total semester hours required
Minimum 3.000 GPA required

Health Informatics Privacy and Security, Graduate Certificate

The certificate program in health informatics privacy and security combines knowledge of health informatics with a strong foundation in important information security issues. Northeastern's status as a National Security Agency Center of Excellence for Information Security Education and Research ensures the program is both relevant and of high academic quality.

- Eight-month program
- Five courses, 18 semester hours

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of B– or higher is required in all course work.

Code	Title	Hours
Required Core		
HINF 5101	Introduction to Health Informatics and Health Information Systems	3
HINF 5102	Data Management in Healthcare	3
Privacy and Security		
CY 5130	Computer System Security	4
CY 5150	Network Security Practices	4
CY 5200	Security Risk Management and Assessment	4

Program Credit/GPA Requirements

18 total semester hours required
Minimum 3.000 GPA required

Health Informatics Software Engineering, Graduate Certificate

This certificate program offers software engineers the background in health informatics (as well as interchange and interoperability standards) needed to better understand the context in which they work and perform effectively in a health-related organization. Program design is flexible to allow completion on a rapid schedule or a slower pace that is more compatible with full-time workers.

- Eight-month program
- Five courses, 15 semester hours

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of B– or higher is required in all course work.

Code	Title	Hours
Required Core		
HINF 5101	Introduction to Health Informatics and Health Information Systems	3
HINF 5102	Data Management in Healthcare	3
Management and Exchange		
HINF 6205	Creation and Application of Medical Knowledge	3
HINF 6345	Design for Usability in Healthcare	3
HINF 6355	Interoperability Key Standards in Health Informatics	3

Program Credit/GPA Requirements

15 total semester hours required
Minimum 3.000 GPA required

School of Clinical and Rehabilitation Sciences

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Kristin Curry Greenwood, PT, DPT, EdD, MS
Chair and Clinical Professor
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The School of Clinical and Rehabilitation Sciences (SoCRS) within the Bouvé College of Health Sciences at Northeastern University brings together the clinical fields of physical therapy (https://bouve.northeastern.edu/physical-therapy/), speech-language pathology (https://bouve.northeastern.edu/csd/), and physician assistant studies (https://bouve.northeastern.edu/physician-assistant/).#Students and

fellows in the school are prepared for clinical and research excellence, training with interdisciplinary experts in habilitation and rehabilitation sciences, epidemiology, neuroscience, engineering, physiology, exercise science, clinical medicine, design, diagnostic and therapeutic imaging, and communication. Working at the intersection of rehabilitation, clinical practice, data, and engineering, students and fellows engage in transformative research and experiential learning that is designed to prepare them to improve the quality of life and self-care for patients and communities, while promoting and developing innovative approaches to the future of healthcare.

Communication Sciences and Disorders

We are a learning community in which faculty and students support each other's learning across the life span. Our department's mission is to educate students to the highest levels of professionalism, consistent with the American Speech-Language-Hearing Association (ASHA), Northeastern University accreditation standards, and Massachusetts licensure requirements; provide them with an interprofessional and practice-oriented education in our urban university environment; to provide them with research experiences based on the highest standards of scientific knowledge; and to provide them with clinical experiences with clients, patients, and families from a diverse population base using an evidence-informed practice approach.

Our faculty engage in continuous learning both inside and outside the department to be current in recent research and to contribute to that knowledge base. They use, develop, and address technology in their teaching that improves the speech, language, social communication, cognitive communication, and swallowing skills of individuals at a variety of age and skill levels.

Master of Science (MS)

- Speech-Language Pathology (p. 267)

Graduate Certificate

- Early Intervention (p. 265)

Medical Sciences

The mission of the Department of Medical Sciences is to educate and inspire diverse and interdisciplinary professionals to be leaders and innovators in medical science.

We offer a Master of Science in Physician Assistant (PA) studies and two interdisciplinary dual-degree programs.

Established in 1971, the physician assistant program has a long-standing history of, and expertise in, the education and training of physician assistants. The PA program is located in close proximity to Boston's major academic medical centers and was the first generalist PA training program in the nation to offer a master's degree in 1985.

This rigorous, highly integrated curriculum offers our students the opportunity to obtain broad generalist training that is designed to prepare them for successful employment in all fields of clinical practice. Our instructional faculty members are practicing clinicians from throughout New England, and most have been teaching with the program for many years. The clinical year provides students with experience in diverse healthcare settings in our well-established network of clinical rotation sites.

Northeastern University's PA program graduates are employed in positions across the United States, and some have worked internationally. In addition to clinical practice, our graduates are employed in research, administration, and education.

Master of Science (MS)

- Physician Assistant Studies (p. 269)

Dual Degree

- Health Informatics, MS / Physician Assistant Studies, MS (p. 264)
- Physician Assistant Studies, MS / Public Health, MPH (p. 264)

Physical Therapy, Movement, and Rehabilitation Sciences

The cornerstone of the Department of Physical Therapy, Movement, and Rehabilitation Sciences is experiential learning aligned with the mission of Bouvé College of Health Sciences and Northeastern University. The programs within the department enhance and extend students' learning of human movement and rehabilitation through experiential education, interdisciplinary collaborations, interprofessional education, research opportunities, and a variety of global educational experiences. The department is led by a collaborative interdisciplinary body of faculty with research, scholarship, clinical, and teaching expertise across a diverse spectrum.

The Department of Physical Therapy, Movement, and Rehabilitation Sciences' research mission is to build the evidence for best practices to maintain and improve the health and well-being of local, national, and global community members. Students have the opportunity to work with faculty to conduct ongoing research in one of the many diverse Department of Physical Therapy, Movement, and Rehabilitation Sciences' labs and centers, including Neuromotor Systems Laboratory, Laboratory for Locomotion Research, ReGameVR Laboratory, Movement Neuroscience Laboratory, Musculoskeletal Epidemiology and Biomechanics Laboratory, Neuroscience Wet Lab, Occupational Biomechanics Laboratory, Teaching and Learning Innovation Lab, and the Center for Cognitive and Brain Health.

The Department of Physical Therapy, Movement, and Rehabilitation Sciences graduates are innovative, global leaders who excel in clinical practice, research, human movement, leadership, and community service.

Doctor of Philosophy (PhD)

- Human Movement and Rehabilitation Sciences (p. 270)

Doctor of Physical Therapy (DPT)

- Doctor of Physical Therapy—Postbaccalaureate Entry (p. 271)
- Transitional Doctor of Physical Therapy—Direct Entry (p. 374) (with the College of Professional Studies)

Master of Science (MS)

- Human Movement and Rehabilitation Sciences (p. 275)

Speech-Language Pathology, MS

Adhering to the highest professional standards, the speech-language pathology (SLP) graduate program seeks to prepare future speech-language pathologists for the rigors of clinical practice in educational and healthcare settings. Graduates of the program will influence society in profound ways—for example, enabling children with autism to communicate effectively, relieving adolescents' fears of speaking dysfluently in the classroom, and helping stroke survivors resume activities in which they had previously participated. The comprehensive program of study emphasizes teamwork and interdisciplinary approaches to complex service delivery issues. SLP graduate students acquire the knowledge and skills needed for a lifetime of professional achievement and social contribution.

Please visit Bouvé College Learning Outcomes (https://bouve.northeastern.edu/learning-outcomes/) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of B or higher is required in each course.

Code	Title	Hours
Disorders		
SLPA 5201	Diagnostic Testing in Speech-Language Pathology	2
SLPA 6219	Aural Rehabilitation (or elective) [1]	3-4
SLPA 6303	Stuttering	3
SLPA 6304	Augmentative and Alternative Communication	3
SLPA 6305	Articulation and Phonology	3
SLPA 6307	Voice Disorders	3
SLPA 6308	Dysphagia	3
SLPA 6311	Counseling in SLP	3
SLPA 6321	Motor Speech Disorders	3
SLPA 6330	Language Literacy 1	0.5
SLPA 6337	Language Literacy Experiential Program	0.5
SLPA 6340	Language Disorders in Children 1	3
SLPA 6341	Language Disorders in Children 2	3
SLPA 6342	Speech-Language Disorders In Adults 1	3
SLPA 6343	Speech-Language Disorders in Adults 2	3
Science		
SLPA 5109	Neurology of Communication	3
SLPA 6301	Speech Science	3
Research		
SLPA 6211	Research and Evidence-Based Practice	3
SLPA 6420	Practical Statistics for Speech-Language Pathology and Audiology	3
Practicum		
SLPA 6415	Speech-Language Pathology Advanced Clinical Practicum 1	3
SLPA 6416	Speech-Language Pathology Advanced Clinical Practicum 2	2
SLPA 6417	Speech-Language Pathology Advanced Clinical Practicum 3	2
SLPA 6418	Speech-Language Pathology Advanced Clinical Practicum 4 (Other)	2

[1] Students with previous coursework in Aural Rehabilitation may replace SLPA 6219 with 3 SH from the elective course list.

Electives

Code	Title	Hours
Students with previous Aural Rehabilitation coursework may complete 3 SH from the elective course list or select other course options in consultation with a faculty adviser.		3
SLPA 6320	Autism Spectrum Disorders	
SLPA 6325	Accent Modification for Speech-Language Pathology	
SLPA 6332	Seminar in Communication Disorders	
SLPA 6773	Topics Seminar	

Program Credit/GPA Requirements

60 total semester hours required
Minimum 3.000 GPA required

Early Intervention, Graduate Certificate

Northeastern University's Certificate Program in Early Intervention is an interdisciplinary, preservice training program that is designed to fulfill requirements for certification as an early intervention specialist, at the advanced provisional level, as set forth by the Massachusetts Department of Public Health (DPH).

The interdisciplinary nature of the program is facilitated by the interaction of graduate students from several disciplines (including school psychology, counseling psychology, and speech-language pathology); undergraduate students from majors such as speech-language pathology and audiology and psychology; and working professionals in the field. Personnel working in the field may use their work sites for field training.

The program is delivered in a hybrid format. Classes meet on campus one day each month, and additional course content is delivered online.

This graduate certificate program can be completed by non-degree-seeking students or integrated with master's or clinical doctoral degree programs. Application of course work from certain degree programs will be approved to apply to requirements of this graduate certificate; students are encouraged to speak with their academic advisors early in their programs to explore these options.

The goals for the early intervention certificate program are:

- To prepare personnel to provide services to infants and toddlers with disabilities and their families, from linguistically and culturally diverse backgrounds in urban environments
- To prepare personnel who have attained all competencies relative to early intervention, specified by the Massachusetts DPH, and that are consistent with best practice and research
- To prepare personnel in an interdisciplinary manner, drawing from Northeastern University's multidisciplinary resources
- To prepare personnel to function effectively across teams (individualized family service plan teams, community teams, interagency teams) and to understand the roles of their interdisciplinary teammates

Upon graduation, students are eligible for employment in an early intervention service delivery setting.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of B or higher is required in all courses.

Code	Title	Hours
Required Core		
CAEP 5150	Early Intervention: Family Systems	3
CAEP 5151	Early Intervention: Infant and Toddler Development, Risk, and Disability	3

SLPA 5152	Early Intervention: Planning and Evaluating Services	3
CAEP 5153	Early Intervention: Assessment and Intervention	3
Practicum		
SLPA 5154	Early Intervention Practicum 1 (Early Intervention Practicum 1)	2
SLPA 5155	Early Intervention Practicum 2 (Early Intervention Practicum 2)	2

Program Credit/GPA Requirements

16 total semester hours required
Minimum 3.000 GPA required

Physician Assistant Studies, MS

Physician assistants (PAs) are healthcare providers who practice medicine with physician supervision. They are highly sought after members of the healthcare team who provide diagnostic and therapeutic patient care. The physician assistant studies (MS) program is a full-time, two-year graduate program that provides an opportunity to earn a Master of Science in Physician Assistant Studies.

Please visit Bouvé College Learning Outcomes for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of C or higher is required in each course.

Code	Title	Hours
Required Core		
PA 6208	Professional Issues for Physician Assistants	2
PA 6326	Aspects of Primary Care	4
PA 6327	Emergency Medicine and Critical Care	2
PA 6328	Aging and Rehabilitation Medicine	2
PA 6329	Healthcare Delivery	2
PA 6330	Research Design	2
Anatomy and Physiology		
PA 6200	Anatomy and Physiology 1	3
PA 6201	Anatomy and Physiology 2	3
Diagnosis and Evaluation		
PA 6203	Physical Diagnosis and Patient Evaluation 1	3
PA 6204	Physical Diagnosis and Patient Evaluation 2	3
Pharmacology		
PA 6205	Pharmacology 1	2
PA 6206	Pharmacology 2	2
PA 6207	Clinical Laboratory and Diagnostic Methods	4
Principles		
PA 6311	Principles of Medicine 1	4
PA 6312	Principles of Medicine 2	4
PA 6313	Principles of Medicine 3	4
PA 6320	Principles of Obstetrics and Gynecology	2
PA 6321	Principles of Surgery	2
PA 6322	Principles of Orthopedics	2
PA 6323	Clinical Neurology	2
PA 6324	Principles of Pediatrics	2
PA 6325	Principles of Psychiatry	2
Clinical		
PA 6400	Applied Clinical Study in Medicine	5
PA 6401	Applied Clinical Study in Ambulatory Medicine	5
PA 6402	Applied Clinical Study in Family Practice	5
PA 6403	Applied Clinical Study in Emergency Medicine	5
PA 6404	Applied Clinical Study in Women's Health	5
PA 6405	Applied Clinical Study in Pediatrics	5
PA 6406	Applied Clinical Study in Surgery	5
PA 6407	Applied Clinical Study in Mental Health	5
PA 6408	Applied Clinical Study Elective	5

Program Credit/GPA Requirements

103 total semester hours required
Minimum 3.000 GPA required

Health Informatics, MS / Physician Assistant Studies, MS

The Northeastern University health informatics and physician assistant combined program allows qualified and interested students to achieve their goal of obtaining a more robust understanding of healthcare technology while also completing robust clinical training in the physician assistant program. This prepares a select group of exceptionally qualified clinicians to become leaders in healthcare technology application and development and fosters interdisciplinary collaboration in order to address problems in the healthcare and health information environments both locally and across the globe. The joint program is designed to provide students a greater understanding of technological issues in clinical practice, quantitative methods, and the use of scientific evidence and cutting-edge technology to optimize clinical workflows and improve patient outcomes.

This dual degree takes 34 months to complete (as opposed to 48, if each degree were pursued separately), and a total number of 8 credits are shared between both degrees.

Physician Assistant Studies, MS / Public Health, MPH

The Northeastern University Physician Assistant (PA) Program and Department of Health Sciences offer a combined Master of Science in Physician Assistant Studies (MS)/Master of Public Health (MPH). The combined PA/MPH program allows qualified and interested students an opportunity to achieve their goal of obtaining a more robust understanding of public health through an MPH degree, while also completing their Master of Science in Physician Assistant Studies.

The Northeastern University Master of Public Health program is accredited by the Council on Education for Public Health (CEPH) (https://ceph.org/). CEPH is an independent agency recognized by the U.S. Department of Education to accredit schools of public health and public

health programs outside of schools of public health. The MPH program has a strong commitment to providing a flexible course of study for working professionals. This flexibility allows for easy incorporation into a dual-degree program.

The combined degree that incorporates both programs is designed to help diversify the public health workforce and improve graduates' ability to approach clinical situations with cultural sensitivity and awareness. Successful graduates of the program benefit from having a greater understanding of public health issues in clinical practice, including the racial and ethnic health disparities prevalent in the U.S. healthcare system, as well as a strong grounding in epidemiology, quantitative and qualitative research methods, and the use of scientific evidence, skills critical to many fields of healthcare practice.

This dual degree takes less than three years to complete (as opposed to four, if each degree were pursued separately), and a total number of 12 credits are shared between both degrees.

For more information, including the application and admissions process, please visit the PA/MPH website here (https://bouve.northeastern.edu/health-sciences/programs/pa-mph/).

Human Movement and Rehabilitation Sciences, PhD

The Department of Physical Therapy, Movement, and Rehabilitation Sciences offers a PhD program in human movement and rehabilitation sciences. The PhD program seeks to prepare graduates to conduct independent (original) basic, translational, and applied research with the goal of creating new knowledge about neuromotor mechanisms and methods of restoring and maximizing human functional capacity and well-being across the life span. The program emphasizes core competencies in motor control and motor learning, movement measurement and analysis, knowledge translation theory, and the use of traditional and emerging technologies. The program is based on the integration of core skills and concepts across the multiple disciplines that are associated with human movement and rehabilitation sciences, coupled with the acquisition of research methodology, analyses, and skills, as well as specialization within specific areas of human movement and rehabilitation research.

The program showcases the unique faculty and research laboratories in human movement and rehabilitation sciences, as well as highly ranked programs in Bouvé College of Health Sciences, the College of Science, and the College of Engineering. Northeastern is dedicated to advancing the field of human movement and rehabilitation sciences and translating research from bench to clinic. Students benefit from our new research laboratories utilizing state-of-the-art movement and rehabilitation methods including virtual reality, ultrasound, neuroscience, neurophysiology, robotics, and movement measurement technologies.

Advanced Entry

Based on a student's background in their preceding master's or clinical doctorate degree, core coursework and total hours for the advanced entry program may vary. The graduate program director will consider all the program requirements and applicants' previous experience when advising students on a plan of study. All students whether entering from traditional or advanced PhD Pathway will complete the milestones as documented in the curriculum.

Please visit Bouvé College Learning Outcomes (https://bouve.northeastern.edu/learning-outcomes/) for the specific student learning outcomes for this program.

Program Requirements

Milestones

All students whether entering from traditional or advanced PhD Pathway will complete the following milestones:

- Annual review
- Qualifying exam
- Dissertation committee
- Dissertation proposal
- Dissertation defense

Core Requirements

Code	Title	Hours
Seminar		
Students must enroll in the following course every semester until start of the dissertation phase of the program (the course is repeatable two times for 1 credit and four times for 0 credit):		2
PT 7030	Interdisciplinary Seminar in Rehabilitation Science	
Foundations		
PHTH 5210	Biostatistics in Public Health	3
Rehabilitation Science and Human Movement		
PT 7001	Core Concepts in Rehabilitation Science and Research	3
PT 7010	Measurement and Analysis of Human Movement and Bioinstrumentation	4
PT 7020	Technologies in Movement and Rehabilitation Science	4

Electives

Code	Title	Hours
Complete 16 semester hours from the list below chosen in consultation with a faculty advisor.		16
BIOE 5810	Design of Biomedical Instrumentation	
BIOE 5235	Biomedical Imaging	
BIOL 5601	Multidisciplinary Approaches in Motor Control	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7200	Linear Systems Analysis	
EXSC 5210	Physical Activity and Exercise: Prescription, Measurement, and Testing	
HLTH 5450	Healthcare Research	
ME 5250	Robot Mechanics and Control	
ME 5659	Control Systems Engineering	
ME 5665	Musculoskeletal Biomechanics	
ME 7247	Advanced Control Engineering	
PHTH 6210	Applied Regression Analysis	
PHTH 6440	Advanced Methods in Biostatistics	
PT 5133	Kinesiology	
PT 5138	Neuroscience	
PT 5150	Motor Control, Development, and Learning	
PT 5209	Neurological Rehabilitation 1	

PT 5600	Ergonomics and the Work Environment
PT 6221	Neurological Rehabilitation 2

Dissertation

Code	Title	Hours
PT 9990	Dissertation Term 1	
PT 9991	Dissertation Term 2	

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

Advanced Entry PhD Program Requirements

Milestones

- Annual review
- Qualifying exam
- Dissertation committee
- Dissertation proposal
- Dissertation defense

Core Requirements

Based on a student's background in their preceding master's degree, core coursework and total hours for the advanced entry program may vary. The graduate program director will consider the following program requirements when advising students on a plan of study.

Code	Title	Hours
Seminar		
Students must enroll in the following course every semester until start of the dissertation phase of the program:		2
PT 7030	Interdisciplinary Seminar in Rehabilitation Science (Repeatable 2 times for 1 credit and 4 times for 0 credit)	
Foundations		
PHTH 5210	Biostatistics in Public Health	3
Rehabilitation Science and Human Movement		
PT 7001	Core Concepts in Rehabilitation Science and Research	3
PT 7010	Measurement and Analysis of Human Movement and Bioinstrumentation	4
PT 7020	Technologies in Movement and Rehabilitation Science	4

Electives

Code	Title	Hours
BIOE 5810	Design of Biomedical Instrumentation	
BIOE 5235	Biomedical Imaging	
BIOL 5601	Multidisciplinary Approaches in Motor Control	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7200	Linear Systems Analysis	
EXSC 5210	Physical Activity and Exercise: Prescription, Measurement, and Testing	
HLTH 5450	Healthcare Research	
ME 5250	Robot Mechanics and Control	
ME 5659	Control Systems Engineering	
ME 5665	Musculoskeletal Biomechanics	
ME 7247	Advanced Control Engineering	
PHTH 6210	Applied Regression Analysis	
PHTH 6440	Advanced Methods in Biostatistics	
PT 5133	Kinesiology	
PT 5138	Neuroscience	
PT 5150	Motor Control, Development, and Learning	
PT 5209	Neurological Rehabilitation 1	
PT 5600	Ergonomics and the Work Environment	
PT 6221	Neurological Rehabilitation 2	
PT 5321	Applications of Biomechanics in Human Function and Movement	

Dissertation

Code	Title	Hours
PT 9990	Dissertation Term 1	
PT 9991	Dissertation Term 2	

GPA Requirement

A minimum 3.000 GPA required

Physical Therapy, DPT—Postbaccalaureate Entry

Kristin Curry Greenwood, PT, DPT, EdD, MS
Chair, Department of Physical Therapy, Movement, and Rehabilitation Sciences and Associate Clinical Professor

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Our Postbaccalaureate Doctor of Physical Therapy (DPT) (http://www.northeastern.edu/bouve/pt/programs/pbdpt.html) program is designed for individuals who hold a minimum of a baccalaureate degree in any major other than physical therapy and have satisfied the prerequisite requirements. Over the course of three years, this rigorous curriculum provides didactic and experiential learning experiences, the cornerstone of our program. These experiences include cooperative education, simulated patient interactions, human cadaver lab, engagement with consumer clients, service-learning, clinical research, and clinical education experiences.

The DPT program recognizes that becoming a physical therapist is a developmental process that allows students the opportunity to take risks, reflect, learn from mistakes, and continue to grow to promote lifelong learning. We are committed to a process of actively engaged learning that occurs in the classroom, the research laboratory, the community, and clinical settings regionally and internationally. We strive to provide challenging and leading-edge academic content in an environment supportive of processional development. Our educational philosophy is based upon a strong foundation of biological, psychological, social, and clinical sciences; experiential learning; evidence-based practice; cultural agility and humanistic values; and ethical and professional expectations. This is supported by a commitment of promoting and improving the health of clients and society locally, nationally, and globally. Academic content is student-centered and delivered using both traditional and innovative teaching methods including, but not limited to, lectures, small group projects and discussions, multimedia presentations, expert panel discussions, human cadaver lab, problem-based approaches,

case studies, faculty-led research, patient simulation, interprofessional education opportunities, virtual and online learning activities, and self-reflection. Experiential learning, a cornerstone of our curriculum, is embedded in academic course requirements including clinical education, cooperative education, service-learning, and capstone research projects. These experiences are intentional and align with the Northeastern University Academic 2025 Plan.

We offer a Sports Performance concentration that is designed to prepare the physical therapy student to confidently pursue a sports physical therapy position working with athletes of all ages in a variety of settings. Students take additional coursework, focused on research and clinical rotations that expand upon the entry-level physical therapy curriculum. Our Sports Clinical Residency program is for licensed practicing physical therapists.

Emphasis on Experiential Learning

COOPERATIVE EDUCATION

Our DPT program provides students with six months of full-time experiential learning in addition to the required clinical affiliations necessary for licensure. Through cooperative education, the hallmark of Northeastern University, students are able to integrate semesters of academic study with semesters of cooperative education experiences in hospitals and clinics throughout the country and around the globe. Students may be employed as physical therapy co-ops or perform other health-related duties.

CLINICAL EDUCATION

The curriculum also includes three rotations for a total of 36 weeks of clinical education under the direct supervision of a licensed physical therapist. We are affiliated with world-class medical centers and clinical sites throughout the United States, providing students with access to master clinicians and clinical scholars. Every effort is made to accommodate individual circumstances, but students should be prepared to travel out of state for two of the three clinical placements. Availability of a car may be required, as most sites are not accessible by public transportation. All expenses associated with clinical education, including travel and housing, are the responsibility of the student.

GLOBAL OUTREACH

Students may participate in short cultural immersion experiences abroad whereby they engage in community service projects under the direction of a physical therapy faculty member or on physical therapy academic exchanges with partner academic institutions.

SERVICE-LEARNING

During the curriculum, students participate in service-learning opportunities in the local community in which they learn and apply skills and knowledge related to program objectives. These opportunities start during the first academic year and continue throughout the program in a variety of settings.

STUDENT RESEARCH

The Department of Physical Therapy, Movement, and Rehabilitation Sciences' research mission is to build the evidence for best practices to maintain and improve the health and well-being of local, national, and global community members. Students have the opportunity to work with faculty to conduct ongoing research in world-renowned medical centers and in one of the nine Department of Physical Therapy, Movement, and Rehabilitation Sciences' labs and centers, including Neuromotor Systems Lab, Laboratory for Locomotion Research, The ReGameVR Laboratory, Movement Neuroscience Laboratory, Musculoskeletal Epidemiology and Biomechanics Laboratory, Occupational Biomechanics and Ergonomics Laboratory, Teaching and Learning Innovation Lab, Neuroscience Wet Lab, and the Center for Cognitive and Brain Health Program.

Progression in the DPT Program

To progress in the program, students must maintain acceptable standards of scholarship and academic performance as stated in the program requirements section. Students must demonstrate appropriate skills and professional behaviors to progress in the program. Students must develop appropriate motor skills, professional behaviors, and emotional maturity as outlined in the essential functions. The program in physical therapy is accredited by the Commission on Accreditation in Physical Therapy Education of the American Physical Therapy Association.

Graduates of the DPT program are eligible to sit for the Physical Therapy Licensure Examination.

PROFESSIONAL BEHAVIORS REQUIREMENT

In order to promote professionalism in the classroom, local and global communities, and clinical settings, the physical therapy program requires the demonstration of professional behaviors in accordance with the professional behaviors policy. The purpose of professional behaviors procedures is to help remediate students who have been identified as having professional behavior issues in an academic, cooperative, or clinical education setting. Professional standards are outlined in the student manual and may include but are not limited to the APTA Code of Ethics for the Physical Therapist (https://www.apta.org/uploadedFiles/APTAorg/About_Us/Policies/Ethics/CodeofEthics.pdf) and/or the APTA Guide for Professional Conduct (http://www.apta.org/uploadedFiles/APTAorg/Practice_and_Patient_Care/Ethics/GuideforProfessionalConduct.pdf).

Any faculty member who has a concern about a student's professional behavior will arrange to meet with the student to discuss the issue. If the faculty member has met with the student and there is satisfactory resolution of the unprofessional conduct, only a form for tracking purposes is needed.

The tracking form shall be kept on record in order to track these students while they are in the program. A request for committee reviews as indicated on the tracking form must occur under the following conditions:

a. A faculty member has attempted to correct the behavior and it has not been corrected after meeting with the student and taking initial steps to improve the identified professional behavior issues.

b. The incident is egregious

c. A second breach of professional standards has occurred.

Full Professional Behaviors Violation Review Process

a. The chairperson of the PTMRS Academic Affairs Committee (AAC) will send a letter to students about whom concerns have been raised and instruct each student to complete a Self-Assessment of Professional Behaviors. A meeting date will be set to discuss the concern. If the committee finds there is sufficient evidence to support a violation of the professional standards previously defined, one will be noted in the student's record.

b. The AAC will develop an appropriate remediation plan in collaboration with the student and appropriate faculty.

c. Depending on the situation, students may have the opportunity to improve professional behaviors.

d. Any of the following may result in a dismissal from the program:

i. A third breach of professional standards

ii. A second offense of the same professional standard

iii. An egregious breach of a professional standard as outlined in the student manual and/or behaviors that may include but are not limited to violation of the APTA Code of Ethics for the Physical Therapist and/or the APTA Guide for Professional Conduct

If a student believes he or she has been erroneously, capriciously, or otherwise unfairly treated in the process or decision, he or she may appeal decisions made by the PTMRS AAC to the chair of PTMRS.

If the student has been suspected of cheating or in any way violating the Academic Code of Conduct, the student will be referred to the AAC as well as Office of Student Conduct and Conflict Resolution (OSCCR). Any concern regarding the student's professional behavior will be brought to the attention of the faculty as appropriate at the faculty meeting.

Please visit Bouvé College Learning Outcomes (https://bouve.northeastern.edu/learning-outcomes/) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of C or higher is required in all courses.

Code	Title	Hours
Foundations		
PT 6330 and PT 6331	Functional Anatomy 1 and Lab for PT 6330	3
PT 6340 and PT 6341	Functional Anatomy 2 and Lab for PT 6340	5
PT 5101 and PT 5102	Foundations of Physical Therapy and Lab for PT 5101	4
PT 6350 and PT 6351	Foundations of PT Examination and Therapeutic Activities and Lab for PT 6350	5
Core		
PT 5160	Psychosocial Aspects of Healthcare	3
PT 6243	Health Education, Promotion, and Wellness	3
PT 6245	Seminar for PT 6243	1
PT 5140	Pathology	4
PT 5500	Pharmacology for Physical Therapy	2
PT 5503 and PT 5504	Cardiovascular and Pulmonary Management and Lab for PT 5503	5
PT 5515 and PT 5516	Integumentary Systems and Lab for PT 5515	3
PT 5138 and PT 5139	Neuroscience and Lab for PT 5138	5
PT 5150 and PT 5151	Motor Control, Development, and Learning and Lab for PT 5150	5
PT 5209 and PT 5210	Neurological Rehabilitation 1 and Lab for PT 5209	5
PT 6221 and PT 6222	Neurological Rehabilitation 2 and Lab for PT 6221	5
PT 6550	Pediatric Aspects of Life Span Management	3
PT 6555	Geriatric Aspects of Life Span Management	2
PT 6305 and PT 6306	Musculoskeletal Management I and Lab for PT 6305	5
PT 6405 and PT 6406	Musculoskeletal Management II and Lab for PT 6405	5
PT 6505 and PT 6506	Musculoskeletal Management 3 and Lab for PT 6505	4
PT 6600	Special Topics	2
PT 6520 and PT 6521	Prosthetic Management and Lab for PT 6520	2
PT 6251	Diagnostic Imaging	3
PT 6420	PT Administration and Management within the U.S. Healthcare System	4
PT 5226	Physical Therapy Professional Seminar 2	2
PT 5540	Clinical Integration 1: Evidence and Practice	2
PT 6250	Clinical Integration 2: Evidence and Practice	2
Clinical		
PT 6441	Clinical Education 1	6
PT 6442	Clinical Education 2	6
PT 6450	Clinical Education 3	8
Research		
PT 6510	Evidence-Based Practice and Research Design	3
PT 6511	Research Methods and Statistics in PT	2
PT 6512	DPT Capstone 1	1
PT 6513	DPT Capstone 2	2
Co-op		
PT 5111	Professional Development for Bouvé Graduate Co-op	1
PT 6964	Co-op Work Experience (taken two semesters)	0

Concentration in Pediatric Physical Therapy

Code	Title	Hours
Required		
CAEP 5150	Early Intervention: Family Systems	3
CAEP 5151	Early Intervention: Infant and Toddler Development, Risk, and Disability (Pediatric Physical Therapy Concentration)	3
PT 6512	DPT Capstone 1 [1]	1
PT 6513	DPT Capstone 2 [1]	2
PT 6550	Pediatric Aspects of Life Span Management	3
Complete one of the following:		
PT 6442	Clinical Education 2	6
PT 6450	Clinical Education 3	8

Concentration in Sports Performance

Code	Title	Hours
Required		
PT 5227	Physical Therapy Project 1 [2]	3
PT 5229	Physical Therapy Project 2 [2]	2
PT 5165	Sports Medicine: Managing the Injured Athlete	4
PT 6237	Advanced Special Topics in Physical Therapy	2
Complete one of the following:		
PT 6442	Clinical Education 2	6
PT 6450	Clinical Education 3	8

[1] Pediatric Physical Therapy concentration students will be assigned a faculty with expertise in pediatric physical therapy. Pediatric-focused PT project proposals will be reviewed and approved by the director of the Pediatric Physical Therapy concentration in line with current course requirements.

[2] Sports Performance concentration students will be assigned a faculty with expertise in sports physical therapy. Sports-focused PT project proposals will be reviewed and approved by the director of the Sports Performance concentration in line with current course requirements.

Program Credit/GPA Requirements

123 total semester hours required
Minimum 3.000 GPA required

Academic Progression Policies

ACADEMIC STANDING

Students must maintain an overall grade-point average (GPA) of #3.000 #or higher and complete all professional courses with a grade of C or better to progress into the subsequent semester of professional courses.

PROBATION IN THE PROFESSIONAL PHASE

Students in the professional phase of the program who fail any professional course or whose overall GPA drops below a 3.000 must request to be placed on academic probation to remediate the deficiency by the semester deadline set by the PTMRS Academic Standing Committee in order to remain in the Doctor of Physical Therapy (DPT) program. Failure to request probation in a timely manner will result in a student being dismissed from the program.

A DPT student may only be placed on academic probation for one semester at a time or until the failed course is offered again. A DPT student may only be placed on academic probation a maximum of twice during the entire professional phase of the program.

During probation, students must correct all deficiencies as specified in their respective signed probation plan during the applicable probationary period. Failure to remediate the deficiencies within the agreed-upon time will result in dismissal from the program. During the period of probation, the student must earn a semester GPA of 3.000 or better, or the student will be dismissed from the DPT program. Once the student has successfully completed their probation action plan, they should work with their academic adviser to be removed from probation.

The chair of the department's Academic Standing Committee may grant a DPT student's request for probation without a formal meeting under the following circumstances:

- The student has not already reached their maximum two semesters of probation.
- The student is in good professional standing with the Professional Behaviors Committee in accordance with the professional behaviors policy.

PROFESSIONAL BEHAVIORS REQUIREMENT

See Progression in the DPT Program located in the overview text.

Academic Dismissal from Major

Students in the DPT program will be dismissed from their major effective the following academic semester for any of the reasons noted below:

- Failure to earn a grade of C or better in a total of three professional courses, regardless of remediation. Within the physical therapy program, each specific professional course (with separate registration number) will be counted as a separate failure even if content is related.
- Failure to remediate a prior deficiency outlined within the probation contract within the agreed-upon time frame.
- Failure to earn the minimum required grade in the same course twice.
- Failure to maintain an overall GPA of 3.000 or higher during the professional phase of the DPT program. Students will be dismissed if they are not eligible for a probationary status.
- Physical therapy students will be permitted only two changes in year of DPT graduation. Any additional changes to year of graduation will result in the student being dismissed from the program.
- Students who do not adhere to the professional standards of the program are violating academic policy and will be dismissed if any of the following occurs:
  - A third breach of professional standards
  - A second offense of the same professional standard
  - Any egregious breach of a professional standard as outlined in the student manual and/or behaviors that may include but are not limited to violation of the APTA Code of Ethics for the Physical Therapist and/or the APTA Guide for Professional Conduct

Appeal of Academic Standing

Students may request, through their academic adviser, to appeal to the chair of the department's Academic Standing Committee to meet with the committee for an exception to the Academic Progression and Probation Policy for DPT program for extenuating or capricious circumstances as provided in the student's respective handbook.

Essential Functions for Physical Therapy Students

The DPT program at Northeastern University is a challenging and intense program, which places specific demands on a student enrolled in the program. The academic rigor of the program closely corresponds to intellectual and physical demands that a graduate will encounter as a practicing physical therapist. Northeastern's DPT program is designed to prepare students to enter the physical therapy profession as a generalist with the skills, knowledge, and ability to successfully perform all the required functions of an entry-level physical therapist. Essential functions are the aptitudes and abilities required of physical therapist students to successfully complete the curriculum of the DPT program and to perform the clinical skills of a physical therapist consistent with Patient/Client Management as detailed in the Guide to Physical Therapy Practice.

The purpose of this document is to delineate the essential functions that are fundamental to the DPT program. Upon admission, students must be able to perform each of the essential functions outlined below during classroom, laboratory, and experiential education learning activities (including, but not limited to, participation in one-on-one interactions, small group discussion and presentation, large group lectures, service

learning, and patient encounters) in both academic, community, and clinical settings.

Students are also required to demonstrate good judgment, responsibility, integrity, sensitivity, and compassion, while simultaneously being able to accurately synthesize and apply knowledge in a timely and safe manner.

Students are required to perform the following essential functions of the DPT program:

Communication Functions

1. Read, understand, and communicate information in written and spoken formats using the English language.
2. Interpret and respond to the verbal, nonverbal, and written communications of others in an appropriate, professional manner.

Affective Functions

1. Establish, value, and continue to develop professional, respectful, empathetic relationships with individuals from all lifestyles, cultures, ages, socioeconomic backgrounds, and abilities.
2. Develop, value, and maintain effective working relationships with faculty, students, professional colleagues, peers, patients/clients, families, and the general public.
3. Meet externally imposed deadlines and time requirements.
4. React effectively in challenging situations with use of appropriate resources.
5. Demonstrate an ability to function effectively in complex, highly stimulating environments.
6. Demonstrate responsibility for self-directed assessment, reflection, and professional growth.
7. Demonstrate core values of honesty, integrity, and accountability for the consequences of one's own actions.
8. Demonstrate ethical behavior, proper judgement, and decision-making skills.

Cognitive Functions

1. Demonstrate self-management skills including planning, organizing, time management, and adhering to legal/regulatory requirements.
2. Use a variety of sources, including reading material, lecture, discussion, observation, and physical examinations to:
   a. Recall, interpret, extrapolate, and apply information
   b. Measure, analyze, synthesize, and evaluate information
   c. Gather and prioritize information needed to solve a problem
3. Respond appropriately to emerging problems and potentially hazardous situations by making timely judgments to react effectively and seek assistance when necessary.
4. Accept and apply constructive feedback.

Psychomotor Functions

1. Possess physical strength, stamina, balance, movement, hand-eye coordination, and dexterity required to perform patient care tasks in a manner that does not compromise the safety of self or others.
2. Perform intermittent physical activity of the whole body throughout an 8- to 12-hour period.
3. Engage in complex, coordinated movements needed during a variety of activities including skills lab practice, manual techniques, patient examination, intervention, and guarding.
4. Utilize auditory, visual, and tactile senses to receive information from written, spoken, and nonverbal communication mechanisms; observation of human structures; postures and movements; and equipment and or technology.
5. Quickly and appropriately react to sudden or unexpected events or movements of others.

For further information please refer to the Post Baccalaureate Doctor of Physical Therapy (PBDPT) Student Handbook (https://northeastern.sharepoint.com/sites/BouveCurrentStudentResources/SitePages/Handbooks.aspx) and Clinical Education Student Manual (https://northeastern.sharepoint.com/sites/BouveCurrentStudentResources/SitePages/Handbooks.aspx).

Human Movement and Rehabilitation Sciences, MS

A strong global need exists for interdisciplinary, innovative, and translational research and practice directed toward improving quality of life and participation of all people in our communities. To meet this need, we offer a novel Master of Science in Human Movement and Rehabilitation Sciences. Human movement and rehabilitation sciences encompasses a broad range of topics including sports performance, functional assessments, occupational biomechanics and ergonomics, motor control and learning, neuroscience, musculoskeletal disorders, orthopedics, aging, assistive technology, injury prevention and rehabilitation, communication sciences, speech, and early development.

The objective of this program is to prepare graduates to assist in advancing basic, translational, and applied research, as well as practice in human movement and rehabilitation sciences. The program is based on the integration of core skills and concepts across the multiple disciplines that are associated with human movement and rehabilitation sciences, coupled with the acquisition of skills and tools, and specialization within specific areas and tracks.

The Master of Science in Human Movement and Rehabilitation Sciences program is housed in the Department of Physical Therapy, Movement, and Rehabilitation Sciences, offering excellent collaborative teaching and research programs across the departments and school of the Bouvé College of Health Sciences, the Khoury College of Computer Sciences, the College of Engineering, and the College of Science. The 12-month program requires 32 credit hours of required and elective courses, including 4 credit hours devoted to the capstone project.

Traditional Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Seminar		
Students must enroll for two semesters for a total of 2 semester hours.		2
PT 7030	Interdisciplinary Seminar in Rehabilitation Science	
Foundations		
PHTH 5210	Biostatistics in Public Health	3
Rehabilitation Science and Human Movement		
PT 7001	Core Concepts in Rehabilitation Science and Research	3
PT 7010	Measurement and Analysis of Human Movement and Bioinstrumentation	4
PT 7020	Technologies in Movement and Rehabilitation Science	4
PT 5321	Applications of Biomechanics in Human Function and Movement	4

PT 6230	Capstone Project: Human Movement and Rehabilitation Sciences	4

Electives

Code	Title	Hours
Complete 8 semester hours from the list below. Students must petition to take electives outside the approved list.		8
BIOE 5810	Design of Biomedical Instrumentation	
BIOE 5235	Biomedical Imaging	
PT 5410	Functional Human Neuroanatomy	
BIOL 5601	Multidisciplinary Approaches in Motor Control	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7200	Linear Systems Analysis	
EXSC 5210	Physical Activity and Exercise: Prescription, Measurement, and Testing	
HLTH 5450	Healthcare Research	
ME 5250	Robot Mechanics and Control	
ME 5659	Control Systems Engineering	
ME 5665	Musculoskeletal Biomechanics	
ME 7247	Advanced Control Engineering	
PHTH 6210	Applied Regression Analysis	
PHTH 6440	Advanced Methods in Biostatistics	
PT 5133	Kinesiology	
PT 5138	Neuroscience	
PT 5150	Motor Control, Development, and Learning	
PT 5209	Neurological Rehabilitation 1	
PT 5600	Ergonomics and the Work Environment	
PT 6221	Neurological Rehabilitation 2	

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

Experiential Program Requirements

Master of Science in Human Movement and Rehabilitation Sciences—Experiential offers students the opportunity to replace electives with educational residency experiences focused on the workplace. This program is designed to prepare graduates to assist in advancing basic, translational, and applied research, as well as practice, in human movement and rehabilitation sciences. The program is based on the integration of core skills and concepts across the multiple disciplines that are associated with human movement and rehabilitation sciences, coupled with experiential opportunities to apply the acquisition of skills and tools in the workplace.

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Seminar		
Students must enroll for two semesters for a total of 2 semester hours.		2
PT 7030	Interdisciplinary Seminar in Rehabilitation Science	
Rehabilitation Science and Human Movement		
PT 7001	Core Concepts in Rehabilitation Science and Research	3
HLTH 5410	Introduction to Statistics in Health and Behavioral Science	3
PT 7010	Measurement and Analysis of Human Movement and Bioinstrumentation	4
PT 7020	Technologies in Movement and Rehabilitation Science	4
PT 5321	Applications of Biomechanics in Human Function and Movement	4
PT 6230	Capstone Project: Human Movement and Rehabilitation Sciences	4

Experiential

Code	Title	Hours
PT 6123	Human Movement and Rehabilitation Experiential Residency 1 (Human Movement and Rehabilitation Experiential Residency 1)	4
PT 6124	Human Movement and Rehabilitation Experiential Residency 2 (Human Movement and Rehabilitation Experiential Residency 2)	4

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

School of Community Health and Behavioral Sciences

Website (https://bouve.northeastern.edu/ap/)

Robert J. Volpe, PhD
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Department of Applied Psychology

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Website (https://bouve.northeastern.edu/health-sciences/)

Sharon L. Harlan, PhD
Professor and Chair
Department of Health Sciences

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The School of Community Health and Behavioral Sciences offers students interdisciplinary education and research excellence; drawing on novel health technologies and data literacy to address society's most pressing public health issues.

Students in the school are prepared to be the next generation of innovators and thought leaders in the health professions and public health; empowered to effect real change by leveraging new and emerging technologies and data.

The school is designed to improve individuals, communities, and society through three pillars of excellence:

- Health technology innovation
- Public mental health interventions
- Improvement of social and environmental determinants of health to achieve social justice

Department of Applied Psychology

Graduate programs in the Department of Applied Psychology (including two doctoral programs accredited by the American Psychological Association) reflect Northeastern University's tradition of practice-oriented education with an ecological and multicultural focus. Faculty and students come from diverse ethnic and cultural backgrounds, providing an enriching learning experience. The department is a scientist-practitioner-based unit that generates new psychological knowledge through research, and the translation of research, to applications that:

1. Optimize development and learning
2. Promote mental and physical health across the life span

The Bouvé College of Health Sciences emphasizes experiential and field-based learning, interdisciplinary and global knowledge, and integration of science and practice. The Department of Applied Psychology seeks to prepare students to become mental- and behavioral-health professionals in a variety of educational, government, community, organizational, and private settings. Our doctoral programs provide excellent educational opportunities for those interested in professional psychology with specialized training for future careers in academic or practice positions as licensed psychologists. Our students have an opportunity to acquire knowledge and competency needed for a lifetime of personal fulfillment and professional achievement.

Doctor of Philosophy (PhD)

- Counseling Psychology (p. 277)
- School Psychology (p. 278)

Certificate of Advanced Graduate Studies (CAGS)

- Applied Behavior Analysis (p. 279)
- Counseling Psychology (p. 280)
- School Psychology (p. 280)

Master of Science (MS)

- Applied Behavior Analysis (p. 281)
- Applied Psychology (p. 282)
- School Psychology (p. 280)

Master of Science in Counseling Psychology (MSCP)

- Counseling Psychology (p. 283)

Graduate Certificate

- Applied Behavior Analysis (p. 283)

Department of Health Sciences

The Department of Health Sciences in the Bouvé College of Health Sciences at Northeastern University provides a unique, transdisciplinary setting that incorporates academics, research, and practice and seeks to prepare students for a wide range of career paths. We offer a bachelor's degree in health sciences and options for combined majors with the D'Amore-McKim School of Business, the College of Social Sciences and Humanities, the College of Science, the College of Engineering, and the Khoury College of Computer Sciences, in addition to minors in exercise science, public health, global health, nutrition, health research methods, and health science. We offer several graduate degrees: Master of Public Health, Master of Science in Exercise Science, and a combined master's in the two fields. We also collaborate with Khoury to offer a Master of Science in Health Informatics, as well as combined graduate degrees with the School of Pharmacy, the Physician Assistant Program, and the School of Law. At the doctoral level, we offer a PhD in Population Health and, in cooperation with Khoury, a PhD in Personal Health Informatics. Finally, we offer a Graduate Certificate in Exercise Science for Clinicians.

Our diverse faculty has expertise in the fields of population health; health disparities; biostatistics; epidemiology; exercise science; medical sociology; public policy; personal health technologies; neurodevelopmental disorders; nutrition, environmental, occupational, and mental health. Students have the opportunity to work side-by-side with faculty in conducting cutting-edge research in these fields. We also have research staff highly skilled in providing unique, specialized dietary assessment services.

In line with Northeastern's commitment to interdisciplinary research and urban engagement, we teach and work closely with many other schools, centers, and institutes in the university, including the Institute for Health Equity and Social Justice Research (IHESJR), the Center for Community Health Education Research and Service (CCHERS), the Social Science Environmental Health Research Institute (SSEHRI), and the Center for Health Policy and Healthcare Research (CHPHR), as well as community agencies and neighborhood health centers in the local Boston area and beyond.

Doctor of Philosophy (PhD)

- Population Health (p. 286)
- Personal Health Informatics (p. 132)

Master of Public Health (MPH)

- Public Health (p. 288)

Master of Science (MS)

- Exercise Science with Concentration in Physical Activity and Public Health (p. 289)
- Health Informatics (p. 134)

Dual Degree

- Law, JD / Public Health, MPH (p. 263)
- Pharmacy, PharmD / Public Health, MPH (p. 291)
- Physician Assistant Studies, MS / Public Health, MPH (p. 264)
- Public Health, MPH / Exercise Science with Concentration in Physical Activity, MS (p. 264)
- Public Health, MPH / Health Informatics, MS (p. 264)

Graduate Certificate

- Exercise Science for Clinicians (p. 292)

Counseling Psychology, PhD

The Doctor of Philosophy in Counseling Psychology program is accredited by the American Psychological Association (APA). It is designed to train the next generation of mental health professionals. The program offers doctoral education and training in psychology and seeks to prepare students for entry-level practice in counseling psychology. Doctoral-level counseling psychologists conduct research, teach at the university level, supervise students and professionals, consult with community agencies, and provide clinical services to people across the developmental life span. Counseling psychologists also

enhance the science of health promotion and health psychology and emphasize community-based interventions. It is the mission of the PhD in Counseling Psychology program to train multiculturally competent counseling psychologists who are clinically adept in multiple settings with a variety of psychological and health-related issues and who are able to conceptualize, conduct, and evaluate research across biological, cultural, and relational systems in numerous social contexts, such as families, schools, neighborhoods, and communities.

Please visit Bouvé College Learning Outcomes (https://bouve.northeastern.edu/bchs/about/learning-outcomes/) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review
Four qualifying examinations completed in the first three years—research, ethics, assessment, and intervention
Research team during the first year (two consecutive semesters)
Dissertation committee
Dissertation proposal
Dissertation defense

Core Requirements

A grade of B or higher is required in all coursework.

Code	Title	Hours
Basic		
CAEP 6390	History and Systems of Psychology	3
CAEP 6394	Advanced Multicultural Psychology	3
CAEP 7750	Biological Bases of Behavior	3
CAEP 7755	Cognitive and Affective Bases of Behavior	3
CAEP 7756	Social Psychology in an Organizational and Ecological Context	3
Fieldwork		
Complete 8 semester hours from the following:		8
CAEP 7741	Advanced Fieldwork 1	
CAEP 7742	Advanced Fieldwork 2	
CAEP 7743	Advanced Fieldwork 3	
CAEP 7744	Advanced Fieldwork 4	
Clinical		
CAEP 6350	Introduction to Cognitive Assessment	3
CAEP 6352	Personality Assessment	3
CAEP 6360	Consultation and Program Evaluation	3
CAEP 7710	Advanced Clinical Assessment	3
CAEP 7720	Advanced Clinical Interventions	3
CAEP 7758	Doctoral Seminar in Contemporary Theories of Psychotherapy	3
Elective		
Three semester hours can be chosen from any graduate level CAEP course or combination of graduate level CAEP courses outside of the PhD in Counseling Psychology program of study. Other electives may be chosen upon approval of the program director and faculty adviser.		3
Professional		
Complete 6 semester hours from the following:		6
CAEP 7701	Doctoral Seminar in Counseling Psychology (Repeatable 3 times for 1 credit and 3 times for 0 credits)	
CAEP 7732	Legal and Ethical Issues in Community and Educational Settings	
Research		
CAEP 7711	Measurement: Advanced Psychometric Principles	3
CAEP 7712	Intermediate Statistical Data Analysis Techniques	3
CAEP 7716	Advanced Research and Data Analyses 2	3
Internship		
Complete 3 semester hours from the following:		3
CAEP 7798	Doctoral Internship 1	
CAEP 7799	Doctoral Internship 2	

Dissertation

Code	Title	Hours
CAEP 9990	Dissertation Term 1	
CAEP 9991	Dissertation Term 2	

Program Credit/GPA Requirements

62 total semester hours required
Minimum 3.000 GPA required

School Psychology, PhD

Northeastern University's Doctor of Philosophy in School Psychology program is accredited by the American Psychological Association (APA) and the National Association of School Psychologists (NASP). The program is designed to prepare the next generation of leaders in school psychology. The ecological perspective and scientist-practitioner training model provide the foundation for the program's educational goals. Students have an opportunity to learn how to conduct research, to use research to inform practice, and to contribute to the scientific foundation of professional practice.

Please visit Bouvé College Learning Outcomes (https://bouve.northeastern.edu/learning-outcomes/) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Comprehensive examination
Annual review
Mentored research project
Dissertation committee
Dissertation proposal
Dissertation defense

Core Requirements

A grade of B or higher is required in all coursework.

Code	Title	Hours
Professional		
CAEP 6365	Seminar in School Psychology	3
CAEP 7732	Legal and Ethical Issues in Community and Educational Settings	3
Basic		
CAEP 6206	Learning Principles	3
CAEP 6390	History and Systems of Psychology	3
CAEP 6218	Infant, Child, and Adolescent Development	3
or CAEP 6220	Development Across the Life Span	
CAEP 7750	Biological Bases of Behavior	3
CAEP 7755	Cognitive and Affective Bases of Behavior	3
CAEP 7756	Social Psychology in an Organizational and Ecological Context	3
Multicultural Competency		
CAEP 6203	Understanding Culture and Diversity	3
CAEP 6394	Advanced Multicultural Psychology	3
Assessment and Intervention		
Course Work		
CAEP 6247	Child and Adolesent Psychopathology	3
CAEP 6345	Learning Problems: Educational, Biological, and Ecological Perspectives	3
CAEP 6347	Behavior Management	3
CAEP 6350	Introduction to Cognitive Assessment	3
CAEP 6353	Curriculum-Based Assessment and Instruction	3
CAEP 6354	Social, Emotional, and Behavioral Assessment	3
CAEP 6360	Consultation and Program Evaluation	3
CAEP 6399	Clinical Skills in Counseling Psychology	3
CAEP 6401	Counseling Children and Adolescents in Schools 1	3
CAEP 6402	Counseling Children and Adolescents in Schools 2	3
CAEP 7710	Advanced Clinical Assessment	3
CAEP 7720	Advanced Clinical Interventions	3
Practicum		
CAEP 6400	Prepracticum in School Psychology	1
CAEP 8415	Practicum in School Psychology 1	2
CAEP 8416	Practicum in School Psychology 2	2
Fieldwork (minimum of 2 SH required per course, for a total of 8 SH)		
CAEP 7741	Advanced Fieldwork 1	1,2
CAEP 7742	Advanced Fieldwork 2	1,2
CAEP 7743	Advanced Fieldwork 3	1,2
CAEP 7744	Advanced Fieldwork 4	1,2
Internship (complete 3 SH)		
CAEP 7798	Doctoral Internship 1	1-3
CAEP 7799	Doctoral Internship 2	2
Research		
CAEP 6202	Research, Evaluation, and Data Analysis	3
CAEP 7711	Measurement: Advanced Psychometric Principles	3
CAEP 7712	Intermediate Statistical Data Analysis Techniques	3
CAEP 7777	Doctoral Seminar: Program Planning and Evaluation	3
CAEP 7716	Advanced Research and Data Analyses 2	3

Dissertation

Code	Title	Hours
CAEP 9990	Dissertation Term 1	
CAEP 9991	Dissertation Term 2	

Program Credit/GPA Requirements

97 total semester hours required
Minimum 3.000 GPA required

Advanced Entry PhD Program Requirements

Students who enter with a master's degree develop an individualized program of study with their advisor, which requires a minimum of 50 semester hours of credit.

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Comprehensive examination
Annual review
Mentored research project
Dissertation committee
Dissertation proposal
Dissertation defense

Core Requirements

A grade of B or higher is required in all course work.

Code	Title	Hours
Complete 50 semester hours of approved course work. Consult your faculty advisor for acceptable courses.		50

Dissertation

Code	Title	Hours
Complete the following (repeatable) course twice:		
CAEP 9990	Dissertation Term 1	
CAEP 9991	Dissertation Term 2	

Program Credit/GPA Requirements

50 total semester hours required
Minimum 3.000 GPA required

Applied Behavior Analysis, CAGS

The Certificate of Advanced Graduate Study (CAGS) program prepares graduates to assume supervisory behavior analyst roles in schools and agencies and to serve as independent consultants. Additionally, it seeks to give graduates expertise in a specific clinical area related to applied behavior analysis, such as early intervention, public policy, or assessment. This program is designed for the student who possesses a graduate degree in either Psychology or Education. The Behavior Analyst Certification Board (BACB) has verified this course sequence as meeting

the course requirements for eligibility to take the Board Certified Behavior Analyst (BCBA) examination.

This program includes 7 core courses in behavior analysis that explore the principles and procedures of applied behavior analysis in-depth and address its philosophical underpinnings. The 7 core courses are followed by 3 additional courses in a specific content area related to behavior analysis. These courses, which are related, explore the related clinical issue in-depth. Students may elect to complete their supervised experience hours by taking Intensive Practicum in Applied Behavior Analysis 1 (CAEP 8417), Intensive Practicum in Applied Behavior Analysis 2 (CAEP 8418), Intensive Practicum in Applied Behavior Analysis 3 (CAEP 8419), and Intensive Practicum in Applied Behavior Analysis 4 (CAEP 8421) in addition to the 10 required courses.

Courses are delivered in an online format. Students attend lectures virtually and view supplementary material on their own schedules, taking advantage of technological advances that promote student learning and increase student-to-instructor and student-to-student communication.

Students take one or two courses each academic term, and courses are offered during the fall, spring, and summer full semesters. Behavioral Concepts and Principles (CAEP 6326) and Service Administration (CAEP 6329) serve as prerequisite courses to the remaining courses in the program.

Professional Portfolio

The capstone for the program is the professional portfolio. This portfolio, which is compiled electronically, documents the student's acquisition of critical behavioral procedures and competency in critical clinical skills. These skills, each of which is associated with a specific project, include:

- Preference and reinforcer assessment
- Functional assessment of problem behavior
- Task analysis
- Discrete trial
- Stimulus equivalence
- Consequence reinforcement
- Conditioned reinforcement
- Literature review

Each semester, students complete assignments associated with the above clinical skills, and each assignment culminates in professional documents to be included in the student's professional portfolio. A faculty member reviews and signs each assignment in the professional portfolio. The faculty member's signature indicates that the student has achieved the faculty-established standards for the project. Graduates are encouraged to use their professional portfolio when applying for employment.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of B or higher is required in each course.

Code	Title	Hours
Basic		
CAEP 6326	Behavioral Concepts and Principles	3
CAEP 6329	Service Administration	3
CAEP 6327	Behavior Assessment	3
CAEP 6328	Research and Design Methods	3
CAEP 6331	Advanced Learning Seminar 1	3
CAEP 6334	Applied Programming Seminar 1	3
CAEP 6336	Systematic Inquiry 1	3
Specialization Area		
Complete specialization area in consultation with your faculty advisor.		9

Practicum

Note: The intensive practicum is optional. Consult your faculty advisor.

Code	Title	Hours
CAEP 8417	Intensive Practicum in Applied Behavior Analysis 1	2
CAEP 8418	Intensive Practicum in Applied Behavior Analysis 2	2
CAEP 8419	Intensive Practicum in Applied Behavior Analysis 3	2
CAEP 8421	Intensive Practicum in Applied Behavior Analysis 4	2

Program Credit/GPA Requirements

30 total semester hours required
Minimum 3.000 GPA required

Counseling Psychology, CAGS

The Certificate of Advanced Graduate Study (CAGS) in Counseling Psychology is for students with a highly related master's degree seeking to enhance their professional skills. This program does not meet licensure requirements in Massachusetts. It is a 30-semester-hour course of study. This program is individually tailored to fulfill a student's professional focus.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of B or higher is required in all course work.

Code	Title	Hours
Required Core		
In consultation with faculty advisor, complete 24 semester hours in the following subject area:		24
CAEP		
Internship		
CAEP 8510	Internship in Counseling Psychology 1	3
CAEP 8511	Internship in Counseling Psychology 2	3

Program Credit/GPA Requirements

30 total semester hours required
Minimum 3.000 GPA required

School Psychology, MS/CAGS

Northeastern University's Master of Science/Certificate of Advanced Graduate Study (CAGS) in School Psychology is approved by the National Association of School Psychologists (NASP) and the Massachusetts Department of Elementary and Secondary Education. The overarching purpose of the program is to develop highly competent school

psychologists. Some students also choose to specialize in either early intervention or applied behavior analysis. The early intervention training option is designed to prepare school psychologists to work with infants and toddlers and their families in community and related agencies, on interdisciplinary teams, and on the transition to school. The applied behavior analysis training option is designed to prepare school psychologists to address the learning and behavioral needs of children and adolescents with challenging behaviors in school, home, and community settings, including children with autism spectrum disorders.

Please visit Bouvé College Learning Outcomes (https://bouve.northeastern.edu/learning-outcomes/) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

MS Requirements

A grade of B or higher is required in all coursework.

Code	Title	Hours
Clinical/Applied		
CAEP 6201	Introduction to Assessment	3
CAEP 6347	Behavior Management	3
CAEP 6350	Introduction to Cognitive Assessment	3
CAEP 6400	Prepracticum in School Psychology	1
Foundations		
CAEP 6202	Research, Evaluation, and Data Analysis	3
CAEP 6203	Understanding Culture and Diversity	3
CAEP 6206	Learning Principles	3
CAEP 6218	Infant, Child, and Adolescent Development	3
CAEP 6247	Child and Adolesent Psychopathology	3
CAEP 6365	Seminar in School Psychology	3
CAEP 7750	Biological Bases of Behavior	3

CAGS Requirements

A grade of B or higher is required in all coursework.

Code	Title	Hours
Clinical/Applied		
CAEP 6353	Curriculum-Based Assessment and Instruction	3
CAEP 6354	Social, Emotional, and Behavioral Assessment	3
CAEP 6345	Learning Problems: Educational, Biological, and Ecological Perspectives	3
CAEP 6360	Consultation and Program Evaluation	3
CAEP 6399	Clinical Skills in Counseling Psychology	3
CAEP 6401	Counseling Children and Adolescents in Schools 1	3
CAEP 6402	Counseling Children and Adolescents in Schools 2	3
Practicum		
CAEP 8415	Practicum in School Psychology 1	2
CAEP 8416	Practicum in School Psychology 2	2
Internship		
CAEP 8501	Internship in School Psychology 1	3
CAEP 8502	Internship in School Psychology 2	3

Optional Concentration

APPLIED BEHAVIOR ANALYSIS

Code	Title	Hours
CAEP 6327	Behavior Assessment	3
CAEP 6328	Research and Design Methods	3
CAEP 6329	Service Administration	3
CAEP 6336	Systematic Inquiry 1	3
CAEP 8417	Intensive Practicum in Applied Behavior Analysis 1	2
CAEP 8418	Intensive Practicum in Applied Behavior Analysis 2	2

Optional Specialization

EARLY INTERVENTION

Code	Title	Hours
CAEP 5150	Early Intervention: Family Systems	3
CAEP 5153	Early Intervention: Assessment and Intervention	3
CAEP 6202	Research, Evaluation, and Data Analysis	3
SLPA 5154	Early Intervention Practicum 1	2
SLPA 5155	Early Intervention Practicum 2	2

MS/CAGS Program Credit/GPA Requirements

62 total semester hours required
Minimum 3.000 GPA required

Applied Behavior Analysis, MS

The Master of Science in Applied Behavior Analysis (ABA) program is designed to prepare graduates to assume supervisory behavior analyst roles in schools and service agencies and to serve as independent consultants. The Association for Behavior Analysis International has verified the following course meets the coursework requirements for eligibility to take the Board Certified Behavior Analyst® or Board Certified Assistant Behavior Analyst® examination. Applicants will need to meet additional requirements before they can be deemed eligible to take the examination. While retaining a practitioner focus, this program examines topics such as conditioned reinforcement, motivational influences on behavior, and errorless teaching procedures. Courses explore the principles and procedures of applied behavior analysis in-depth and address its philosophical underpinnings. With this background, successful graduates are prepared to address the most complex behavior problems and learning challenges. Students complete 7 core courses, plus an additional 3 courses that extend the student's familiarity with clinical procedures and with the research supporting their use. Students may elect to complete their supervised fieldwork hours by taking Intensive Practicum in Applied Behavior Analysis 1–4 (Intensive Practicum in Applied Behavior Analysis 1 (CAEP 8417); Intensive Practicum in Applied Behavior Analysis 2 (CAEP 8418); Intensive Practicum in Applied Behavior Analysis 3 (CAEP 8419); Intensive Practicum in Applied Behavior Analysis 4 (CAEP 8421), in addition to the 10 required courses.

Courses are delivered in an online format. Students attend lectures virtually and view supplementary material on their own schedules, taking advantage of technological advances that promote student learning and increase student-to-instructor and student-to-student communication.

Students take one or two courses each academic term, and courses are offered during the fall, spring, and summer full semesters. Behavioral Concepts and Principles (CAEP 6326) and Service Administration (CAEP 6329) serve as prerequisite courses to the remaining courses in the program.

Professional Portfolio

The capstone for the program is the professional portfolio. This portfolio, which is compiled electronically, documents the student's acquisition of critical behavioral procedures. This portfolio documents the student's behavioral competency in critical clinical skills. These skills, each of which is associated with a specific project, include:

- Preference and reinforce assessment
- Functional assessment of problem behavior
- Task analysis
- Discrete trial
- Stimulus equivalence
- Conditioned reinforcement
- Literature review

Each semester, students complete assignments associated with the above clinical skills, and each assignment culminates in professional documents to be included in the student's professional portfolio. A faculty member reviews and signs each assignment in the professional portfolio. The faculty member's signature indicates that the student has achieved the faculty-established standards for the project. Graduates are encouraged to use their professional portfolio when applying for employment.

Please visit Bouvé College Learning Outcomes (https://bouve.northeastern.edu/learning-outcomes/) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Professional Portfolio

- Preference and reinforce assessment
- Functional assessment of problem behavior
- Task analysis
- Discrete trial
- Stimulus equivalence
- Conditioned reinforcement
- Literature review

Core Requirements

A grade of B or higher is required in each course.

Code	Title	Hours
Basic		
CAEP 6326	Behavioral Concepts and Principles	3
CAEP 6327	Behavior Assessment	3
CAEP 6328	Research and Design Methods	3
CAEP 6329	Service Administration	3
CAEP 6331	Advanced Learning Seminar 1	3
CAEP 6334	Applied Programming Seminar 1	3
CAEP 6336	Systematic Inquiry 1	3
Advanced		
CAEP 6324	Programmed Learning	3
CAEP 6332	Advanced Learning Seminar 2	3
CAEP 6335	Applied Programming Seminar 2	3

Practicum

Note: The intensive practicum is optional. Consult your faculty advisor.

Code	Title	Hours
CAEP 8417	Intensive Practicum in Applied Behavior Analysis 1	2
CAEP 8418	Intensive Practicum in Applied Behavior Analysis 2	2
CAEP 8419	Intensive Practicum in Applied Behavior Analysis 3	2
CAEP 8421	Intensive Practicum in Applied Behavior Analysis 4	2

Program Credit/GPA Requirements

30 total semester hours required
Minimum 3.000 GPA required

Applied Psychology, MS

The Master of Science in Applied Psychology (MAP) program at Northeastern is committed to providing evidence-based knowledge and counseling skills to students who seek entry into a PhD in Counseling Psychology program and to graduates of baccalaureate degrees in human services, psychology, and health sciences who desire quality training in applied psychology. The program is 30 credits and is intended to be completed in two semesters. It does not meet licensing regulations for mental health counselors in the Commonwealth of Massachusetts.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of B or higher is required in each course.

Code	Title	Hours
Disorders		
CAEP 6200	Introduction to Counseling: Theory and Process in an Ecological Context	3
CAEP 6242	Psychopathology: Diagnosis and Treatment Planning	3
Science		
CAEP 5150	Early Intervention: Family Systems	3
CAEP 6203	Understanding Culture and Diversity	3
CAEP 6220	Development Across the Life Span	3
Practicum		
CAEP 6235	Vocational, Education, and Career Development	3
CAEP 6287	Group Counseling	3
CAEP 6399	Clinical Skills in Counseling Psychology	3
Research		
CAEP 6202	Research, Evaluation, and Data Analysis	3
HLTH 5410	Introduction to Statistics in Health and Behavioral Science	3

Program Credit/GPA Requirements

30 total semester hours required
Minimum 3.000 GPA required

Counseling Psychology, MSCP

The Master of Science in Counseling Psychology (MSCP) program at Northeastern is committed to the development of competent Licensed Mental Health Counselors (LMHC) through the disciplinary studies and contemporary professional practice of counseling psychology. The program complies with licensing regulations for mental health counselors in the Commonwealth of Massachusetts and is unique in its offer of a choice of specific specializations to gain additional depth in selected areas within the general Master of Science program.

Please visit Bouvé College Learning Outcomes for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

The MSCP program requires a grade of B or better in all courses. Practicum and Internship courses require a grade of Satisfactory (S). Grades of B- and lower or Unsatisfactory (U) are inconsistent with this policy and if received, students will be required to pay for the course again, repeat the course, and earn a grade of B or better or a grade of Satisfactory (S) in Clinical Practice courses.

Code	Title	Hours
Seminar		
CAEP 6380	Seminar in Feminist Psychology	3
Required Core		
CAEP 6200	Introduction to Counseling: Theory and Process in an Ecological Context	3
CAEP 6201	Introduction to Assessment	3
CAEP 6203	Understanding Culture and Diversity	3
CAEP 6220	Development Across the Life Span	3
CAEP 6235	Vocational, Education, and Career Development	3
CAEP 6242	Psychopathology: Diagnosis and Treatment Planning	3
CAEP 6250	Individual Interventions	3
CAEP 6260	Community Counseling Psychology	3
CAEP 6282	Ethics and Professional Development	3
CAEP 6287	Group Counseling	3
CAEP 6375	Substance Use and Treatment	3
CAEP 6399	Clinical Skills in Counseling Psychology	3
Research		
CAEP 6202	Research, Evaluation, and Data Analysis	3
Practicum		
CAEP 8401	Practicum in Counseling Psychology	3
Internship		
CAEP 8510	Internship in Counseling Psychology 1	3
CAEP 8511	Internship in Counseling Psychology 2	3

Electives

Code	Title	Hours
Complete 9 semester hours from the following. Other electives or alternatives may be chosen in consultation with faculty advisor.		9
CAEP 6215	Groups: Dynamics and Leadership	
CAEP 6218	Infant, Child, and Adolescent Development	
CAEP 6222	Human Sexuality	
CAEP 6247	Child and Adolesent Psychopathology	
CAEP 6283	Brief Therapies	
CAEP 6286	Family Counseling Interventions	
CAEP 6390	History and Systems of Psychology	
CAEP 6394	Advanced Multicultural Psychology	
CAEP 7720	Advanced Clinical Interventions	
CAEP 7758	Doctoral Seminar in Contemporary Theories of Psychotherapy	
PHTH 6320	Qualitative Methods in Health and Illness	

Program Credit/GPA Requirements

60 total semester hours required
Minimum 3.000 GPA required

Applied Behavior Analysis, Graduate Certificate

The goal of the Graduate Certificate in Applied Behavior Analysis is to prepare graduates to assume supervisory behavior analyst roles in schools and service agencies and to serve as independent consultants. The Association for Behavior Analysis International has verified the following courses toward the coursework requirements for eligibility to take the Board Certified Behavior Analyst® or Board Certified Assistant Behavior Analyst® examination. Applicants will need to meet additional requirements before they can be deemed eligible to take the examination.

This program includes seven core courses in behavior analysis that explore the principles and procedures of applied behavior analysis in-depth and address its philosophical underpinnings. Students may elect to complete their supervised fieldwork hours by taking Intensive Practicum in Applied Behavior Analysis 1–4 (Intensive Practicum in Applied Behavior Analysis 1 (CAEP 8417); Intensive Practicum in Applied Behavior Analysis 2 (CAEP 8418); Intensive Practicum in Applied Behavior Analysis 3 (CAEP 8419); Intensive Practicum in Applied Behavior Analysis 4 (CAEP 8421), in addition to the seven required courses.

Courses are delivered in an online format. Students attend lectures virtually and view supplementary material on their own schedules, taking advantage of technological advances that promote student learning and increase student-to-instructor and student-to-student communication.

Students take one or two courses each academic term, and courses are offered during the fall, spring, and summer full semesters. Behavioral Concepts and Principles (CAEP 6326) and Service Administration (CAEP 6329) serve as prerequisite courses to the remaining courses in the program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of B or higher is required in each course.

Code	Title	Hours
Basic Core		
CAEP 6326	Behavioral Concepts and Principles (Behavioral Concepts and Principles)	3
CAEP 6327	Behavior Assessment	3
CAEP 6328	Research and Design Methods	3
CAEP 6329	Service Administration	3
CAEP 6331	Advanced Learning Seminar 1	3
CAEP 6334	Applied Programming Seminar 1	3
CAEP 6336	Systematic Inquiry 1	3

Intensive Practicum

Note: The intensive practicum is optional. Consult your faculty advisor.

Code	Title	Hours
CAEP 8417	Intensive Practicum in Applied Behavior Analysis 1	2
CAEP 8418	Intensive Practicum in Applied Behavior Analysis 2	2
CAEP 8419	Intensive Practicum in Applied Behavior Analysis 3	2
CAEP 8421	Intensive Practicum in Applied Behavior Analysis 4	2

Program Credit/GPA Requirements

21 total semester hours required
Minimum 3.000 GPA required

Personal Health Informatics, PhD

Northeastern's Doctor of Philosophy (PhD) in Personal Health Informatics (PHI) is a transdisciplinary doctoral program focused on educating top researchers in the theoretical underpinnings, design, evaluation, and dissemination of consumer- and patient-focused health systems. Personal health technologies are those that non–health professionals interact with *directly*, both in and out of a clinical setting and in various life stages of illness and wellness.

Examples include:

- Assistive technologies that aid persons with disabilities
- Consumer wellness promotion technologies
- Patient education and counseling systems
- Interfaces for reviewing personal health records
- Advanced ambulatory monitoring for supporting health
- Automated elder care systems that monitor health and support independent living
- Social networking systems connecting families and their social and medical support networks

Developing personal health interface technologies requires that professionals have skills and experience designing systems for individual patients and consumers with a wide range of backgrounds in different contexts using a variety of media, while ensuring that fielded technologies are effective, reliable, and responsive to the needs of at-risk and patient populations. Critical skills and knowledge include needs assessment, theories of interface design and health behavior, rapid prototyping and implementation, experimental design with human subjects in challenging settings, and statistical data analysis and validation. Moreover, these skills must be deployed while working with, or leading, transdisciplinary teams.

The interdisciplinary nature of the program targets students who are interested in improving health and wellness using novel technologies that directly impact the lives of consumers and patients. This is a program for students who are not only technically strong but also socially conscious, design oriented, and interested in rigorously evaluating the technologies they imagine and build. The program provides a path for technical students to acquire more experience in the deployment and evaluation of health technologies in the field but also a path for students with health backgrounds to develop the technical skills needed to prototype and assess creative ideas they envision for improving care. The expected length of study is five years after the bachelor's degree.

Admission Requirements

Students will be accepted with either of the following:

- A bachelor's or higher degree in a technical discipline (e.g., computer science or information science, computer systems engineering) with either academic or work experience demonstrating a commitment to working in health.
- A bachelor's or higher degree in a health science discipline (e.g., nursing, medicine, physical therapy, pharmacy, public health) with either some academic coursework in technology, such as a course in programming or design, or work experience where the applicant participated in the development, adaptation, or evaluation of consumer- or patient-facing health technology. (Otherwise outstanding applicants without programming skills may be advised to take an introductory programming course prior to entry, and otherwise outstanding applicants without any formal experience working in health settings may be advised to spend some time volunteering in a medical or community health setting prior to entry.)

Applicants will be expected to have:

- A minimum 3.000 undergraduate grade-point average (GPA)
- A minimum total GRE score of 300 or equivalent
- A minimum GRE academic writing score of 3.5
- For international applicants, a minimum TOEFL score of 105

Minimum Academic Standards and Requirements

RESIDENCY REQUIREMENT

The residency requirement will follow the University Graduate Council By-Law policy.

TEACHING REQUIREMENT

All personal health informatics PhD students must satisfy the teaching requirement in order to graduate. This requirement is fulfilled when the student works as a teaching assistant (TA) or instructor of record (IoR) for one semester and during this semester:

- Teaches at least three hours of classes
- Prepares at least one assignment, or quiz, or equivalent

PhD students are expected to satisfy the teaching requirement some time after completing their first year and at least one semester prior to scheduling their PhD defense.

DISSERTATION ADVISING

Each student will have one primary adviser from the personal health informatics doctoral program faculty.

DISSERTATION COMMITTEE

The committee will consist of at least three members: the dissertation adviser, one additional personal health informatics doctoral program faculty member, and one member external to Northeastern who is an expert in the specific personal health informatics topic of research. The dissertation committee shall include experts with both health and technology backgrounds. The dissertation adviser must be a full-time member of the Northeastern University faculty.

QUALIFYING EXAMINATION

The qualifying examination consists of a three-part exam conducted by a committee of three personal health informatics doctoral program faculty members, each overseeing one part of the exam. The research core of the exam is fulfilled with submission of a high-quality paper to a strong peer-reviewed conference or journal. The health component of the exam is fulfilled when the student passes a written exam developed by a faculty member with a health sciences background, and the technical component of the exam is fulfilled when the student passes an exam developed by a faculty member with a technical background. The content of the written exams and the paper topic are developed in consultation with each faculty member.

DEGREE CANDIDACY

A student is considered a PhD degree candidate upon meeting these conditions:

- Completion of core courses with a minimum GPA of 3.000 overall on the core courses
- Completion of the qualifying examination

COMPREHENSIVE EXAM

A PhD student must submit a written dissertation proposal to the dissertation committee. The proposal should identify the research problem, the research plan, and its potential impact on the field. A presentation of the proposal will be made in an open forum, and the student must successfully defend it before the dissertation committee.

DISSERTATION DEFENSE

A PhD student must complete and defend a dissertation that involves original research in personal health informatics.

Curriculum Requirements

REQUIRED AND ELECTIVE COURSES

The curriculum is designed to provide all PhD students with a strong foundation in principles critical to the design and evaluation of personal health interfaces. All students take six core courses (24 semester hours) and the user-interface practicum (1 semester hour).The student must maintain a minimum GPA of 3.500 among the six core courses and receive a grade of B or better in each of these courses. All students must also fulfill the programming fundamentals requirement (4 semester hours) and the statistics fundamentals requirement (4 semester hours), where some flexibility in course selection allows tailoring based on background and experience. Two additional research electives (8 semester hours) are selected based on research interests from the personal health informatics electives list. Students are also expected to participate in the personal health informatics seminar series each semester.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Qualifying examinations (3)
Annual review
Dissertation proposal
Dissertation committee
Dissertation defense

Core Requirements

A grade of B or higher is required in each course. A cumulative 3.500 GPA is required for the core requirement.

Code	Title	Hours
Foundations		
HINF 5200	Theoretical Foundations in Personal Health Informatics	4
Program Design and Development		
CS 5010	Programming Design Paradigm (or another programming course)	4
CS 7340	Theory and Methods in Human Computer Interaction	4
HINF 5300	Personal Health Interface Design and Development	4
Methods and Statistics		
CS 6350	Empirical Research Methods	4
Choose one:		*3-4*
CAEP 7712	Intermediate Statistical Data Analysis Techniques	
CS 7200	Statistical Methods for Computer Science	
PHTH 5210	Biostatistics in Public Health	
PHTH 6440	Advanced Methods in Biostatistics	
Evaluation		
HINF 5301	Evaluating Health Technologies	4
HINF 8982	Readings	1-8

Electives

Code	Title	Hours
Complete 12-17 semester hours in the following subject areas to fulfill the minimum program hours:		12-17
(Note: Please see faculty advisor for other acceptable elective courses.)		
CAEP		
CS		
HINF		
PHTH		

Dissertation

Code	Title	Hours
CS 9990	Dissertation Term 1	
CS 9991	Dissertation Term 2	

Program Credit/GPA Requirements

48 total semester hours required
Minimum 3.000 GPA required

Plan of Study
Sample Curriculum

Year 1

Fall	Hours	Spring	Hours
HINF 5200	4	CS 5010 or 5520	4
CS 7340	4	CS 6350	4
		Additionally, students should participate in the Personal Health Informatics Usability Evaluation Practicum	1
	8		9

Year 2

Fall	Hours	Spring	Hours
HINF 5300	4	HINF 5301	4
PHTH 5210, 6440, CAEP 7712, or CS 7200	3-4	PHI elective	3-4
	7-8		7-8

Year 3

Fall	Hours	Spring	Hours
CS 9990	0	CS 9991	0
HINF 8982	1-8	PHI electives	7-8
	1-8		7-8

Year 4

Fall	Hours	Spring	Hours
HINF 9996	0	HINF 9996	0
	0		0

Year 5

Fall	Hours	Spring	Hours
HINF 9996	0	HINF 9996	0
	0		0

Total Hours: 39-49

Population Health, PhD

This program seeks to train students to become public health researchers and leaders through simultaneous examination of multiple determinations of health, including social, environmental, nutritional, and behavioral risk factors. Our students investigate the underlying causes of adverse health, including disease, disparities, and disability, through training in core population health disciplines—biostatistics, epidemiology, and health services—together with individual-specific and specialized training in topics related to student research. Importantly, our students are mentored by Northeastern's distinguished faculty, who individually and together conduct innovative, solution-focused research in critical population health topics.

Our population health doctoral students have an opportunity to learn to conduct research that addresses five key health determinants:

1. Social and community contexts
2. Environment and neighborhoods
3. Health and healthcare delivery
4. Education
5. Economic stability

Our diverse faculty has expertise in numerous population health disciplines, including health services research, health disparities, environmental and social epidemiology, biostatistics, exercise science, medical sociology, public policy, personal health technologies, and mental health. Students have the opportunity to work side by side with faculty in conducting cutting-edge, transdisciplinary research in these fields.

Course Requirements

All population health PhD candidates must earn at least 33 semester hours by completing core research courses, selecting a concentration and taking courses for that concentration, and taking additional electives and directed study courses as needed and in consultation with their faculty advisors. They must complete a dissertation in order to earn their degree. Eight core courses (22–23 semester hours) must be taken by all students, in addition to a mandatory, non-credit-bearing seminar speaker series. All students must fulfill the requirements of their specific population health option: social and environmental determinants of health or health services and policy. There may be some flexibility in course selection based on a student's relevant experience and dissertation topic. Students must consult with their advisor before selecting elective courses (9–10 semester hours). Electives should be used to either help the student develop skills needed for research or to help the student develop new research ideas.

ADVANCED ENTRY

This program is strictly for students who already have a master's degree in public health or a closely related area and have full-time employment at a company or agency who has entered into an agreement with Northeastern to be the student's sponsor. Completion of the PhD program requires 21–23 semester hours, including a yearlong research methods seminar and other advanced research courses. All students must fulfill the course requirements of their specific population health option: social and environmental determinants of health (9 semester hours) or health services and policy (7 semester hours). There may be some flexibility in course selection based on a student's relevant experience and dissertation topic. Students must consult with their advisor before selecting elective courses. Electives can be used to either help the student develop skills needed for research or to help the student develop new research ideas but are not required.

Please visit Bouvé College Learning Outcomes for the specific student learning outcomes for this program.

Students who do not qualify for the doctoral degree, but who have completed required coursework with a cumulative GPA of 3.000 or better, may be eligible to receive a terminal MS Population Health *(p. 291) degree. Note that no students will be admitted directly into the Population Health program to pursue a master's degree.*

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Qualifying examination
Annual review
Dissertation committee
Dissertation proposal

Oral defense of dissertation proposal
Candidacy status
Dissertation defense

Core Requirements

Code	Title	Hours
Health Services		
PHTH 5232	Evaluating Healthcare Quality	3
or PHTH 5234	Economic Perspectives on Health Policy	
Population Health		
PHTH 6400	Principles of Population Health 1	3
PHTH 6410	Principles of Population Health 2	3
Epidemiology		
PHTH 5202	Introduction to Epidemiology	3
PHTH 6202	Intermediate Epidemiology	3
Research Ethics		
BIOL 6381	Ethics in Biological Research	2
or PHSC 5212	Research Skills and Ethics	
Research and Analysis		
PHTH 5210	Biostatistics in Public Health	3
PHTH 6210	Applied Regression Analysis	3

Options

Complete one of the following options:

SOCIAL AND ENVIRONMENTAL DETERMINANTS OF HEALTH OPTION

Code	Title	Hours
PHTH 6224	Social Epidemiology	3
PHTH 6440	Advanced Methods in Biostatistics	3
PHTH 6800	Causal Inference in Public Health Research	3
Electives		2-4

HEALTH SERVICES AND POLICY OPTION

Code	Title	Hours
ECON 5110	Microeconomic Theory	4
PHTH 5234	Economic Perspectives on Health Policy	3
Electives		3-4

Electives

Code	Title	Hours
CS 6220	Data Mining Techniques	
CS 7280	Special Topics in Database Management	
ECON 5110	Microeconomic Theory	
ECON 5140	Applied Econometrics	
ECON 7200	Topics in Applied Economics	
EXSC 5200	Cardiopulmonary Physiology	
EXSC 5220	Advanced Exercise Physiology	
EXSC 5230	Physical Activity and Exercise: Effects on Musculoskeletal Health and Disease	
HINF 5200	Theoretical Foundations in Personal Health Informatics	
HRMG 6220	Health Organization Management	
PHSC 6216	Human Physiology and Pathophysiology	
PHTH 5212	Public Health Administration and Policy	
PHTH 5214	Environmental Health	
PHTH 5226	Strategic Management and Leadership in Healthcare	
PHTH 5230	Global Health	
PHTH 5540	Health Education and Program Planning	
PHTH 6200	Principles and History of Urban Health	
PHTH 6204	Society, Behavior, and Health	
PHTH 6208	Urban Community Health Assessment	
PHTH 6320	Qualitative Methods in Health and Illness	
SOCL 7287	Social Movements in Health	
STRT 6220	Strategic Management for Healthcare Organizations	

Dissertation

Code	Title	Hours
PHTH 9990	Dissertation Term 1	
PHTH 9991	Dissertation Term 2	

Program Credit/GPA Requirements

33 total semester hours required
Minimum 3.000 GPA required

Advanced Entry PhD Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Qualifying examination
Annual review
Dissertation committee
Dissertation proposal
Oral defense of dissertation proposal
Candidacy Status
Dissertation defense

Core Requirements

A grade of B or higher is required in all coursework. Students must complete all core requirements unless otherwise indicated:

Code	Title	Hours
Population Health		
PHTH 6400	Principles of Population Health 1	3
PHTH 6410	Principles of Population Health 2	3
Epidemiology		
PHTH 6202	Intermediate Epidemiology	3
Research Ethics		
BIOL 6381	Ethics in Biological Research	2
or PHSC 5212	Research Skills and Ethics	
Research and Analysis		
PHTH 6210	Applied Regression Analysis	3

Options

Complete one of the following options:

- Social and Environmental Determinants of Health Option
- Health Services and Policy Option

SOCIAL AND ENVIRONMENTAL DETERMINANTS OF HEALTH OPTION

Code	Title	Hours
PHTH 6224	Social Epidemiology	3
PHTH 6440	Advanced Methods in Biostatistics	3
PHTH 6800	Causal Inference in Public Health Research	3

HEALTH SERVICES AND POLICY OPTION

Code	Title	Hours
ECON 5110	Microeconomic Theory	4
PHTH 5234	Economic Perspectives on Health Policy	3

Electives

Students may elect to take additional course credits to support their dissertation work.

Code	Title	Hours
CS 6220	Data Mining Techniques	
CS 7280	Special Topics in Database Management	
ECON 5140	Applied Econometrics	
EXSC 5200	Cardiopulmonary Physiology	
EXSC 5220	Advanced Exercise Physiology	
EXSC 5230	Physical Activity and Exercise: Effects on Musculoskeletal Health and Disease	
HINF 5200	Theoretical Foundations in Personal Health Informatics	
HRMG 6220	Health Organization Management	
PHSC 6216	Human Physiology and Pathophysiology	
PHTH 5212	Public Health Administration and Policy	
PHTH 5214	Environmental Health	
PHTH 5226	Strategic Management and Leadership in Healthcare	
PHTH 5230	Global Health	
PHTH 5540	Health Education and Program Planning	
PHTH 6200	Principles and History of Urban Health	
PHTH 6204	Society, Behavior, and Health	
PHTH 6208	Urban Community Health Assessment	
PHTH 6320	Qualitative Methods in Health and Illness	
SOCL 7287	Social Movements in Health	
STRT 6220	Strategic Management for Healthcare Organizations	

Dissertation

Code	Title	Hours
PHTH 9990	Dissertation Term 1	
PHTH 9991	Dissertation Term 2	

Program Credit/GPA Requirements

Minimum 21 total semester hours required
Minimum 3.000 GPA required

Public Health, MPH

Website (http://www.northeastern.edu/mph/)

Through innovation in experiential education, research, and service, the Master of Public Health Program at Northeastern University trains diverse and skilled professionals who promote and protect the health of all communities.

The Northeastern University Master of Public Health Program is accredited by the Council on Education for Public Health (CEPH) (https://ceph.org/). CEPH is an independent agency recognized by the U.S. Department of Education to accredit schools of public health and public health programs outside of schools of public health.

In order to help prepare the next generation of public health leaders and professionals, the MPH offers our diverse graduate students an opportunity to:

- Complete your degree 100 percent online, on-ground, or in a hybrid format (combination of both)
- Participate in learning options that meet the needs of the working professional:
  - On-ground courses are offered in the evening (most classes meet once a week from 5:00 to 7:30 p.m.)
  - Enroll as either a full-time or part-time student
- Take elective courses on a wide range of public health topics, including cross-departmental offerings from Northeastern's other colleges (law, business, social sciences, and more)
- Enjoy a supportive learning environment that includes outstanding student mentoring

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of B– or higher is required in each required course.

Code	Title	Hours
Required Core		
PHTH 5202	Introduction to Epidemiology	3
PHTH 5210	Biostatistics in Public Health	3
PHTH 5212	Public Health Administration and Policy	3
PHTH 5214	Environmental Health	3
PHTH 5540	Health Education and Program Planning	3
or PPUA 6509	Techniques of Program Evaluation	
PHTH 6204	Society, Behavior, and Health	3
Urban Health		
PHTH 5120	Race, Ethnicity, and Health in the United States	3
PHTH 6200	Principles and History of Urban Health	3
PHTH 6208	Urban Community Health Assessment	3
Practicum		
PHTH 6966	Practicum	3
Capstone		
PHTH 6910	Public Health Capstone	3

Electives

Code	Title	Hours
Complete 9 semester hours from the following. In consultation with your faculty adviser, you may complete electives from another discipline:		9
PHTH 5222	Health Advocacy	
PHTH 5226	Strategic Management and Leadership in Healthcare	
PHTH 5230	Global Health	
PHTH 5232	Evaluating Healthcare Quality	
PHTH 5234	Economic Perspectives on Health Policy	
PHTH 5300	Project Management in Public Health	
PHTH 5310	Budget Principles in Public Health	
PHTH 5320	Grant Writing in Public Health	
PHTH 5330	Using Publicly Available Data in Public Health	
PHTH 5340	Writing for Peer-Reviewed Journals in Public Health	
PHTH 5350	Using SAS in Public Health Research	
PHTH 5540	Health Education and Program Planning	
PHTH 6202	Intermediate Epidemiology	
PHTH 6210	Applied Regression Analysis	
PHTH 6224	Social Epidemiology	
PHTH 6320	Qualitative Methods in Health and Illness	
PHTH 6400	Principles of Population Health 1	
PHTH 6410	Principles of Population Health 2	
PHTH 6440	Advanced Methods in Biostatistics	
PHTH 6800	Causal Inference in Public Health Research	
PPUA 6509	Techniques of Program Evaluation	

Program Credit/GPA Requirements

42 total semester hours required
Minimum 3.000 GPA required

Exercise Science with Concentration in Physical Activity and Public Health, MS

The Department of Health Sciences currently offers a Master of Science in Exercise Science with a public health emphasis. The concentration in physical activity and public health recognizes that inactivity is a major public health problem and represents a significant risk factor for many chronic diseases, including heart disease, stroke, hypertension, metabolic syndrome, obesity, type 2 diabetes, and some types of cancer. Moreover, this concentration integrates key competencies for a degree in exercise science recommended by the American College of Sports Medicine (ACSM), including knowledge of exercise physiology and the assessment and development of physical activity and exercise programs for the general and clinical populations. Graduate students seeking this degree are members of the Bouvé College of Health Sciences—a leading national model for education and research in the health, psychosocial, and biomedical sciences, which supports the university's mission of educating students for a life of fulfillment and accomplishment and creating and translating knowledge to meet global and societal needs through interdisciplinary research, urban engagement, experiential learning, and the integration of classroom learning with real-world experience. Faculty in the department are exploring a range of research topics, including acute/chronic effects of exercise, community-based exercise and nutrition interventions, nutrition epidemiology, health disparities, urban public health, and application of technology for measuring and motivating behavior change.

Two unique features of the program are:

- The program offers three pathways of study based on student interests: research, public health, and practice-based pathways. Students take two electives to enhance their knowledge in their selected pathway. These pathways are designed to train students to pursue a terminal degree in exercise science/opportunities in a research setting, federal/private/nonprofit institutions, and clinical setting.
- We offer students internship, practicum, and research opportunities at both on- and off-campus sites. Experiential education is a key component of the program because application of classroom knowledge provides valuable preparation for a career in exercise science.

Please visit Bouvé College Learning Outcomes (https://bouve.northeastern.edu/learning-outcomes/) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of B or higher is required in all coursework.

Code	Title	Hours
Exercise Science		
EXSC 5200	Cardiopulmonary Physiology	3
EXSC 5210	Physical Activity and Exercise: Prescription, Measurement, and Testing	3
EXSC 5220	Advanced Exercise Physiology	3
EXSC 5230	Physical Activity and Exercise: Effects on Musculoskeletal Health and Disease	3
EXSC 6202	Electrocardiography, Clinical Assessment, and Prescription	3
Public Health		
PHTH 5540	Health Education and Program Planning	3
PHTH 6208	Urban Community Health Assessment	3
Research		
PHTH 5202	Introduction to Epidemiology	3
PHTH 5210	Biostatistics in Public Health	3
EXSC 6400	Applied Research Methods	3

Electives

Code	Title	Hours
Complete 6 semester hours from the following: [1]		6
HSCI 5230	Clinical Nutrition Applications in Health and Disease	
EXSC 5000 to EXSC 6402		
PHTH 5000 to PHTH 6800		

Program Credit/GPA Requirement

36 total semester hours required
Minimum 3.000 GPA required

[1] Students may choose two courses within one of three areas (public health, practice-based, and research-based) to deepen their knowledge and competency within that area.

Health Informatics, MS

Northeastern's interdisciplinary Master of Science in Health Informatics was the first MS in the field. The program seeks to prepare students to address the combined clinical, technical, and business needs of health-related professionals. Successful students graduate with the knowledge of how technology, people, health, and the healthcare system interrelate; the ability to use technology and information management to improve healthcare delivery and outcomes; and the skills to communicate effectively among healthcare practitioners, administrators, and information technology professionals.

With approval from the health informatics program director, selected students can substitute one course from the Graduate Certificate in Data Analytics for a technical core requirement in the MS in Health Informatics degree, and up to two more courses from the Graduate Certificate in Data Analytics can be counted as electives for the MS in Health Informatics degree.

Northeastern also offers graduate certificate programs in health informatics. Three certificate programs enable you to choose the one that addresses your specific goals. These programs are listed separately in this catalog:

- Graduate Certificate in Health Informatics Management and Exchange
- Graduate Certificate in Health Informatics Privacy and Security
- Graduate Certificate in Health Informatics Software Engineering

Courses in the certificate program also apply toward master's degree requirements. This gives you the flexibility to complete a certificate and be well on your way to earning a degree if you decide later to continue your education.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of B– or higher is required in each course.

Code	Title	Hours
Required Core		
HINF 5101	Introduction to Health Informatics and Health Information Systems	3
HINF 5105	The American Healthcare System	3
HINF 7701	Health Informatics Capstone Project	3
Business Management		
Complete two courses from the following:		6
HINF 6201	Organizational Behavior, Work Flow Design, and Change Management	
HINF 6202	Business of Healthcare Informatics	
HINF 6215	Project Management	
HINF 6335	Management Issues in Healthcare Information Technology	
HINF 6240	Improving the Patient Experience through Informatics	
PHTH 5226	Strategic Management and Leadership in Healthcare	
Health Informatics		
Complete two courses from the following:		6
HINF 5102	Data Management in Healthcare	
HINF 5110	Global Health Information Management	
HINF 5200	Theoretical Foundations in Personal Health Informatics	
HINF 5300	Personal Health Interface Design and Development	
HINF 5301	Evaluating Health Technologies	
HINF 6205	Creation and Application of Medical Knowledge	
HINF 6350	Public Health Surveillance and Informatics	
HINF 6404	Patient Engagement Informatics and Analytics	
HINF 6405	Quantifying the Value of Informatics	
PHTH 5232	Evaluating Healthcare Quality	
Technical		
Complete two courses from the following:		6
HINF 6220	Database Design, Access, Modeling, and Security	
HINF 6355	Interoperability Key Standards in Health Informatics	
HINF 6400	Introduction to Health Data Analytics	
PHTH 5202	Introduction to Epidemiology	
PHTH 5210	Biostatistics in Public Health	
PHTH 6210	Applied Regression Analysis	
PHTH 6400	Principles of Population Health 1	
PHTH 6440	Advanced Methods in Biostatistics	
One course from the following may count toward the technical core requirement:		
DA 5020	Collecting, Storing, and Retrieving Data	
DA 5030	Introduction to Data Mining/Machine Learning	
INSH 5301	Introduction to Computational Statistics	
INSH 5302	Information Design and Visual Analytics	

Electives

Code	Title	Hours
Complete two courses from the following. Any course not taken to complete a core requirement may be taken as an elective.		6
HINF 6345	Design for Usability in Healthcare	
DA 5020	Collecting, Storing, and Retrieving Data	
DA 5030	Introduction to Data Mining/Machine Learning	
INSH 5301	Introduction to Computational Statistics	

INSH 5302	Information Design and Visual Analytics

Program Credit/GPA Requirements

Minimum 33 total semester hours required
Minimum 3.000 GPA required

Population Health, MS

Please see Population Health, PhD (p. 286) for further information about this program. No students will be admitted directly into this program to pursue a master's degree.

Program Requirements

Core Requirements

A grade of B or higher is required in all coursework.

Code	Title	Hours
Core Population Health Courses		
PHTH 5232	Evaluating Healthcare Quality	3
or PHTH 5234	Economic Perspectives on Health Policy	
PHTH 6400	Principles of Population Health 1	3
PHTH 6410	Principles of Population Health 2	3
Core Research and Statistics Courses		
PHTH 5202	Introduction to Epidemiology	3
PHTH 5210	Biostatistics in Public Health	3
PHTH 6202	Intermediate Epidemiology	3
PHTH 6210	Applied Regression Analysis	3
PHSC 5212	Research Skills and Ethics	2
or BIOL 6381	Ethics in Biological Research	

Electives

Code	Title	Hours
Complete a minimum of 7 semester hours of additional courses from the following:		7
PHTH 6224	Social Epidemiology	
PHTH 6440	Advanced Methods in Biostatistics	
PHTH 6800	Causal Inference in Public Health Research	
ECON 5110	Microeconomic Theory	
PHTH 5234	Economic Perspectives on Health Policy	

Program Credit/GPA Requirements

Minimum of 30 semester hours required
Minimum 3.000 GPA required

Law, JD / Public Health, MPH

Northeastern University's School of Law and Bouvé College of Health Sciences offer a JD/MPH dual degree. Given the worldwide trend toward urbanization, the Master of Public Health (MPH) recognizes the growing need for professionals trained to respond to unique public health challenges and opportunities facing urban populations. The MPH program brings together interdisciplinary faculty (from the School of Law, D'Amore-McKim School of Business, College of Social Sciences and Humanities, Khoury College of Computer Sciences, and the Bouvé College of Health Sciences) with expertise in collaborating with diverse urban populations to offer students an opportunity to obtain practice-based knowledge, skills, and experience needed to address public health problems.

Up to 9 credit hours of coursework in the JD program may count toward the MPH, while up to 12 credit hours of coursework in the MPH program may count toward the JD. See JD/MPH program page (http://www.northeastern.edu/law/academics/jd/dual-degrees/jdmph-bouve.html) for more information.

All JD students, including FlexJD students, are ordinarily eligible to apply into dual degree pathways.

Pharmacy, PharmD—Direct Entry / Public Health, MPH

The School of Pharmacy and the Department of Health Sciences offer a combined Doctor of Pharmacy (PharmD) and Master of Public Health (MPH) program.

The combined PharmD/MPH program recognizes and reinforces the importance of public health in pharmacy practice. Central to addressing public health concerns, and in particular those associated with racial and ethnic health disparities, the program is committed to building a strong, diverse, and activist public health workforce. The goal of the program is to graduate professionals who are well educated in the complex issues associated with disparate health status and healthcare access. The combined PharmD/MPH program allows qualified and interested students an opportunity to achieve their goal of obtaining a more robust understanding of public health through an MPH degree while also completing their PharmD.

Refer to the School of Pharmacy PharmD – Direct Entry (p. 328) and Department of Health Sciences Master of Public Health (p. 288) pages of this catalog for program requirements and technical standards. Students must adhere to all PharmD and MPH program standards, policies, and requirements as listed in the catalog, unless otherwise specified.

The Northeastern University Master of Public Health Program is accredited by the Council on Education for Public Health (CEPH). CEPH is an independent agency recognized by the U.S. Department of Education to accredit schools of public health and public health programs outside of schools of public health.

Physician Assistant Studies, MS / Public Health, MPH

The Northeastern University Physician Assistant (PA) Program and Department of Health Sciences offer a combined Master of Science in Physician Assistant Studies (MS)/Master of Public Health (MPH). The combined PA/MPH program allows qualified and interested students an opportunity to achieve their goal of obtaining a more robust understanding of public health through an MPH degree, while also completing their Master of Science in Physician Assistant Studies.

The Northeastern University Master of Public Health program is accredited by the Council on Education for Public Health (CEPH) (https://ceph.org/). CEPH is an independent agency recognized by the U.S. Department of Education to accredit schools of public health and public health programs outside of schools of public health. The MPH program has a strong commitment to providing a flexible course of study for working professionals. This flexibility allows for easy incorporation into a dual-degree program.

The combined degree that incorporates both programs is designed to help diversify the public health workforce and improve graduates' ability to approach clinical situations with cultural sensitivity and awareness. Successful graduates of the program benefit from having a greater understanding of public health issues in clinical practice, including the racial and ethnic health disparities prevalent in the U.S. healthcare system, as well as a strong grounding in epidemiology, quantitative and qualitative research methods, and the use of scientific evidence, skills critical to many fields of healthcare practice.

This dual degree takes less than three years to complete (as opposed to four, if each degree were pursued separately), and a total number of 12 credits are shared between both degrees.

For more information, including the application and admissions process, please visit the PA/MPH website here (https://bouve.northeastern.edu/health-sciences/programs/pa-mph/).

Public Health, MPH / Exercise Science with Concentration in Physical Activity, MS

Website (https://bouve.northeastern.edu/health-sciences/programs/ms-exercise-science-mph/)

The Department of Health Sciences at Northeastern University offers a combined Master of Public Health / Master of Science in Exercise Science. This dual degree program allows qualified students to achieve their goal of obtaining a more robust understanding of public health through an MPH degree while also completing their master's in exercise science. Coursework consists of advanced physiology, such as musculoskeletal and cardiopulmonary systems, and the assessment and prescription of exercise and physical activity in the context of the social determinants of health. Graduates of the program will benefit from having a greater understanding of public health issues in the fields of exercise and physical activity, in order to better design exercise prescription programs in the healthcare industry that aim to improve the health of individuals and communities.

The Northeastern University Master of Public Health program is accredited by the Council on Education for Public Health (CEPH) (https://ceph.org/). CEPH is an independent agency recognized by the U.S. Department of Education to accredit schools of public health and public health programs outside of schools of public health.

Up to 15 credits of coursework in the dual-degree program can be counted toward both the MPH degree and the MS degree.

Public Health, MPH / Health Informatics, MS

Website (https://bouve.northeastern.edu/health-sciences/programs/ms-hinf-mph/)

The Master of Public Health and Master of Science in Health Informatics dual degree allows qualified and interested students to prepare to lead healthcare at the nexus between public health and health informatics. Graduates of this program will be well-educated in the complex issues associated with improvements in information technology, as well as changes to the public health and healthcare delivery systems. Recognizing the increasing overlap between health informatics and public health, this program incorporates course work from both the MPH and MSHI curricula for both degrees, reducing tuition costs and saving one year of study compared to obtaining both degrees individually.

The Northeastern University Master of Public Health program is accredited by the Council on Education for Public Health (CEPH). CEPH is an independent agency recognized by the U.S. Department of Education to accredit schools of public health and public health programs outside of schools of public health.

Up to 15 credits of coursework in the dual-degree program can be counted toward both the MPH and MS degrees.

Exercise Science for Clinicians, Graduate Certificate

The Department of Health Sciences offers a Graduate Certificate in Exercise Science for Clinicians. Exercise training has been shown to be of therapeutic benefit to patients who have chronic diseases, including but not limited to cardiovascular disease, pulmonary disease, and metabolic disorders. Supervised exercises are commonly performed in a variety of settings including hospitals, outpatient clinics, physician's offices, university laboratories, or hospital-based research facilities. Exercise physiologists work in the above settings to create, implement, and evaluate exercise programs. Clinicians, such as physicians and nurses, work with exercise physiologists to prescribe individualized exercise to meet the specific clinical needs of their patients. Understanding the benefits of exercise, and how exercise plays a role in health promotion and disease prevention/intervention, is only a small part of traditional training of physicians and nurses. This Graduate Certificate in Exercise Science for Clinicians bridges the knowledge gap between the medical field and the exercise field. Additionally, the program helps clinicians understand the role of exercise as a proven, powerful medicine and a readily available therapy that has demonstrated a high therapeutic effect in a number of chronic disease states, with little to no side effects.

Experiential learning opportunities are an important feature of this program, providing students with opportunities to develop well-rounded knowledge of the role of physical activity and exercise on health and disease prevention/intervention. The curriculum covers knowledge of exercise physiology and exercise testing, assessment, and prescription, all of which are major domains of job tasks for a clinical exercise physiologist required by the American College of Sports Medicine (ACSM).

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Advanced Physiology		
EXSC 5200	Cardiopulmonary Physiology	3
EXSC 5220	Advanced Exercise Physiology	3
Assessment and Prescription		
EXSC 5210	Physical Activity and Exercise: Prescription, Measurement, and Testing	3
EXSC 6202	Electrocardiography, Clinical Assessment, and Prescription	3
Internship		
Complete the following repeatable course twice [1]		6
EXSC 6300	Internship in Exercise Science	
Electives		

Complete 3 SH of electives in the BNSC, CHEM, COMM, EXSC, PHMD, PHTH, or PT subject areas. Please see your adviser for additional approved courses.	3

[1] Students who choose not to continue in the Physician's Assistant or Physical Therapy programs may be approved to take an additional elective in place of the second EXSC6300 course.

Program Credit/GPA Requirements

21 total semester hours required
Minimum 3.000 GPA required

School of Nursing

Website (https://bouve.northeastern.edu/nursing/)

Maria van Pelt, CRNA, PhD, FAAN
Dean and Associate Clinical Professor, School of Nursing
Associate Dean, Bouvé College of Health Sciences

Mary Lynn Fahey, DNP, APRN
Assistant Clinical Professor and Assistant Dean of Graduate Programs

617.373.3521
617.373.2985 (fax)

This is an exciting time in healthcare, and nursing plays a pivotal role in the transformation of our healthcare system. Northeastern University School of Nursing offers multiple options for graduate study, including master's, Doctor of Nursing Practice, and PhD degree programs, as well as Certificate of Advanced Graduate Study programs, that are designed to prepare outstanding clinicians, leaders, scholars, educators, and policymakers. These programs leverage the school's renowned faculty, as well as exceptional clinical practicum sites. Our reputation is why our graduates are sought by top employers. Practicing advanced practice nurses may easily change their specialty area by enrolling in one of our Certificate of Advanced Graduate Study programs in adult primary or acute, pediatric primary and acute, or mental health.

The Doctor of Nursing Practice (DNP) program is a practice-oriented degree designed to prepare advanced nurses at the highest level of scholarly practice. Keeping pace with the demands of today's changing healthcare environment requires clinical experts who have the knowledge and skills to be effective change agents. Graduates of our post-master's DNP program assume clinical and leadership positions as advanced nurses in a variety of roles, including clinical experts, nurse executives, community leaders, and professional organization leaders.

The PhD program in nursing prepares research scientists, educators, and leaders who seek to improve health and healthcare across the life span with an emphasis on urban, vulnerable, and underserved populations. Graduates are expected to lead research initiatives that advance nursing science through knowledge development and interdisciplinary scholarly inquiry.

Further information about the degrees and specializations can be found at each program's page of this catalog.

Programs

Doctor of Philosophy (PhD)

- Nursing (p. 293)

Doctor of Nursing Practice (DNP)

- Nursing Practice—Post-Master's (p. 295)
- Nursing Practice with Concentration in Nurse Anesthesia (p. 295)

Certificate of Advanced Graduate Study (CAGS)

- Nursing with Concentration in Adult-Gerontology Nurse Practitioner, Acute Care (p. 296)
- Nursing with Concentration in Adult-Gerontology Nurse Practitioner, Primary Care (p. 296)
- Nursing with Concentration Neonatal Nurse Practitioner (p. 297)
- Nursing with Concentration in Pediatric Nurse Practitioner, Acute Care (p. 298)
- Nursing with Concentration in Pediatric Nurse Practitioner, Acute and Primary Care (p. 298)
- Nursing with Concentration in Pediatric Nurse Practitioner, Primary Care (p. 299)
- Nursing with Concentration in Psychiatric-Mental Health Nurse Practitioner (p. 297)

Master of Science (MS)

- Nursing with Concentration in Adult-Gerontology Nurse Practitioner, Acute Care (p. 299)
- Nursing with Concentration in Adult-Gerontology Nurse Practitioner, Primary Care (p. 300)
- Nursing with Concentration in Family Nurse Practitioner, Primary Care (p. 300)
- Nursing with Concentration in Neonatal Nurse Practitioner (p. 301)
- Nursing with Concentration in Pediatric Nurse Practitioner, Acute and Primary Care (p. 304)
- Nursing with Concentration in Pediatric Nurse Practitioner, Primary Care (p. 305)
- Nursing with Concentration in Psychiatric-Mental Health Nurse Practitioner (p. 305)
- Nursing—Direct Entry (p. 301)

Graduate Certificate

- Nursing Informatics (p. 306)

Nursing, PhD

Overview

Research

The PhD in Nursing program is designed to prepare nurse researchers to advance the science of nursing by developing expertise in both leadership and innovation. Graduates are expected to lead multidisciplinary research initiatives that advance nursing and healthcare through knowledge development and interdisciplinary scholarly inquiry. Students will work with nursing faculty whose research addresses innovative questions that seek to advance knowledge for improvement of care. Students will have opportunities to collaborate with faculty across the broader Northeastern University community, in addition to Boston-area research and healthcare institutions. This collaboration allows students to work across disciplines and to access populations and research sites essential to the success of their original dissertation study.

Advanced entry into the PhD in Nursing program requires a master's degree in nursing.

Visit the Northeastern University Faculty Research site (http://www.northeastern.edu/research/faculty-research/) for more information.

Please visit Bouvé College Learning Outcomes for the specific student learning outcomes for this program.

Students who do not qualify for the doctoral degree, but who have completed required coursework with a cumulative GPA of 3.000 or better, may be eligible to receive a terminal MS *(*http://catalog.northeastern.edu/graduate/health-sciences/nursing/applied-nursing-research-ms/*)Applied Nursing Research degree. Note that no students will be admitted directly into the Applied Nursing Research program to pursue a master's degree.*

Program Requirements

Bachelor's Degree Entrance

A bachelor's degree in nursing is preferred. Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review of progress
Comprehensive examination
Candidacy status
Dissertation committee
Dissertation proposal
Dissertation defense

Core Requirements

A grade of B or higher is required in all coursework.

Code	Title	Hours
Required Core		
NRSG 7104	Foundations in Nursing Research	3
NRSG 7700	The Science of Nursing	3
NRSG 7705	Theoretical and Conceptual Foundations in Nursing Science	3
NRSG 7715	Measurement in Clinical Research	3
NRSG 7750	Healthcare of Urban Populations	3
Statistics		
PHTH 5210	Biostatistics in Public Health	3
NRSG 5121	Epidemiology and Population Health	3
PHTH 6210	Applied Regression Analysis	3
Research		
NRSG 7709	Qualitative Research Methods	3
NRSG 7712	Quantitative Research Methods	3
NRSG 7755	Intervention Research: Development, Implementation, and Evaluation	3
NRSG 7770	Research Colloquium	1
Complete the following (repeatable) course twice:		6
NRSG 9984	Research	
Cognate Courses		
Complete two cognate courses in consultation with your faculty advisor. Cognates are graduate-level courses that are taken outside of nursing. These courses should provide depth and breadth to the student's dissertation research.		6

Electives

Code	Title	Hours
Complete two elective courses in consultation with your faculty advisor. Electives may be taken in nursing or in an area related to the student's dissertation research, including appropriate methodology and statistics courses.		6

Dissertation

Code	Title	Hours
NRSG 9845	Dissertation Seminar 1	3
NRSG 9846	Dissertation Seminar 2	3
NRSG 9990	Dissertation Term 1	1
NRSG 9991	Dissertation Term 2	1

Program Credit/GPA Requirements

60 total semester hours required
Minimum 3.000 GPA required

Advanced Entry PhD Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review of progress
Comprehensive examination

Candidacy status

Dissertation committee
Dissertation proposal
Dissertation defense

Core Requirements

A grade of B or higher is required in all coursework.

Code	Title	Hours
Required Core		
NRSG 7700	The Science of Nursing	3
NRSG 7705	Theoretical and Conceptual Foundations in Nursing Science	3
NRSG 7750	Healthcare of Urban Populations	3
Statistics		
PHTH 5210	Biostatistics in Public Health	3
PHTH 6210	Applied Regression Analysis	3
Cognate Courses [1]		
Complete two cognate courses in consultation with your faculty adviser.		6
Research		
NRSG 7709	Qualitative Research Methods	3
NRSG 7712	Quantitative Research Methods	3
NRSG 7715	Measurement in Clinical Research	3
NRSG 7755	Intervention Research: Development, Implementation, and Evaluation	3
NRSG 7770	Research Colloquium	1
Complete the following (repeatable) course twice:		6
NRSG 9984	Research	

Dissertation Courses

Code	Title	Hours
NRSG 9845	Dissertation Seminar 1	3
NRSG 9846	Dissertation Seminar 2	3
NRSG 9990	Dissertation Term 1	1
NRSG 9991	Dissertation Term 2	1

Program Credit/GPA Requirements

48 total semester hours required
Minimum 3.000 GPA required

[1] Cognates are graduate-level courses that are taken outside of nursing and should provide depth and breadth to the student's area of interest.

Nursing Practice, DNP—Post-Master's

The Doctor of Nursing Practice (DNP) is a practice-oriented degree designed to prepare advanced nurses at the highest level of scholarly practice. Keeping pace with the demands of today's changing healthcare environment requires clinical experts who have the knowledge and skills to be effective change agents. Graduates of our post-master's DNP program assume clinical and leadership positions as advanced nurses in a variety of roles including clinical experts, nurse executives, community leaders, and professional organization leaders.

The Northeastern University post-master's DNP program includes advanced course work in leadership, practice inquiry, population health, informatics, and health policy. Our goal is to prepare the next generation of nurse leaders with a greater breadth of expertise so they can collaborate more effectively with interprofessional partners and provide leadership to enhance quality and safety. The DNP program curriculum is delivered online in an executive model hybrid format, with the on-ground meetings at the Boston campus.

If you are a registered nurse with at least two years of active advanced nursing experience, you may enter the DNP program after completing a master's degree in nursing or, in some cases, a related health field. A DNP Scholarly Project and 1,000 scholarly practice hours are required for program completion. A gap analysis upon admission will determine how many, if any, practice hours from a previously completed Master of Science in Nursing practicum qualify toward this practice hour requirement. An ePortfolio is used to document all scholarly practice hours and DNP program achievements.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of B or higher is required in each course.

Code	Title	Hours
Required Core		
NRSG 6300	Healthcare Finance and Marketing	3
NRSG 6306	Health Informatics	3
NRSG 7100	Leadership in Advanced Practice Nursing	3
NRSG 7924	Applied Epidemiology for Advanced Nursing	3
NRSG 7925	Health Policy and Advocacy	3
Project		
NRSG 7920	The Steps to Practice Inquiry: Analyze, Evaluate, Synthesize, and Apply the Evidence	3
NRSG 7921	DNP Scholarly Project 1: Design and Ethical Consideration of Practice Application	3
NRSG 7922	DNP Scholarly Project 2: Applying Practice Knowledge—Implementation/ Outcomes	3
NRSG 7923	DNP Scholarly Project 3: Dissemination of Practice Inquiry	3

Elective

Code	Title	Hours
Complete 3 semester hours, selected in consultation with faculty program advisor.		3

Program Credit/GPA Requirements

30 total semester hours required
Minimum 3.000 GPA required

Nursing Practice with Concentration in Nurse Anesthesia, DNP

The Doctor of Nursing Practice with Concentration in Nurse Anesthesia is a practice-oriented degree designed to prepare nurse anesthetists at the highest level of clinical scholarly practice. Keeping pace with the demands of today's changing healthcare environment requires clinical experts who have the knowledge and skills to be effective change agents. The program prepares graduates to question practice, search for and critically appraise the best evidence to guide practice, and implement and evaluate the application of best evidence in practice.

A successful graduate from the program will gain the requisite skill set and leadership expertise to be a critical member of the healthcare team and provide anesthetics to patients throughout the life cycle in diverse settings such as small local hospitals, regional centers, and rural or urban settings for all types of surgery or procedures.

Please visit Bouvé College Learning Outcomes (https://bouve.northeastern.edu/learning-outcomes/) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

A grade of B or higher is required in all coursework.

Core Requirements

Code	Title	Hours
Required Core		
NRSG 5117	Advanced Pharmacology	2
NRSG 5121	Epidemiology and Population Health	3
NRSG 5126	Pathophysiology for Advanced Practice	3
NRSG 6115	Health Assessment	3
NRSG 6300	Healthcare Finance and Marketing	3
NRSG 6302	Health Policy and Law	3
NRSG 6306	Health Informatics	3
NRSG 7100	Leadership in Advanced Practice Nursing	3

Didactic		
NRSG 7500	Role/Practice Issues in Nurse Anesthesia	3
NRSG 7503	Pharmacotherapeutics in Anesthesia and Critical Care Nursing	3
NRSG 7506	Applied Chemistry, Physics, and Cardiopulmonary Physiology of Anesthesia	3
NRSG 7509	Advanced Concepts in Nurse Anesthesia Practice	3
NRSG 7511	Applied Gross Anatomy and Physiology of Anesthesia	3
NRSG 7520	Conceptual Basis of Nurse Anesthesia Practice 1	3
NRSG 7523	Conceptual Basis of Nurse Anesthesia Practice 2	3
NRSG 7526	Conceptual Basis of Nurse Anesthesia Practice 3	3
Practicum		
NRSG 7530	Nurse Anesthesia Practicum 1	3
NRSG 7533	Nurse Anesthesia Practicum 2	3
NRSG 7536	Nurse Anesthesia Practicum 3	4
Research		
NRSG 7105	Translating Research Evidence into Practice	3
NRSG 7920	The Steps to Practice Inquiry: Analyze, Evaluate, Synthesize, and Apply the Evidence	3
Project		
NRSG 7921	DNP Scholarly Project 1: Design and Ethical Consideration of Practice Application	3
NRSG 7922	DNP Scholarly Project 2: Applying Practice Knowledge—Implementation/ Outcomes	3
NRSG 7923	DNP Scholarly Project 3: Dissemination of Practice Inquiry	3
Clinical		
NRSG 7540	Advanced Clinical Experiences in Nurse Anesthesia 1	1
NRSG 7543	Advanced Clinical Experiences in Nurse Anesthesia 2	2
NRSG 7546	Advanced Clinical Experiences in Nurse Anesthesia 3	2

Program Credit/GPA Requirements

77 total semester hours required
Minimum 3.000 GPA required

Nursing—Adult-Gerontology Nurse Practitioner, Acute Care, CAGS

The adult-gerontology acute-care nurse practitioner program is designed to prepare nurses for advanced-practice roles as clinical experts, managers, educators, and consultants. The program offers advanced study with a major focus on clinical experience. Nurses who possess a Master of Science are eligible for the Certificate of Advanced Graduate Study (CAGS) in this specialization.

Please visit Bouvé College Learning Outcomes (https://bouve.northeastern.edu/bchs/about/learning-outcomes/) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of B or higher is required in each course.

Code	Title	Hours
Theory		
NRSG 6220	Nursing Management: Acute Episodic Illness	3
NRSG 6221	Nursing Management: Critical and Chronic Illness	3
NRSG 6241	Acute-Care Concepts in Nursing Practice	3
Practicum		
NRSG 6420	Adult-Gerontology Acute-Care Nursing Practicum 1	2
NRSG 6421	Adult-Gerontology Acute-Care Nursing Practicum 2	4
NRSG 6422	Adult-Gerontology Acute-Care Nursing Practicum 3	4

Electives

Code	Title	Hours
Complete 5 semester hours in the following subject area:		5
NRSG		

Program Credit/GPA Requirements

24 total semester hours required
Minimum 3.000 GPA required

Nursing—Adult-Gerontology Nurse Practitioner, Primary Care, CAGS

The Adult-Gerontology Nurse Practitioner, Primary Care CAGS, offers nurse practitioners (NPs) with certification in a different specialty the opportunity to prepare for practice providing high-quality adult primary care services as an adult-gerontology NP. Adult-gerontology NPs provide services to individuals across most of the life span in clinics, private practices, home care, long-term care, and day programs. Upon completion of the primary care program, graduates are eligible to sit for the adult-gerontology certification exam.

Prerequisite Courses

To ensure that all students have the foundation necessary to be successful in this program, each incoming student, regardless of his or her background, must have completed coursework in the following areas with a minimum grade of B.

Code	Title	Hours
Advanced Pharmacology		
Pathology for Advanced Practice		
Health Assessment		

Please visit Bouvé College Learning Outcomes (https://bouve.northeastern.edu/bchs/about/learning-outcomes/) for the specific student learning outcomes for this program.

Program Requirements

Core Requirements

Students should refer to the Program Overview page for required program prerequisites.

A grade of B or higher is required in each course.

Code	Title	Hours
Required Courses		
NRSG 6222	Pharmacology of Adults and Older Adults	2
NRSG 6249	Health Promotion of Adult/Older Adult	3
NRSG 6253	Primary Care of Adult/Older Adult Health Problems	4
NRSG 6254	Primary Care of Adult/Older Adult Complex Patients	4
NRSG 6449	Health Promotion of Adult/Older Adult Practicum	1
NRSG 6450	Adult/Older Adult Practicum 1	4
NRSG 6451	Adult/Older Adult Practicum 2	4
Elective		2

Program Credit/GPA Requirements

24 total semester hours required
Minimum 3.000 GPA required

Nursing—Psychiatric-Mental Health Nurse Practitioner, CAGS

The School of Nursing offers specialized and flexible program options in psychiatric mental health nursing for nurse practitioners (NPs) with certification in another specialty. Classes are offered during the late afternoon and early evening hours to accommodate the multiple responsibilities of adult learners. This is a 24-semester-hour program of study. Upon completion of the psychiatric mental health advanced practice Certificate of Advanced Graduate Study (CAGS) program, graduates are eligible to sit for available national certification exams in their area of practice.

Please visit Bouvé College Learning Outcomes (https://bouve.northeastern.edu/bchs/about/learning-outcomes/) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of B or higher is required in each course.

Code	Title	Hours
Required Core		
NRSG 6281	Dimensions of Clinical Practice	3
NRSG 6282	Clinical Psychopharmacology	3
NRSG 6283	Psychobiological Bases of Mental Disorders	3
NRSG 6286	Contemporary Psychotherapies—Theory and Practice	3
Practicum		
NRSG 6480	Psychiatric Practicum across the Life Span 1	5
NRSG 6481	Psychiatric Practicum across the Life Span 2	5

Elective

Code	Title	Hours
Complete 2 semester hours in the following subject area:		2
NRSG		

Program Credit/GPA Requirements

24 total semester hours required
Minimum 3.000 GPA required

Nursing—Neonatal Nurse Practitioner, CAGS

The School of Nursing offers a certificate of advanced study for experienced nurses who have a master's degree in nursing and want to specialize in neonatal critical care. Applicants are required to have at least two years of level 3 or greater of neonatal intensive care unit (NICU) experience before entering the program; most applicants have greater relevant experience. One year of full-time study offers the student an opportunity to increase skills and experience and enables the student to sit for the neonatal nurse practitioner certification exam offered by the National Certification Corporation for the obstetric, gynecologic, and neonatal nursing specialties.

Please visit Bouvé College Learning Outcomes (https://bouve.northeastern.edu/bchs/about/learning-outcomes/) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Prerequisites

Code	Title	Hours
NRSG 5117	Advanced Pharmacology	2
NRSG 5126	Pathophysiology for Advanced Practice	3

Core Requirements

A grade of B or higher is required in all coursework.

Code	Title	Hours
Clinical		
NRSG 6116	Advanced Health Assessment of the Neonate and Infant	3
NRSG 6230	Nursing Management: Critically Ill Neonatal 1	3
NRSG 6231	Nursing Management: Critically Ill Neonatal 2	3
NRSG 6232	Neonatal Pharmacology	2
Practicum		
NRSG 6430	Neonatal Clinical Practicum 1	4
NRSG 6431	Neonatal Clinical Practicum 2	4
NRSG 6432	Neonatal Clinical Practicum 3	2

Elective

Code	Title	Hours
Select courses in consultation with faculty adviser.		3
NRSG		

Program Credit/GPA Requirements

24 total semester hours required
Minimum 3.000 GPA required

Nursing—Pediatric Nurse Practitioner, Acute Care, CAGS

The pediatric acute-care Certificate of Advanced Graduate Study (CAGS) is available for pediatric or family nurse practitioners who wish to be prepared for practice in the pediatric acute-care role. Applicants must have a minimum of one year of work experience in an acute-care setting working with the pediatric population. The program requires 24 credits of study.

Prerequisite Courses

To ensure that all students have the foundation necessary to be successful in this program, each incoming student, regardless of his or her background, must have completed coursework in the following areas with a minimum grade of B.

Code	Title	Hours
Advanced Pharmacology		
Pathophysiology for Advanced Practice		
Health Assessment		

Please visit Bouvé College Learning Outcomes (https://bouve.northeastern.edu/bchs/about/learning-outcomes/) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Students should refer to the Program Overview page for required program prerequisites.

A grade of B or higher is required in all coursework.

Code	Title	Hours
Required Courses		
NRSG 6116	Advanced Health Assessment of the Neonate and Infant	3
NRSG 6262	Pediatric Pharmacology	2
NRSG 6265	Care of Child/Adolescent Health Problems	4
NRSG 6267	Care of the Critically Ill Child	4
NRSG 6275	Health Promotion and Preventative Care in Pediatrics in the Context of Community Health	4
NRSG 6461	Child/Adolescent Health Problems Practicum	4
NRSG 6463	Care of the Critically Ill Child Practicum	4

Program Credit/GPA Requirements

25 total semester hours required
Minimum 3.000 GPA required

Nursing—Pediatric Nurse Practitioner, Acute and Primary Care, CAGS

The Pediatric Nurse Practitioner, Acute and Primary Care CAG is designed to prepare nurse practitioners (NPs) prepared in different specialties with the skills needed to care for children who are at risk across the continuum of care. For nearly two decades, the School of Nursing's pediatric nurse practitioner (PNP) program has prepared primary care PNPs to provide community-based, culturally-sensitive care. More recently, building on its foundation in evidence-based, interdisciplinary, urban healthcare, the School of Nursing expanded the PNP program into acute care. Students may study either full-time or part-time.

Prerequisite Courses

To ensure that all students have the foundation necessary to be successful in this program, each incoming student, regardless of his or her background, must have completed coursework in the following areas with a minimum grade of B.

Code	Title	Hours
Advanced Pharmacology		
Pathophysiology for Advanced Practice		
Health Assessment		

Please visit Bouvé College Learning Outcomes (https://bouve.northeastern.edu/bchs/about/learning-outcomes/) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Students should refer to the Program Overview page for required program prerequisites.

A grade of B or higher is required in each course.

Code	Title	Hours
Required Courses		
NRSG 6116	Advanced Health Assessment of the Neonate and Infant	3
NRSG 6262	Pediatric Pharmacology	2
NRSG 6264	Care of Well Child/Adolescent Health Promotion	4
NRSG 6265	Care of Child/Adolescent Health Problems	4
NRSG 6267	Care of the Critically Ill Child	4
NRSG 6275	Health Promotion and Preventative Care in Pediatrics in the Context of Community Health	4
NRSG 6460	Care of Well Child/Adolescent Health Promotion Practicum	4
NRSG 6461	Child/Adolescent Health Problems Practicum	4
NRSG 6463	Care of the Critically Ill Child Practicum	4

Program Credit/GPA Requirements

33 total semester hours required
Minimum 3.000 GPA required

Nursing—Pediatric Nurse Practitioner, Primary Care, CAGS

The goal of the pediatric nurse practitioner (PNP) program is to prepare pediatric nurse practitioners who are able to provide advanced evidence-based, comprehensive, family centered healthcare to infants, children, adolescents, and their families. The program offers a broad background of advanced pathophysiology, advanced and pediatric pharmacology, and advanced health assessment. In addition, theoretical basis of best practice and diagnostic clinical reasoning skills are examined and developed as students study the advanced clinical provider management and technology skills needed to care for children across the continuum of care. The highly immersive hands-on clinical core curriculum is intended to provide PNP students with real-life and/or simulated advanced patient care experiences.

Nurses who possess an MS degree in nursing are eligible to apply for the Certificate of Advanced Graduate Study (CAGS) in Primary Care (PC). The PC concentration is designed to prepare students for the role of pediatric nurse practitioner focusing on well child care and prevention and management of common acute and chronic illnesses.

Please visit Bouvé College Learning Outcomes (https://bouve.northeastern.edu/bchs/about/learning-outcomes/) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of B or higher is required in each course.

Code	Title	Hours
Prerequisite Courses or Equivalent		
NRSG 5117	Advanced Pharmacology	2
NRSG 5126	Pathophysiology for Advanced Practice	3
NRSG 6115	Health Assessment	3
Required Courses		
NRSG 6262	Pediatric Pharmacology	2
NRSG 6264	Care of Well Child/Adolescent Health Promotion	4
NRSG 6265	Care of Child/Adolescent Health Problems	4
NRSG 6275	Health Promotion and Preventative Care in Pediatrics in the Context of Community Health	4
NRSG 6460	Care of Well Child/Adolescent Health Promotion Practicum	4
NRSG 6461	Child/Adolescent Health Problems Practicum	4
Elective		
Complete 2 semester hours of graduate NRSG coursework.		2

Program Credit/GPA Requirements

24 total semester hours required (prerequisite courses or equivalent are an additional 8 hours)
Minimum 3.000 GPA required

Nursing—Adult-Gerontology Nurse Practitioner, Acute Care, MS

The adult-gerontology acute-care program seeks to prepare nurses for advanced-practice roles as clinical experts, educators, and consultants. The program provides advanced study with a major focus on clinical experience and culminates with the Master of Science with a specialization in Nursing. Students may pursue either full-time or part-time study. Nurses who possess an MS are eligible for the Certificate of Advanced Graduate Study (CAGS) in this specialization.

Please visit Bouvé College Learning Outcomes (https://bouve.northeastern.edu/bchs/about/learning-outcomes/) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of B or higher is required in each course.

Code	Title	Hours
Professional		
NRSG 5118	Healthcare System and Professional Role Development	3
NRSG 5121	Epidemiology and Population Health	3
Clinical		
NRSG 5117	Advanced Pharmacology	2
NRSG 5126	Pathophysiology for Advanced Practice	3
NRSG 6115	Health Assessment	3
NRSG 6325	Pharmacotherapeutics in Anesthesia and Critical Care Nursing	2
or NRSG 6222	Pharmacology of Adults and Older Adults	
Theory		
NRSG 6220	Nursing Management: Acute Episodic Illness	3
NRSG 6221	Nursing Management: Critical and Chronic Illness	3
NRSG 6241	Acute-Care Concepts in Nursing Practice	3
Practicum		
NRSG 6420	Adult-Gerontology Acute-Care Nursing Practicum 1	2
NRSG 6421	Adult-Gerontology Acute-Care Nursing Practicum 2	4
NRSG 6422	Adult-Gerontology Acute-Care Nursing Practicum 3	4
Research		
NRSG 7105	Translating Research Evidence into Practice	3
NRSG 7110	Evidence-Based Practice Research Application	2

Elective

Code	Title	Hours
Complete 3 semester hours in the following subject area:		3
NRSG		

Program Credit/GPA Requirements

43 total semester hours required
Minimum 3.000 GPA required

Nursing—Adult-Gerontology Nurse Practitioner, Primary Care, MS

This specialization offers registered nurses with a bachelor's degree the opportunity to prepare for a career providing high-quality adult primary care services as an adult-gerontologic nurse practitioner (NP). Adult-gerontology NPs provide services to individuals across most of the life span in clinics, private practices, home care, long-term care, and day programs. Upon completion of the primary care program, graduates are eligible to sit for the adult-gerontology certification exam.

Please visit Bouvé College Learning Outcomes (https://bouve.northeastern.edu/bchs/about/learning-outcomes/) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of B or higher is required in each course.

Code	Title	Hours
Professional		
NRSG 5118	Healthcare System and Professional Role Development	3
NRSG 5121	Epidemiology and Population Health	3
Required Core		
NRSG 6249	Health Promotion of Adult/Older Adult	3
NRSG 6253	Primary Care of Adult/Older Adult Health Problems	4
NRSG 6254	Primary Care of Adult/Older Adult Complex Patients	4
Clinical		
NRSG 5117	Advanced Pharmacology	2
NRSG 5126	Pathophysiology for Advanced Practice	3
NRSG 6115	Health Assessment	3
NRSG 6222	Pharmacology of Adults and Older Adults	2
Practicum		
NRSG 6449	Health Promotion of Adult/Older Adult Practicum	1
NRSG 6450	Adult/Older Adult Practicum 1	4
NRSG 6451	Adult/Older Adult Practicum 2	4
Research		
NRSG 7105	Translating Research Evidence into Practice	3
NRSG 7110	Evidence-Based Practice Research Application	2

Elective

Code	Title	Hours
Complete 2 semester hours in the following subject area:		2
NRSG		

Program Credit/GPA Requirements

43 total semester hours required
Minimum 3.000 GPA required

Nursing—Family Nurse Practitioner, Primary Care, MS

The family nurse practitioner program is a specialty track focusing on the primary healthcare of individuals and families. The program is offered in a hybrid format with the majority of the classes delivered online, coupled with live presentation sessions. Students are required to be on campus monthly.

Upon completion of the primary care program, graduates are eligible to sit for all national certification exams in their area of practice.

Please visit Bouvé College Learning Outcomes (https://bouve.northeastern.edu/bchs/about/learning-outcomes/) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of B or higher is required in each course.

Code	Title	Hours
Professional		
NRSG 5117	Advanced Pharmacology	2
NRSG 5118	Healthcare System and Professional Role Development	3
NRSG 5121	Epidemiology and Population Health	3
NRSG 5126	Pathophysiology for Advanced Practice	3
NRSG 6115	Health Assessment	3
Family		
NRSG 6390	Family Care of the Adult/Older Adult Patient	4
NRSG 6392	Family Theory	2
NRSG 6393	Family Care of the Pediatric and Adolescent Patient	4
NRSG 6395	Healthcare of Women in Family Practice	2
Clinical		
NRSG 6222	Pharmacology of Adults and Older Adults	2
NRSG 6262	Pediatric Pharmacology	2
Practicum		
NRSG 6391	Practicum for NRSG 6390	4
NRSG 6394	Practicum for NRSG 6393	4
NRSG 6396	Practicum for NRSG 6395	4
Research		
NRSG 7105	Translating Research Evidence into Practice	3

NRSG 7110	Evidence-Based Practice Research Application	2

Program Credit/GPA Requirements

47 total semester hours required
720 clinical hours plus 40 research practicum hours
(60 clinical hours/1 semester credit)
Minimum 3.000 GPA required

Nursing—Neonatal Nurse Practitioner, MS

Applicants are required to have at least two years of level 3 or greater of neonatal intensive care unit (NICU) experience before entering this program; most applicants have greater relevant experience. The neonatal nurse practitioner (NNP) program builds on the applicant's significant base of nursing knowledge and focuses on advanced nursing knowledge and clinical practice. In this program, students:

- Learn advanced diagnostic reasoning
- Carry out independent management of patients and their families
- Develop the expertise necessary to care for high-risk neonates and their families
- Become proficient at delivery room management of high-risk neonates

Successful graduates are prepared to make independent decisions in level 2 and level 3 NICUs, drawing on their experience and diagnostic abilities to affect lives every day.

Please visit Bouvé College Learning Outcomes (https://bouve.northeastern.edu/bchs/about/learning-outcomes/) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of B or higher is required in each course.

Code	Title	Hours
Required Core		
NRSG 5117	Advanced Pharmacology	2
NRSG 5118	Healthcare System and Professional Role Development	3
NRSG 5121	Epidemiology and Population Health	3
NRSG 5126	Pathophysiology for Advanced Practice	3
Clinical		
NRSG 6116	Advanced Health Assessment of the Neonate and Infant	3
NRSG 6230	Nursing Management: Critically Ill Neonatal 1	3
NRSG 6231	Nursing Management: Critically Ill Neonatal 2	3
NRSG 6232	Neonatal Pharmacology	2
Practicum		
NRSG 6430	Neonatal Clinical Practicum 1	4
NRSG 6431	Neonatal Clinical Practicum 2	4
NRSG 6432	Neonatal Clinical Practicum 3	2
Research		
NRSG 7105	Translating Research Evidence into Practice	3
NRSG 7110	Evidence-Based Practice Research Application	2

Elective

Code	Title	Hours
Complete 4 semester hours from the following subject area:		4
NRSG		

Program Credit/GPA Requirements

41 total semester hours required
Minimum 3.000 GPA required

Nursing, MS—Direct Entry

Part I: Prelicensure

The direct-entry nursing student enters the accelerated master's program as a graduate student. The first 16 months (four semesters) of the program consist of intensive, sequential classes and clinical with combined undergraduate- and graduate-level courses. Students are then prepared to take the National Council Licensure Exam (NCLEX-RN) upon completion of 64 program semester hours to earn an RN license. Students earn a Bachelor of Science in Nursing (BSN) after this part of the program. Financial aid will be granted on an undergraduate basis during the prelicensure phase of the program.

Academic Standards for Nursing Majors

Academic Dismissal from Major

Students in the Bouvé College of Health Sciences will be dismissed from their major effective the following academic semester for any of the reasons noted below:

- Students who do not meet the required minimum grade in two professional courses, including labs and clinical, will be dismissed from the program. Only one professional course can be remediated.
- Remediation of a failed professional course is a requirement for progression in the program.
- Students who do not meet the minimum grade requirement within two attempts of the course will be dismissed from the program.

Academic Appeals

Students who believe that they were erroneously, capriciously, or otherwise unfairly treated in an academic or cooperative education decision may petition to appeal the decision. Refer to the Bouvé College of Health Sciences Academic Affairs Appeals Process and the Northeastern University Academic Appeals Policies and Procedures.

Program Policies and Standards

Students are expected to adhere to the policies and standards of their program major to progress through their curriculum as planned. Students seeking any exceptions to the program policies and standards specified for their program major will present their petitions before the School of Nursing Academic Standing Committee.

Students are required to attend all scheduled nursing classes, clinical experiences, and clinical labs on campus and in clinical agencies. If the student fails to meet attendance requirements, the student will fail the associated class, clinical, and/or lab.

CLINICAL REQUIREMENTS

Clinical settings require a criminal background check.

All students must receive a health clearance from University Health and Counseling Services (UHCS). Health clearance is based on specific documentation of immunity from infectious disease and a physical examination. (This may be done by the student's own healthcare provider.) In addition, nursing students need a clinical clearance in order to participate in clinical courses. Clinical clearance, managed by the School of Nursing's Clinical Placement Office, includes verification of certification in cardiopulmonary resuscitation (CPR); recent negative tuberculosis screening (PPD); positive titers for MMR, varicella, and hepatitis B; vaccines including TDAP and influenza; and additional health screenings as may be required by the program. It is the responsibility of the student to stay current and to provide documentation required for clinical clearance throughout the entire nursing program.

Six weeks prior to the start of a clinical course, students must show the following to be eligible for clinical placement:

- Evidence of immunizations and health clearance by University Health and Counseling Services
- Documentation of CPR certification
- Completion of a Criminal Offender Record Information (CORI) background check

Students will not be allowed to start the clinical course, and may be dropped from the clinical course, if these processes are not satisfactorily completed.

Students should refer to Requirements for Clinical, Internships, and Practicum Courses (p. 252)in this catalog (applicable to both undergraduate students and graduate students at the college) for additional details.

Clinical Warning

A nursing student may be placed on clinical warning, or fail the clinical course, at any time during the semester for the following reasons:

- Failing to meet the clinical objectives at a satisfactory level.
- Failing to demonstrate safe practice. Students may be removed from the clinical area, before completion of the clinical rotation, if the instructor determines that the student is unsafe. This will result in the student failing the clinical course.
- Failing to meet the attendance requirement.

Conditions

- Students on clinical warning must develop an academic plan with the clinical instructor to address clinical performance.
- Students will be expected to improve clinical performance by adhering to the plan.
- Failure to adhere to the terms of the plan will result in the student failing the course and being placed on academic probation. All conditions of academic probation will then apply.

Notification

- The clinical instructor will issue the student a clinical warning via the Faculty and Advisor Communication Tool (FACT) identifying the problem.
- The student and the instructor should then develop a plan together to address the deficiency.
- Copies of the warning will be forwarded to the program director and/or the assistant dean for undergraduate programs if needed.
- This is an administrative warning and will not be posted on the transcript.
- Satisfactory completion of the clinical experience component of the course will result in removal of the warning from the student's file.

BLOODBORNE PATHOGEN EXPOSURE AND INJURY

Any students who sustain any kind of injury and/or exposure related to bloodborne, respiratory, or other pathogens or hazardous materials while on a clinical rotation must immediately follow the procedures below. Students are provided access to postexposure counseling through the university's partner, OEHN (Occupational & Environmental Health Network).

PROCEDURES

Students must follow the affiliate site's protocol for exposure reporting, testing, counseling, and follow-up. If there is no affiliate site protocol, students should notify their program, as well as the Office of Risk Services (risk@northeastern.edu).

Within 24 hours of the incident, students must also inform their program's director of clinical education (or unit designee responsible for clinical placements) and/or medical director and submit, in writing, a description of the incident and injury or exposure.

The program's director of clinical education (or unit designee responsible for clinical placements) will notify the following individuals that an incident has occurred (PHI only necessary upon request):

- The associate dean of clinical, rehabilitation, and new initiatives
- The unit head
- The dean
- The Office of Risk Services (risk@northeastern.edu)

Students on or near the NU Boston campus are encouraged to schedule an appointment with UHCS to discuss the exposure, treatment, potential risks, and side effects of any medications. Students in clinical programs outside the Boston area should contact OEHN at 1-866-360-8100. OEHN is open 24 hours a day, 7 days a week, 365 days a year. OEHN will collect appropriate information and engage the doctor on call, who can help to direct appropriate care depending on exposure and circumstances.

Students should rely on their health insurance for necessary treatment. Out-of-pocket costs may be submitted to the Office of Risk Services for reimbursement consideration.

Students should contact their clinical education program director and/or the Office of Risk Services with any further questions related to exposure-related treatment.

Technical Standards for Admission, Academic Progression, and Graduation

The primary mission of the School of Nursing is to educate our students to provide evidence-based, culturally and linguistically competent, ethical healthcare that is high quality, safe, and accessible to diverse local, national, and global communities. Our programs are designed to prepare students to become leaders as nurse clinicians, educators, scholars, and researchers. The School of Nursing is also committed to achieving the goals of the university to become an outstanding national research, practice-oriented, student-centered, urban institution.

The goal of the School of Nursing is to prepare students to think critically and to practice nursing competently and compassionately in rapidly changing practice environments. All efforts are designed to build nursing knowledge; enhance nursing practice and patient safety; foster professional integrity; and ultimately improve the health outcomes of patients, families, and communities across the continuum of care.

In addition to classroom learning, students' clinical education experiences occur in settings, like hospitals, in which patient safety is the priority. For this reason, students who, upon enrollment in any of the nursing programs, seek accommodations from the Disability Resource Center (DRC) at NU must also request an assessment of accommodations that would be needed for clinical education.

Certain functional abilities are essential for the delivery of safe, effective nursing care during clinical education activities. Therefore, the School of Nursing has determined that certain technical standards are requisite for admission, progression, and graduation from the nursing programs. An individual must be able to independently, with or without reasonable accommodation, meet the following technical standards:

1. General abilities (p. 303)
2. Observational ability (p. 303)
3. Communication ability (p. 303)
4. Motor ability (p. 303)
5. Intellectual, conceptual, and quantitative abilities (p. 303)
6. Essential behavioral and social attributes (p. 303)
7. Ability to manage stressful situations (p. 303)

Individuals unable to meet these technical standards, with or without reasonable accommodation, will not be able to complete the program.

GENERAL ABILITIES

The student is expected to possess functional use of the senses of vision, touch, hearing, and smell so that data received by the senses may be integrated, analyzed, and synthesized in a consistent and accurate manner. A student must be able to respond promptly to urgent situations that may occur during clinical training activities and must not hinder the ability of other members of the healthcare team to provide prompt treatment and care to patients.

OBSERVATIONAL ABILITY

The student must have sufficient capacity to make accurate visual observations and interpret them in the context of laboratory studies, medication administration, and patient care activities. In addition, the student must be able to document these observations and maintain accurate records.

COMMUNICATION ABILITY

The student must communicate both verbally and nonverbally in order to elicit information and to convey that information to others. Each student must have the ability to read and write accurately and comprehensively in English. The student must be able to thoroughly comprehend and fluently speak the English language so as to facilitate communication with patients, families, professionals in healthcare settings, instructors, and other students. The student must also be able to present information in a professional, logical manner and to provide counseling and instruction in order to effectively care for patients and their families.

MOTOR ABILITY

The student must be able to perform gross and fine motor movements with sufficient coordination needed to perform complete physical examinations utilizing the techniques of inspection, palpation, percussion, auscultation, and other diagnostic maneuvers. A student must develop the skills needed to perform or assist with procedures, treatments, administration of medication, and the management and operation of diagnostic and therapeutic medical equipment. The student must possess the physical and mental stamina to meet the demands associated with extended periods of sitting, standing, moving, and physical exertion required for satisfactory and safe performance in the clinical and classroom settings.

INTELLECTUAL, CONCEPTUAL, AND QUANTITATIVE ABILITIES

The student must be able to develop and refine critical thinking skills that are essential to nursing practice. Critical thinking involves the abilities to measure, calculate, reason, analyze, and synthesize objective and subjective data and to make decisions, often in a time-urgent environment, that reflect consistent and thoughtful deliberation and sound clinical judgment.

ESSENTIAL BEHAVIORAL AND SOCIAL ATTRIBUTES

Compassion, integrity, motivation, effective interpersonal skills, and concern for others are personal attributes required of those in the nursing programs. The student must be able to work under supervision of a clinical instructor or preceptor; this is essential to ensure patient safety. The student must exercise good judgment and promptly complete all responsibilities in the classroom and clinical settings. The ability to establish culturally competent relationships with individuals, families, and groups and to respond effectively to patients who have different intellectual capacities is critical to nursing practice.

ABILITY TO MANAGE STRESSFUL SITUATIONS

The student must be able to adapt to and function effectively in stressful situations in both the classroom and clinical settings, including emergency situations. These stressors include personal, patient care/family, faculty/peer, and/or program-related issues.

Disability and Special Needs

Students with special needs are encouraged to contact the Disability Resource Center (https://drc.sites.northeastern.edu/) (DRC) to register and request services. Students must notify the instructor at the beginning of the semester if they plan to use DRC services throughout the course. The staff in that office is available for assistance.

State Board Nursing Examination

In Massachusetts, and several other states, the registering board requires that graduates taking the National Council Licensing Examination (NCLEX-RN) meet standards of "good moral character" (GMC). Students may review the GMC requirement specified at Massachusetts General Laws Chapter 112, sections 74, 74A, and 76; Licensure Policy No. 00-01 under "Rules & Regulations" on the Massachusetts BORN website.

RN Work Experience

Once a student graduates with a BSN, they participate in an online professional seminar for two semesters. In addition, students seek full-time RN experience required for progression into the NP master's clinical practicums. One-to-two years of RN work experience is required, depending on the track. Students may begin core courses, such as epidemiology, during the required one-to-two years of RN experience, with approval from the specialty track director. Finding RN employment is the responsibility of the student, as it is professional nursing experience. Northeastern will help support the student in preparation for the job search. The student may take no more than 12 months' leave of absence between the prelicensure and MS phases of the Direct Entry program.

Part II: Return to Master's Specialty Tracks

In the master's specialty track, students are required to take professional and research core classes, clinical core, and specialty clinical courses. Full- or part-time academic study is available to students. Most students return to the master's segment of the program taking coursework as a part-time student while continuing to work and increase the amount of RN professional experience. Completion of the MSN can take four to six semesters, depending on the student's pace and specialty track. Upon

completion of the required specialty area credits, the student receives a Master of Science degree and is eligible to take the national certification exam in their area of advanced specialty nursing practice. Financial aid is awarded on a graduate basis during this portion of the program.

Please visit Bouvé College of Health Sciences Program Learning Outcomes for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of B or better in the BSN clinical courses is highly recommended for progression into the MSN portion of the program. Progression is at the graduate specialty director's discretion.

Students must successfully complete all courses with a grade of C or better except where otherwise indicated.

Code	Title	Hours
Semester 1		
NRSG 2220 and NRSG 2221	Health Assessment and Fundamental Nursing Skills and Lab for NRSG 2220	4
NRSG 3302 and NRSG 3303	Nursing with Women and Families and Clinical for NRSG 3302	5
A grade of B or higher is required in the course NRSG 5117.		
NRSG 5117	Advanced Pharmacology	2
A grade of B or higher is required in the course NRSG 5126.		
NRSG 5126	Pathophysiology for Advanced Practice	3
Semester 2		
NRSG 2210	Influences on Health and Illness: A Nursing Perspective	3
NRSG 3323 and NRSG 3324	Advanced Assessment and Interventions and Lab for NRSG 3323	2
NRSG 3320 and NRSG 3321	Nursing Care of Adults 1 and Clinical for NRSG 3320	6
NRSG 3400 and NRSG 3401	Nursing and the Promotion of Mental Health and Clinical for NRSG 3400	5
Semester 3		
NRSG 3420 and NRSG 3421	Nursing Care of Adults 2 and Clinical for NRSG 3420	6
NRSG 4502 and NRSG 4503	Nursing Care of the Child and Clinical for NRSG 4502	6
NRSG 5220	Introduction to Research Methods and Application for Healthcare	4
Semester 4		
NRSG 2150	Ethical Healthcare: Genetics and Genomics	4
NRSG 4604 and NRSG 4605	Public Health Community Nursing and Clinical for NRSG 4604	5
NRSG 4610	Managing and Leading in Healthcare	4
NRSG 4995 and NRSG 4996	Comprehensive Nursing Practicum and Clinical for NRSG 4995	5

Academic Progression Standards for Nursing Majors

- Students who either fail or withdraw from a professional course will need to successfully remediate that course before continuing in their approved curriculum plan.
- Students who incur an incomplete grade in a prerequisite course must obtain approval from their academic advisor, upon consultation with the department faculty and, when appropriate, the School of Nursing Academic Standing Committee, prior to progression into the subsequent course(s).
- Students may not change their graduation date more than twice.

Program Credit / GPA Requirements

64 total semester hours required
Minimum 3.000 GPA required

Nursing—Pediatric Nurse Practitioner, Acute and Primary Care, MS

The Master of Science in Nursing—Pediatric Nurse Practitioner, Acute and Primary Care, is designed to prepare pediatric nurse practitioner students for the primary care role, as well as for the acute-care role, with courses and clinical experiences that provide instruction in the care of patients with acute, complex, critical, and chronic illness in a variety of settings.

The School of Nursing offers two programs for pediatric nurse practitioner students. Please also visit the Master of Science in Nursing—Pediatric Nurse Practitioner, Primary Care, (p. 305) for more information.

Both programs offer preparation in advanced, evidence-based, comprehensive, family centered healthcare for infants, children, adolescents, and their families. With a broad background of advanced pathophysiology, advanced and pediatric pharmacology, and advanced health assessment, the programs of study emphasize both the theoretical basis of best practice and diagnostic clinical reasoning skills. The highly immersive, hands-on, clinical core curriculum is intended to provide pediatric nurse practitioner students with real-life and/or simulated advanced patient care experiences, providing instruction and practice in advanced clinical provider management and the technology skills needed to care for children across the continuum of care.

Please visit Bouvé College Learning Outcomes (https://bouve.northeastern.edu/learning-outcomes/) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of B or higher is required in each course.

Code	Title	Hours
Professional Core Courses		
NRSG 5118	Healthcare System and Professional Role Development	3
NRSG 5121	Epidemiology and Population Health	3
Research Core Courses		
NRSG 7105	Translating Research Evidence into Practice	3
NRSG 7110	Evidence-Based Practice Research Application	2

Clinical Core Courses		
NRSG 5117	Advanced Pharmacology	2
NRSG 5126	Pathophysiology for Advanced Practice	3
NRSG 6115	Health Assessment	3
NRSG 6116	Advanced Health Assessment of the Neonate and Infant	3
NRSG 6262	Pediatric Pharmacology	2
Clinical Theory Courses		
NRSG 6275	Health Promotion and Preventative Care in Pediatrics in the Context of Community Health	4
NRSG 6264	Care of Well Child/Adolescent Health Promotion	4
NRSG 6265	Care of Child/Adolescent Health Problems	4
NRSG 6267	Care of the Critically Ill Child	4
Clinical Practicum Courses		
NRSG 6460	Care of Well Child/Adolescent Health Promotion Practicum	4
NRSG 6461	Child/Adolescent Health Problems Practicum	4
NRSG 6463	Care of the Critically Ill Child Practicum	4

Program Credit/GPA Requirements

52 total semester hours required
Minimum 3.000 GPA required

Nursing—Pediatric Nurse Practitioner, Primary Care, MS

The Master of Science in Nursing—Pediatric Nurse Practitioner, Primary Care, is designed to prepare pediatric nurse practitioner students in well child care and prevention, as well as management of common acute and chronic illnesses.

The School of Nursing offers two programs for pediatric nurse practitioner students. Please also visit the Master of Science in Nursing—Pediatric Nurse Practitioner, Acute and Primary Care, (p. 304) for more information.

Both programs offer preparation in advanced, evidence-based, comprehensive, family centered healthcare for infants, children, adolescents, and their families. With a broad background of advanced pathophysiology, advanced and pediatric pharmacology, and advanced health assessment, the programs of study emphasize both the theoretical basis of best practice and diagnostic clinical reasoning skills. The highly immersive, hands-on, clinical core curriculum is intended to provide pediatric nurse practitioner students with real-life and/or simulated advanced patient care experiences, providing instruction and practice in advanced clinical provider management and the technology skills needed to care for children across the continuum of care.

Please visit Bouvé College Learning Outcomes (https://bouve.northeastern.edu/learning-outcomes/) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of B or higher is required in each course.

Code	Title	Hours
Professional Core Courses		
NRSG 5118	Healthcare System and Professional Role Development	3
NRSG 5121	Epidemiology and Population Health	3
Clinical Theory Courses		
NRSG 6264	Care of Well Child/Adolescent Health Promotion	4
NRSG 6265	Care of Child/Adolescent Health Problems	4
NRSG 6275	Health Promotion and Preventative Care in Pediatrics in the Context of Community Health	4
Clinical Core Courses		
NRSG 5117	Advanced Pharmacology	2
NRSG 5126	Pathophysiology for Advanced Practice	3
NRSG 6115	Health Assessment	3
NRSG 6262	Pediatric Pharmacology	2
Clinical Practicum Courses		
NRSG 6460	Care of Well Child/Adolescent Health Promotion Practicum	4
NRSG 6461	Child/Adolescent Health Problems Practicum	4
Research Core Courses		
NRSG 7105	Translating Research Evidence into Practice	3
NRSG 7110	Evidence-Based Practice Research Application	2

Program Credit/GPA Requirements

41 total semester hours required
Minimum 3.000 GPA required

Nursing—Psychiatric-Mental Health Nurse Practitioner, MS

The School of Nursing offers specialized and flexible program options in psychiatric mental health nursing. Part-time and full-time programs are available. Classes are offered during the late afternoon and early evening hours to accommodate the multiple responsibilities of adult learners.

- For nurses who have a baccalaureate degree in nursing, the Master of Science (MS) option is a 43-semester-hour program.
- For nurses with master's preparation in other nursing specialties, the Certificate of Advanced Graduate Study (CAGS) option is a 24-semester-hour program.
- For those who wish to pursue a career in nursing and possess a baccalaureate degree or higher in a related (non-nursing) field, a direct-entry program is available.

Upon completion of the psychiatric mental health advanced-practice nursing graduate program curriculum, graduates are eligible to sit for available national certification exams in their area of practice.

Please visit Bouvé College Learning Outcomes (https://bouve.northeastern.edu/bchs/about/learning-outcomes/) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of B or higher is required in each course.

Code	Title	Hours
Required Core		
NRSG 6281	Dimensions of Clinical Practice	3
NRSG 6282	Clinical Psychopharmacology	3
NRSG 6283	Psychobiological Bases of Mental Disorders	3
NRSG 6286	Contemporary Psychotherapies—Theory and Practice	3
Professional		
NRSG 5118	Healthcare System and Professional Role Development	3
NRSG 5121	Epidemiology and Population Health	3
Clinical		
NRSG 5117	Advanced Pharmacology	2
NRSG 5126	Pathophysiology for Advanced Practice	3
NRSG 6115	Health Assessment	3
Practicum		
NRSG 6480	Psychiatric Practicum across the Life Span 1	5
NRSG 6481	Psychiatric Practicum across the Life Span 2	5
Research		
NRSG 7105	Translating Research Evidence into Practice	3
NRSG 7110	Evidence-Based Practice Research Application	2

Elective

Code	Title	Hours
Complete 2 semester hours in the following subject area:		2
NRSG		

Program Credit/GPA Requirements

43 total semester hours required
Minimum 3.000 GPA required

Nursing Informatics, Graduate Certificate

Globally connected networks, big data, and innovative decision analytics are rapidly shaping the future of healthcare systems and patient care delivery. This graduate certificate blends nursing science with knowledge and skills in information science, business management, and healthcare to prepare the student to:

- Utilize nursing informatics concepts to support decision making, work flows, and improve healthcare outcomes
- Accelerate the transformation of data into information and knowledge
- Design, implement, and evaluate health information systems
- Employ evidence-based strategies to promote data integrity and security
- Apply business, economic, and entrepreneurial principles to advance strategic business goals
- Become an innovative informatics healthcare leader to participate in efforts to improve human health

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Grade of B or higher is required in all courses.

Core Requirements

Code	Title	Hours
HINF 6202	Business of Healthcare Informatics	3
NRSG 6306	Health Informatics	3
NRSG 6307	Operational Informatics in Healthcare Organizations	3

Elective

Code	Title	Hours
Complete one of the following:		3
HINF 6201	Organizational Behavior, Work Flow Design, and Change Management	
HINF 6240	Improving the Patient Experience through Informatics	
HINF 6404	Patient Engagement Informatics and Analytics	
HINF 6405	Quantifying the Value of Informatics	

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

School of Pharmacy and Pharmaceutical Sciences

Website (http://www.northeastern.edu/bouve/pharmacy/)

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The School of Pharmacy and Pharmaceutical Sciences is dedicated to excellence in pharmacy-related education, research, and service, including the provision of patient care. We seek to prepare students with knowledge, skills, and values for careers in pharmacy practice and the pharmaceutical sciences. Our programs promote intellectual growth, professionalism, and lifelong learning. Through the generation and dissemination of new knowledge and through scholarship and community service, the school contributes to improved individual and population health.

Programs

Doctor of Philosophy (PhD)

- Biomedical Sciences (p. 307)
- Medicinal Chemistry (p. 310)
- Medicinal Chemistry and Drug Discovery (p. 314)

- Pharmaceutical Sciences (p. 318)
- Pharmaceutics and Drug Delivery (p. 321)
- Pharmacology (p. 325)

Doctor of Pharmacy (PharmD)

- Doctor of Pharmacy (p. 328)
- Doctor of Pharmacy—Direct Entry (p. 328)

Master of Science (MS)

- Biomedical Sciences (p. 333)
- Medicinal Chemistry (p. 335)
- Medicinal Chemistry and Drug Discovery (p. 337)
- Pharmaceutical Sciences (p. 339)
- Pharmaceutics and Drug Delivery (p. 342)
- Pharmacology (p. 344)

Dual Degree

- Pharmacy, PharmD—Direct Entry / Public Health, MPH (p. 346)

Biomedical Sciences, PhD

The Department of Pharmaceutical Sciences offers a PhD program in biomedical sciences that focuses on the cross-disciplinary integration of human (patho)biology with drug action, invention, and clinical utility. The biomedical sciences curriculum involves coursework and original research in areas including drug design and profiling, toxicology, and pharmaceutical biochemistry/cell biology aimed at increasing our understanding of how unsolved medical needs may be addressed by novel therapeutic approaches. The biomedical sciences program is appropriate for those entering the field as well as persons currently employed as research technicians, clinical laboratory workers, and science teachers/administrators. The flexibility of the biomedical sciences program and its interdisciplinary nature can enhance job performance in a present position and invite new employment opportunities.

Journal Club Participation

The Department of Pharmaceutical Sciences sponsors weekly journal clubs at which students present and evaluate current scientific literature in their fields of study. Students must attend one of these journal clubs (Pharmaceutics & Drug Delivery Journal Club, Pharmacology Journal Club, or Medicinal Chemistry & Drug Discovery Journal Club), chosen in consultation with their advisors.

Attendance at one of these journal clubs is required each and every academic semester as an integral part of the PhD curriculum, throughout students' entire progression toward the PhD. Attendance is recorded by sign-up sheet. All PhD students must participate full-time in journal club for course credit, Pharmaceutical Science Seminar (PHSC 6300), at least twice during their course of study. Failure to attend journal club regularly may result in sanctions such as probation or dismissal from the PhD program. Any student who does not comply with these (or any other) conditions required in the PhD program faces potential dismissal.

Colloquium Attendance

All PhD students, regardless of program, are required to attend the weekly Pharmaceutical Science Colloquium series. Announcements of times and locations will be distributed weekly to students by email to their university email addresses. Attendance is recorded by sign-up sheet. One excused absence is permitted per semester. Failure to attend colloquia may result in sanctions such as probation or dismissal from the PhD program.

Internship Requirements and Regulations for Department of Pharmaceutical Sciences

Internships provide an experiential component of the graduate curriculum that fosters professional development through work in industry and hospitals.

After PhD candidates have completed their dissertation research and are working on their dissertations, they are able, with the express permission of their PhD advisor, to participate in an internship if they choose. They are never allowed to intern while they are serving as teaching assistants.

1. Students are responsible for finding their own internship and must be honest and accurate representing their experiences on their resumés. Students are responsible for tracking this experience on their resumés as there will be no detailed record on students' transcripts of these opportunities.
2. Students must not accept more than one position. They must honor the first offer accepted. Any student not adhering to this requirement will not be allowed to participate.
3. International students must register for the internship course Pharmaceutical Science Internship (PHSC 6401) and follow instructions to receive Curricular Practical Training (CPT) authorization from the Office of Global Services (https://international.northeastern.edu/ogs/) every semester they work. This applies to part-time jobs and volunteer opportunities. International students cannot engage in full-time CPT authorization totaling more than 52 weeks. Doing so will eliminate the possibility of engaging in the post-graduation benefit of Post-Completion Optional Practical Training (Post-OPT).
4. In order to receive a grade for the course, students must write at least two learni goals within the first two weeks of the internship and a one- to two-page paper describing what they learned, mid- and end of semester. Supervisors for internships will reply to a questionnaire about students' performance.
5. Taking internship must not extend international students' visas.
6. There are no vacations on co-op/internships. Companies' sick time policies may vary. Students should check with their employers. For all other matters, please see the University-wide Academic Policies and Procedures (p. 23) and/or Bouvé College of Health Sciences Academic Policies and Procedures (p. 251).

Milestones

QUALIFYING EXAMINATION

The PhD qualifying examination is required for students in all four programs under the auspices of the Department of Pharmaceutical Sciences: pharmacology, medicinal chemistry, biomedical sciences, and pharmaceutical sciences. Students from each of the four programs will take the exams together, regardless of program focus.

Doctoral students should select a dissertation advisor in the second year of the program and are expected to begin research and demonstrate satisfactory proficiency in the laboratory before taking the PhD qualifying examination.

The examination tests the candidates' knowledge and skills in core courses and program content areas. The overall PhD qualifying examination consists of three written exams and one oral exam. The qualifying examination is taken as a course, Doctoral Training and Research (PHSC 8940), no later than during the fall semester of the

students' third year, after having successfully completed the first two years and all the core courses of their respective programs.

At least three departmental faculty will contribute questions for the written exams, and no one faculty member will write more than the equivalent of one entire exam. All students qualified to sit for the exams are expected to take them at the times announced.

The format for the written exams may vary among programs (e.g., faculty in some disciplines may ask a series of comprehensive essay questions, whereas others may provide research publications(s) from the biomedical literature and ask questions based upon the publications' content). The written exams are scheduled within two weeks of each other and graded by the providers of the question(s).

- Written exam 1 reflects students' knowledge of the core course material
- Written exam 2 reflects students' knowledge of their program material
- Written exam 3 requires that students write an NIH F31 grant proposal

A score of at least 70 percent is required to pass each written exam. Students must pass all three written portions of the PhD qualifying examination prior to taking the oral exam. Students who fail one written exam will have one opportunity to retake and pass that examination. A student who fails two written exams will be required to withdraw from the PhD program.

During the oral exam, students defend their NIH F31 grant proposal before an examination committee of four faculty members: the dissertation advisor, at least two other Department of Pharmaceutical Sciences faculty members, and at least one member from outside the department. This committee is convened only for the oral exam and does not need to be the same committee for the student's dissertation committee in future semesters.

Members of the oral examination committee are selected by the student, after consultation with the dissertation advisor and/or the director of graduate studies. The oral exam for each student will be scheduled within approximately two months after successful completion of the written exams. The oral exam is graded on a pass/fail basis. Students who fail the oral exam on the first attempt may retake the exam within a time period designated by the examination committee not to exceed six months. Those who fail twice will be dismissed from the program.

Students who do not successfully pass the PhD qualifying examination but have earned sufficient course credits may petition to receive the MS degree.

DOCTORAL CANDIDACY STATUS

Doctoral students who have completed a minimum of 33 semester hours of graduate credit beyond the bachelor's degree and who have passed the written and oral qualifying examinations shall be admitted to candidacy status for the PhD degree.

DOCTORAL DISSERTATION COMMITTEE

Doctoral students must complete a dissertation that embodies the results of extended research and makes an original contribution to their field. This work should give evidence of candidates' abilities to conduct independent investigation and interpret the results of their research in a professional manner. The doctoral dissertation advisor serves as chairperson of the dissertation committee, which consists of no fewer than five members. Selection of an advisor is by mutual consent of the student and a member of the faculty, with approval by the director of graduate studies in the Department of Pharmaceutical Sciences. At least two members of the committee must be faculty members in the Department of Pharmaceutical Sciences. At least one member is to be selected from outside the department. Committee members are chosen for their expertise in students' research areas.

DISSERTATION PROPOSAL DEFENSE

Within a year after successful completion of the PhD qualifying examination, but no later than the beginning of the fall semester of the fourth year, students must prepare and defend a written proposal detailing their planned dissertation project. Failure to do so will be regarded as failure to progress in the PhD program and will result in a warning from the director of graduate studies of the Department of Pharmaceutical Sciences.

Students who do not correct this deficiency within one semester will be placed on academic probation. Students on academic probation must complete the dissertation proposal defense and return to nonprobationary status within one semester or will be dismissed from the PhD program.

The dissertation proposal should be no more than 50 double-spaced pages (12-point font minimum and one-half-inch margins on all sides). This page limit excludes references but includes figures, figure legends, and tables. Aside from these exceptions, the proposal should otherwise conform to the format and structure of an NIH grant proposal with four main sections: specific aims, background and significance, preliminary studies, and experimental design and methods. The Department of Pharmaceutical Sciences *Dissertation Proposal* document provides detailed instructions on the preparation of a dissertation proposal and associated required forms and may be found here (https://bouve.northeastern.edu/pharmsci/).

The dissertation proposal must be defended orally before the students' dissertation committee and signed by all dissertation committee members *before students undertake their planned dissertation research.* Upon dissertation approval, the copies of the signed proposal approval cover sheet (https://bouve.northeastern.edu/pdf/dissertation-proposal-approval-form.pdf) must be submitted to the department's director of graduate studies and to the Bouvé College of Health Sciences Graduate Office.

BIANNUAL REVIEW

Dissertation committees meet routinely at six-month intervals, but no less than once a year, to evaluate students' research progress and to be presented with written and oral progress reports on the direction and status of the research. Progress reports should be written in a brief format, identical to that described for the formal dissertation (see *Instructions for the Preparation of the Thesis*). Unsatisfactory productivity provides the basis for a warning by the dissertation committee and/or the Graduate Committee. Two such warnings will result in a student's dismissal from the program.

Registration for Dissertation

Advisor consent and completion of all coursework (with the exception of the colloquium course) must be documented before students register for the first dissertation course. Students must register for Dissertation Term 1 (PHSC 9990) and Dissertation Term 2 (PHSC 9991). Students must register for **Dissertation Continuation (PHSC 9996)** each semester thereafter until the dissertation has been successfully defended. Students are given a maximum of five years after establishing degree candidacy to complete all PhD degree requirements.

Publications and Presentations

Prior to completion of PhD training, candidates must present their research either as a poster or podium presentation at a regional or national scientific conference. Also prior to completion, the student must

have submitted (preferably, published) at least one manuscript in a peer-reviewed journal that reflects original findings and laboratory work from the candidate's dissertation research.

PhD Dissertation Preparation

Detailed guidelines for the format and content of the written dissertation are given in Instructions for Preparation of the Dissertation found here (https://bouve.northeastern.edu/pharmsci/). The completed dissertation document should be reviewed first by the dissertation advisor. Feedback from the advisor should be incorporated into the dissertation draft before its distribution to the dissertation committee. The completed dissertation should be delivered to all dissertation committee members no later than two weeks before the scheduled oral defense.

PHARMACEUTICAL SCIENCES COLLOQUIUM

All PhD candidates nearing completion of their research are required to present their dissertation findings at the department's Pharmaceutical Sciences Colloquium. These presentations should be scheduled at least six months before anticipated completion of the dissertation. In turn, the dissertation should be completed no later than one year after the colloquium presentation. Students must register for Pharmaceutical Science Colloquium (PHSC 6810) during the semester that the colloquium presentation is to be given.

ORAL DISSERTATION DEFENSE

The oral dissertation defense takes place after students complete their PhD dissertation research and all other requirements for the PhD degree. The oral defense deals with the subject matter of the dissertation, significant developments in the field, and students' background knowledge in their field of concentration.

The dissertation committee conducts the final defense. The committee may recommend that the student clarify, amplify, or rewrite portions of the dissertation *before the final defense is scheduled.* Once the committee concurs that that written dissertation document is acceptable, a date is chosen for the final oral examination.

At least two weeks prior to the defense, students should inform the director of graduate studies in the Department of Pharmaceutical Sciences the date of defense, so that advance announcement may be distributed. The final defense is open to anyone who wishes to attend and typically lasts at least two hours. After presentation of the work by the student in a seminar format, and responses to audience and committee questions, the committee meets first with the student for any follow-up discussion and then in executive session to decide whether the student has defended the dissertation successfully.

The committee's decision is then announced to the student. If the committee's vote is favorable, the student incorporates committee suggestions and corrections, if applicable, and the dissertation is signed and passed on to the department's director of graduate studies. Requests for a second defense are highly irregular but may be permitted in the event that the previous oral defense was judged by the committee to be highly promising but inadequate in one critical aspect.

Deadline

The final dissertation must be written, defended, and approved at least two weeks before the university commencement deadline. Students must submit signed copies of their dissertations to the website designated by the university and must abide by any embargo sanctioned by the student's principal dissertation advisor and/or dissertation committee. The students should apply for graduation before the final dissertation defense, on the assumption that the dissertation will be approved. If the dissertation committee decides that more time is required to complete the dissertation beyond the commencement date, then the application for graduation can be withdrawn and a new one submitted pending final dissertation approval.

Please visit Bouvé College of Health Sciences Program Learning Outcomes (https://bouve.northeastern.edu/learning-outcomes/) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Qualifying examination
Doctoral candidacy status
Doctoral dissertation committee
Dissertation proposal
Biannual review
Pharmaceutical Sciences Colloquium
Oral dissertation defense

Core Requirements

A grade of C– or higher is required in each course.

Code	Title	Hours
Seminar		
Complete the following (repeatable) course twice:		2
PHSC 6300	Pharmaceutical Science Seminar	
Required Core		
Complete 18–20 semester hours from the following:		18-20
PHSC 5100	Concepts in Pharmaceutical Science	
PHSC 5102	Concepts in Pharmaceutical Science 2	
PHSC 5212	Research Skills and Ethics	
PHSC 5300	Pharmaceutical Biochemistry	
or PHSC 7010	Pharmaceutical Sciences Laboratory	
PHSC 5310	Cellular Physiology	
PHSC 6213	Ethical Problems in Health Sciences Research	
PHSC 6214	Experimental Design and Biostatistics	
PHSC 6216	Human Physiology and Pathophysiology	
PHSC 7020	Scientific Writing: Thesis Proposal	

Electives

Code	Title	Hours
Complete 17–19 semester hours from the following subject areas: [1]		17-19
BIOL, BIOT, CHEM, NNMD, PHSC, PMCL, PMST		

[1] Students who opt to complete 4-credit PHSC 7010 in the core requirements may complete the degree with 17 elective credits; all other students must complete 19 elective credits.

Research and Dissertation

Code	Title	Hours
Qualifying Exam		
PHSC 8940	Doctoral Training and Research	1
Proposal Preparation		
PHSC 9681	Doctoral Proposal	2
Dissertation		

PHSC 9990	Dissertation Term 1	1
PHSC 9991	Dissertation Term 2	1
Colloquium		
PHSC 6810	Pharmaceutical Science Colloquium	1

Program Credit/GPA Requirements

45 total semester hours required
Minimum 3.000 GPA required

Plan of Study

Year 1

Fall	Hours	Spring	Hours
Core requirements/ electives	8	Core requirements/ electives	8
PHSC 6300	1	PHSC 6300	1
	9		9

Year 2

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
Core requirements/ electives	8	Core requirements/ electives	8	PHSC 7020[1]	2
	8		8		2

Year 3

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 8940	1	PHSC 8986 or 9681[2]	0	PHSC 9681[2]	2
	1		0		2

Year 4

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 9990	1-3	PHSC 9991	1-3	PHSC 9996	0
	1-3		1-3		0

Year 5

Fall	Hours	Spring	Hours
PHSC 6810[3]	1	PHSC 9996	0
	1		0

Total Hours: 42-46

1. Scientific Writing: Thesis Proposal (PHSC 7020) must be taken the summer before the qualifying exams.
2. Doctoral Proposal (PHSC 9681) may be taken in the spring of third year but must be taken before fall of fourth year.
3. Pharmaceutical Science Colloquium (PHSC 6810) must be taken six months before dissertation defense.

Advanced Entry PhD Program Requirements

Advanced entry into the PhD in Biomedical Sciences requires a master's degree in pharmaceutical sciences or a related area. An applicant's transcripts are required to be reviewed by the admissions committee to ensure they are eligible to be in the advanced entry program. Completion of the PhD program requires 12 additional credits, focusing on various advanced research courses and successful defense of the dissertation.

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review
Qualifying examination
Dissertation committee
Dissertation proposal
Dissertation defense

Core Requirements

A grade of C– or higher is required in each course.

Code	Title	Hours
Seminar		
Complete the following (repeatable) course twice:		2
PHSC 6300	Pharmaceutical Science Seminar	
Colloquium		
PHSC 6810	Pharmaceutical Science Colloquium	1

Research and Dissertation

Code	Title	Hours
Qualifying Examination		
PHSC 8940	Doctoral Training and Research	1
Proposal Preparation		
PHSC 9681	Doctoral Proposal	2
Dissertation		
PHSC 9990	Dissertation Term 1	3
PHSC 9991	Dissertation Term 2	3

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

Medicinal Chemistry, PhD

The PhD Program in Medicinal Chemistry educates and trains students in the design and synthesis of novel, biologically active compounds and in delineating their mechanisms of action using biochemical, biophysical, and pharmacological approaches. Research specializations are available in synthetic, biochemical/pharmacological, and biophysical aspects of medicinal chemistry. Doctoral research in these specializations will relate to faculty areas of research, which currently include substance use disorders and addiction; neuropathic pain; obesity and metabolic disorders; neuropsychiatric disorders (psychoses, ADHD, depression, anxiety, eating disorders); and neurodegenerative diseases.

Journal Club Participation

The Department of Pharmaceutical Sciences sponsors weekly journal clubs at which students present and evaluate current scientific literature in their fields of study. Students must attend one of these journal clubs (Pharmaceutics & Drug Delivery Journal Club, Pharmacology Journal Club, or Medicinal Chemistry & Drug Discovery Journal Club), chosen in consultation with their advisors.

Attendance at one of these journal clubs is required each and every academic semester as an integral part of the PhD curriculum, throughout students' entire progression toward the PhD. Attendance is recorded by sign-up sheet. All PhD students must participate full-time in journal club for course credit, Pharmaceutical Science Seminar (PHSC 6300), at least twice during their course of study. Failure to attend journal club

regularly may result in sanctions such as probation or dismissal from the PhD program. Any student who does not comply with these (or any other) conditions required in the PhD program faces potential dismissal.

Colloquium Attendance

All PhD students, regardless of program, are required to attend the weekly Pharmaceutical Science Colloquium series. Announcements of times and locations will be distributed weekly to students by email to their university email addresses. Attendance is recorded by sign-up sheet. One excused absence is permitted per semester. Failure to attend colloquia may result in sanctions such as probation or dismissal from the PhD program.

Internship Requirements and Regulations for Department of Pharmaceutical Sciences

Internships provide an experiential component of the graduate curriculum that fosters professional development through work in industry and hospitals.

After PhD candidates have completed their dissertation research and are working on their dissertations, they are able, with the express permission of their PhD advisor, to participate in an internship if they choose. They are never allowed to intern while they are serving as teaching assistants.

1. Students are responsible for finding their own internship and must be honest and accurate representing their experiences on their resumés. Students are responsible for tracking this experience on their resumés as there will be no detailed record on students' transcripts of these opportunities.
2. Students must not accept more than one position. They must honor the first offer accepted. Any student not adhering to this requirement will not be allowed to participate.
3. International students must register for Pharmaceutical Science Internship (PHSC 6401) and follow instructions to receive Curricular Practical Training (CPT) authorization from the Office of Global Services (https://international.northeastern.edu/ogs/) every semester they work. This applies to part-time jobs and volunteer opportunities. International students cannot engage in full-time CPT authorization totaling more than 52 weeks. Doing so will eliminate the possibility of engaging in the post-graduation benefit of Post-Completion Optional Practical Training (Post-OPT).
4. In order to receive a grade for the course, students must write at least two learning goals within the first two weeks of the internship and a one- to two-page paper describing what they learned, mid- and end of semester. Supervisors for internships will reply to a questionnaire about students' performance.
5. Taking internship must not extend international students' visas.
6. There are no vacations on co-op/internships. Companies' sick time policies may vary. Students should check with their employers. For all other matters, please see the University-wide Academic Policies and Procedures (p. 23) and/or Bouvé College of Health Sciences Academic Policies and Procedures (p. 251).

Milestones

QUALIFYING EXAMINATION

The PhD qualifying examination is required for students in all four programs under the auspices of the Department of Pharmaceutical Sciences: pharmacology, medicinal chemistry, biomedical sciences, and pharmaceutical sciences. Students from each of the four programs will take the exams together, regardless of program focus.

Doctoral students should select a dissertation advisor in the second year of the program and are expected to begin research and demonstrate satisfactory proficiency in the laboratory before taking the PhD qualifying examination.

The examination tests the candidates' knowledge and skills in core courses and program content areas. The overall PhD qualifying examination consists of three written exams and one oral exam. The qualifying examination is taken as a course, Doctoral Training and Research (PHSC 8940), no later than during the fall semester of the students' third year, after having successfully completed the first two years and all the core courses of their respective programs.

At least three departmental faculty will contribute questions for the written exams, and no one faculty member will write more than the equivalent of one entire exam. All students qualified to sit for the exams are expected to take them at the times announced.

The format for the written exams may vary among programs (e.g., faculty in some disciplines may ask a series of comprehensive essay questions, whereas others may provide research publications(s) from the biomedical literature and ask questions based upon the publications' content). The written exams are scheduled within two weeks of each other and graded by the providers of the question(s).

- Written exam 1 reflects students' knowledge of the core course material
- Written exam 2 reflects students' knowledge of their program material
- Written exam 3 requires that students write an NIH F31 grant proposal

A score of at least 70 percent is required to pass each written exam. Students must pass all three written portions of the PhD qualifying examination prior to taking the oral exam. Students who fail one written exam will have one opportunity to retake and pass that examination. A student who fails two written exams will be required to withdraw from the PhD program.

During the oral exam, students defend their NIH F31 grant proposal before an examination committee of four faculty members: the dissertation advisor, at least two other Department of Pharmaceutical Sciences faculty members, and at least one member from outside the department. This committee is convened only for the oral exam and does not need to be the same committee for the student's dissertation committee in future semesters.

Members of the oral examination committee are selected by the student, after consultation with the dissertation advisor and/or the director of graduate studies. The oral exam for each student will be scheduled within approximately two months after successful completion of the written exams. The oral exam is graded on a pass/fail basis. Students who fail the oral exam on the first attempt may retake the exam within a time period designated by the examination committee not to exceed six months. Those who fail twice will be dismissed from the program.

Students who do not successfully pass the PhD qualifying examination but have earned sufficient course credits may petition to receive the MS degree.

DOCTORAL CANDIDACY STATUS

Doctoral students who have completed a minimum of 33 semester hours of graduate credit beyond the bachelor's degree and who have passed the written and oral qualifying examinations shall be admitted to candidacy status for the PhD degree.

DOCTORAL DISSERTATION COMMITTEE

Doctoral students must complete a dissertation that embodies the results of extended research and makes an original contribution to their field. This work should give evidence of candidates' abilities to conduct independent investigation and interpret the results of their research in a professional manner. The doctoral dissertation advisor serves as chairperson of the dissertation committee, which consists of no fewer than five members. Selection of an advisor is by mutual consent of the student and a member of the faculty, with approval by the director of graduate studies in the Department of Pharmaceutical Sciences. At least two members of the committee must be faculty members in the Department of Pharmaceutical Sciences. At least one member is to be selected from outside the department. Committee members are chosen for their expertise in students' research areas.

DISSERTATION PROPOSAL DEFENSE

Within a year after successful completion of the PhD qualifying examination, but no later than the beginning of the fall semester of the fourth year, students must prepare and defend a written proposal detailing their planned dissertation project. Failure to do so will be regarded as failure to progress in the PhD program and will result in a warning from the director of graduate studies of the Department of Pharmaceutical Sciences.

Students who do not correct this deficiency within one semester will be placed on academic probation. Students on academic probation must complete the dissertation proposal defense and return to nonprobationary status within one semester or will be dismissed from the PhD program.

The dissertation proposal should be no more than 50 double-spaced pages (12-point font minimum and one-half-inch margins on all sides). This page limit excludes references but includes figures, figure legends, and tables. Aside from these exceptions, the proposal should otherwise conform to the format and structure of an NIH grant proposal with four main sections: specific aims, background and significance, preliminary studies, and experimental design and methods. The Department of Pharmaceutical Sciences *Dissertation Proposal* document provides detailed instructions on the preparation of a dissertation proposal and associated required forms and may be found here (https://bouve.northeastern.edu/pharmsci/).

The dissertation proposal must be defended orally before the students' dissertation committee and signed by all dissertation committee members *before students undertake their planned dissertation research.* Upon dissertation approval, the copies of the signed proposal approval cover sheet (https://bouve.northeastern.edu/pdf/dissertation-proposal-approval-form.pdf) must be submitted to the department's director of graduate studies and to the Bouvé College of Health Sciences Graduate Office.

BIANNUAL REVIEW

Dissertation committees meet routinely at six-month intervals, but no less than once a year, to evaluate students' research progress and to be presented with written and oral progress reports on the direction and status of the research. Progress reports should be written in a brief format, identical to that described for the formal dissertation (see *Instructions for the Preparation of the Thesis*). Unsatisfactory productivity provides the basis for a warning by the dissertation committee and/or the Graduate Committee. Two such warnings will result in a student's dismissal from the program.

Registration for Dissertation

Advisor consent and completion of all coursework (with the exception of the colloquium course) must be documented before students register for the first dissertation course. Students must register for Dissertation Term 1 (PHSC 9990) and Dissertation Term 2 (PHSC 9991). Students must register for Dissertation Continuation (PHSC 9996) each semester thereafter until the dissertation has been successfully defended. Students are given a maximum of five years after establishing degree candidacy to complete all PhD degree requirements.

Publications and Presentations

Prior to completion of PhD training, candidates must present their research either as a poster or podium presentation at a regional or national scientific conference. Also prior to completion, the student must have submitted (preferably, published) at least one manuscript in a peer-reviewed journal that reflects original findings and laboratory work from the candidate's dissertation research.

PhD Dissertation Preparation

Detailed guidelines for the format and content of the written dissertation are given in Instructions for Preparation of the Dissertation found here (https://bouve.northeastern.edu/pharmsci/). The completed dissertation document should be reviewed first by the dissertation advisor. Feedback from the advisor should be incorporated into the dissertation draft before its distribution to the dissertation committee. The completed dissertation should be delivered to all dissertation committee members no later than two weeks before the scheduled oral defense.

PHARMACEUTICAL SCIENCES COLLOQUIUM

All PhD candidates nearing completion of their research are required to present their dissertation findings at the department's Pharmaceutical Sciences Colloquium. These presentations should be scheduled at least six months before anticipated completion of the dissertation. In turn, the dissertation should be completed no later than one year after the colloquium presentation. Students must register for Pharmaceutical Science Colloquium (PHSC 6810) during the semester that the colloquium presentation is to be given.

ORAL DISSERTATION DEFENSE

The oral dissertation defense takes place after students complete their PhD dissertation research and all other requirements for the PhD degree. The oral defense deals with the subject matter of the dissertation, significant developments in the field, and students' background knowledge in their field of concentration.

The dissertation committee conducts the final defense. The committee may recommend that the student clarify, amplify, or rewrite portions of the dissertation *before the final defense is scheduled.* Once the committee concurs that that written dissertation document is acceptable, a date is chosen for the final oral examination.

At least two weeks prior to the defense, students should inform the director of graduate studies in the Department of Pharmaceutical Sciences the date of defense, so that advance announcement may be distributed. The final defense is open to anyone who wishes to attend and typically lasts at least two hours. After presentation of the work by the student in a seminar format, and responses to audience and committee questions, the committee meets first with the student for any follow-up discussion and then in executive session to decide whether the student has defended the dissertation successfully.

The committee's decision is then announced to the student. If the committee's vote is favorable, the student incorporates committee suggestions and corrections, if applicable, and the dissertation is signed and passed on to the department's director of graduate studies. Requests for a second defense are highly irregular but may be permitted in the event that the previous oral defense was judged by the committee to be highly promising but inadequate in one critical aspect.

Deadline

The final dissertation must be written, defended, and approved at least two weeks before the university commencement deadline. Students must submit signed copies of their dissertations to the website designated by the university and must abide by any embargo sanctioned by the student's principal dissertation advisor and/or dissertation committee. The students should apply for graduation before the final dissertation defense, on the assumption that the dissertation will be approved. If the dissertation committee decides that more time is required to complete the dissertation beyond the commencement date, then the application for graduation can be withdrawn and a new one submitted pending final dissertation approval.

Please visit Bouvé College of Health Sciences Program Learning Outcomes (https://bouve.northeastern.edu/learning-outcomes/) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Qualifying examination
Doctoral candidacy status
Doctoral dissertation committee
Dissertation proposal
Biannual review
Pharmaceutical Sciences Colloquium
Oral dissertation defense

Core Requirements

A grade of C– or higher is required in each course.

Code	Title	Hours
Seminar		
Complete the following (repeatable) course twice:		2
PHSC 6300	Pharmaceutical Science Seminar	
Required Core		
PHSC 5100	Concepts in Pharmaceutical Science	2
PHSC 5102	Concepts in Pharmaceutical Science 2	2
PHSC 5212	Research Skills and Ethics	2
PHSC 6213	Ethical Problems in Health Sciences Research	2
PHSC 7020	Scientific Writing: Thesis Proposal	2
Chemistry		
CHEM 5626	Organic Synthesis 1	3
CHEM 5628	Principles of Spectroscopy of Organic Compounds	3
CHEM 5672	Organic Synthesis 2	3
CHEM 5676	Bioorganic Chemistry	3
PHSC 5400	Principles of Drug Design	3
PHSC 6222	The Chemistry and Biology of Drugs of Abuse	2
PHSC 6224	Behavioral Pharmacology and Drug Discovery	2
PHSC 6290	Biophysical Methods in Drug Discovery	2

Electives

Code	Title	Hours
Complete 6 semester hours in the following subject areas:		6
BIOL, BIOT, CHEM, NNMD, PHSC, PMCL, PMST		

Research and Dissertation

Code	Title	Hours
Research		
PHSC 8940	Doctoral Training and Research	1
Proposal Preparation		
PHSC 9681	Doctoral Proposal	2
Dissertation		
PHSC 9990	Dissertation Term 1	1-3
PHSC 9991	Dissertation Term 2	1-3
Colloquium		
PHSC 6810	Pharmaceutical Science Colloquium	1

Program Credit/GPA Requirements

45 total semester hours required
Minimum 3.000 GPA required

Plan of Study

Year 1

Fall	Hours	Spring	Hours
Core requirements/ electives	8	Core requirements/ electives	8
PHSC 6300	1	PHSC 6300	1
	9		9

Year 2

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
Core requirements/ electives	8	Core requirements/ electives	8	PHSC 7020[1]	2
	8		8		2

Year 3

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 8940	1	PHSC 8986 or 9681[2]	0	PHSC 9681[2]	2
	1		0		2

Year 4

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 9990	1-3	PHSC 9991	1-3	PHSC 9996	0
	1-3		1-3		0

Year 5

Fall	Hours	Spring	Hours
PHSC 6810[3]	1	PHSC 9996	0
	1		0

Total Hours: 42-46

[1] Scientific Writing: Thesis Proposal (PHSC 7020)l must be taken the summer before the qualifying exams.

[2] Doctoral Proposal (PHSC 9681) may be taken in spring of third year but must be taken by fall of fourth year.

[3] Pharmaceutical Science Colloquium (PHSC 6810) must be taken six months before dissertation defense.

Advanced Entry PhD Program Requirements

Advanced entry into the PhD in Medicinal Chemistry requires a master's degree in pharmaceutical sciences or a related area. An applicant's transcripts are required to be reviewed by the admissions committee to ensure they are eligible to be in the advanced entry program. Completion of the PhD program requires 12 additional credits, focusing on various advanced research courses and successful defense of the dissertation.

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review
Qualifying examination
Dissertation committee
Dissertation proposal
Dissertation defense

Core Requirements

A grade of C– or higher is required in each course.

Code	Title	Hours
Seminar		
Complete the following (repeatable) course twice:		2
PHSC 6300	Pharmaceutical Science Seminar	
Colloquium		
PHSC 6810	Pharmaceutical Science Colloquium	1

Research and Dissertation

Code	Title	Hours
Qualifying Examination		
PHSC 8940	Doctoral Training and Research	1
Proposal Preparation		
PHSC 9681	Doctoral Proposal	2
Dissertation		
PHSC 9990	Dissertation Term 1	3
PHSC 9991	Dissertation Term 2	3

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

Medicinal Chemistry and Drug Discovery, PhD

The PhD Program in Medicinal Chemistry and Drug Discovery educates and trains students in the design and synthesis of novel, biologically active compounds and in delineating their mechanisms of action using biochemical, biophysical, and pharmacological approaches. Research specializations are available in synthetic, biochemical/pharmacological, and biophysical aspects of medicinal chemistry. Doctoral research in these specializations will relate to faculty areas of research, which currently include substance use disorders and addiction; neuropathic pain; obesity and metabolic disorders; neuropsychiatric disorders (psychoses, ADHD, depression, anxiety, eating disorders); and neurodegenerative diseases.

Journal Club Participation

The Department of Pharmaceutical Sciences sponsors weekly journal clubs at which students present and evaluate current scientific literature in their fields of study. Students must attend one of these journal clubs (Pharmaceutics & Drug Delivery Journal Club, Pharmacology Journal Club, or Medicinal Chemistry & Drug Discovery Journal Club), chosen in consultation with their advisors.

Attendance at one of these journal clubs is required each and every academic semester as an integral part of the PhD curriculum, throughout students' entire progression toward the PhD. Attendance is recorded by sign-up sheet. All PhD students must participate full-time in journal club for course credit, Pharmaceutical Science Seminar (PHSC 6300), at least twice during their course of study. Failure to attend journal club regularly may result in sanctions such as probation or dismissal from the PhD program. Any student who does not comply with these (or any other) conditions required in the PhD program faces potential dismissal.

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Internship Requirements and Regulations for Department of Pharmaceutical Sciences

Internships provide an experiential component of the graduate curriculum that fosters professional development through work in industry and hospitals.

After PhD candidates have completed their dissertation research and are working on their dissertations, they are able, with the express permission of their PhD advisor, to participate in an internship if they choose. They are never allowed to intern while they are serving as teaching assistants.

1. Students are responsible for finding their own internship and must be honest and accurate representing their experiences on their resumés. Students are responsible for tracking this experience on their resumés as there will be no detailed record on students' transcripts of these opportunities.
2. Students must not accept more than one position. They must honor the first offer accepted. Any student not adhering to this requirement will not be allowed to participate.
3. International students must register for the internship course Pharmaceutical Science Internship (PHSC 6401) and follow instructions to receive Curricular Practical Training (CPT) authorization from the Office of Global Services (https://international.northeastern.edu/ogs/) every semester they work. This applies to part-time jobs and volunteer opportunities. International students cannot engage in full-time CPT authorization totaling more than 52 weeks. Doing so will eliminate the possibility of engaging in the post-graduation benefit of Post-Completion Optional Practical Training (Post-OPT).
4. In order to receive a grade for the course, students must write at least two learni goals within the first two weeks of the internship and a one- to two-page paper describing what they learned, mid- and end of semester. Supervisors for internships will reply to a questionnaire about students' performance.
5. Taking internship must not extend international students' visas.

6. There are no vacations on co-op/internships. Companies' sick time policies may vary. Students should check with their employers. For all other matters, please see the University-wide Academic Policies and Procedures (p. 23) and/or Bouvé College of Health Sciences Academic Policies and Procedures (p. 251).

Milestones

QUALIFYING EXAMINATION

The PhD qualifying examination is required for students in all four programs under the auspices of the Department of Pharmaceutical Sciences: pharmacology, medicinal chemistry, biomedical sciences, and pharmaceutical sciences. Students from each of the four programs will take the exams together, regardless of program focus.

Doctoral students should select a dissertation advisor in the second year of the program and are expected to begin research and demonstrate satisfactory proficiency in the laboratory before taking the PhD qualifying examination.

The examination tests the candidates' knowledge and skills in core courses and program content areas. The overall PhD qualifying examination consists of three written exams and one oral exam. The qualifying examination is taken as a course, Doctoral Training and Research (PHSC 8940), no later than during the fall semester of the students' third year, after having successfully completed the first two years and all the core courses of their respective programs.

At least three departmental faculty will contribute questions for the written exams, and no one faculty member will write more than the equivalent of one entire exam. All students qualified to sit for the exams are expected to take them at the times announced.

The format for the written exams may vary among programs (e.g., faculty in some disciplines may ask a series of comprehensive essay questions, whereas others may provide research publications(s) from the biomedical literature and ask questions based upon the publications' content). The written exams are scheduled within two weeks of each other and graded by the providers of the question(s).

- Written exam 1 reflects students' knowledge of the core course material
- Written exam 2 reflects students' knowledge of their program material
- Written exam 3 requires that students write an NIH F31 grant proposal

A score of at least 70 percent is required to pass each written exam. Students must pass all three written portions of the PhD qualifying examination prior to taking the oral exam. Students who fail one written exam will have one opportunity to retake and pass that examination. A student who fails two written exams will be required to withdraw from the PhD program.

During the oral exam, students defend their NIH F31 grant proposal before an examination committee of four faculty members: the dissertation advisor, at least two other Department of Pharmaceutical Sciences faculty members, and at least one member from outside the department. This committee is convened only for the oral exam and does not need to be the same committee for the student's dissertation committee in future semesters.

Members of the oral examination committee are selected by the student, after consultation with the dissertation advisor and/or the director of graduate studies. The oral exam for each student will be scheduled within approximately two months after successful completion of the written exams. The oral exam is graded on a pass/fail basis. Students who fail the oral exam on the first attempt may retake the exam within a time period designated by the examination committee not to exceed six months. Those who fail twice will be dismissed from the program.

Students who do not successfully pass the PhD qualifying examination but have earned sufficient course credits may petition to receive the MS degree.

DOCTORAL CANDIDACY STATUS

Doctoral students who have completed a minimum of 33 semester hours of graduate credit beyond the bachelor's degree and who have passed the written and oral qualifying examinations shall be admitted to candidacy status for the PhD degree.

DOCTORAL DISSERTATION COMMITTEE

Doctoral students must complete a dissertation that embodies the results of extended research and makes an original contribution to their field. This work should give evidence of candidates' abilities to conduct independent investigation and interpret the results of their research in a professional manner. The doctoral dissertation advisor serves as chairperson of the dissertation committee, which consists of no fewer than five members. Selection of an advisor is by mutual consent of the student and a member of the faculty, with approval by the director of graduate studies in the Department of Pharmaceutical Sciences. At least two members of the committee must be faculty members in the Department of Pharmaceutical Sciences. At least one member is to be selected from outside the department. Committee members are chosen for their expertise in students' research areas.

DISSERTATION PROPOSAL DEFENSE

Within a year after successful completion of the PhD qualifying examination, but no later than the beginning of the fall semester of the fourth year, students must prepare and defend a written proposal detailing their planned dissertation project. Failure to do so will be regarded as failure to progress in the PhD program and will result in a warning from the director of graduate studies of the Department of Pharmaceutical Sciences.

Students who do not correct this deficiency within one semester will be placed on academic probation. Students on academic probation must complete the dissertation proposal defense and return to nonprobationary status within one semester or will be dismissed from the PhD program.

The dissertation proposal should be no more than 50 double-spaced pages (12-point font minimum and one-half-inch margins on all sides). This page limit excludes references but includes figures, figure legends, and tables. Aside from these exceptions, the proposal should otherwise conform to the format and structure of an NIH grant proposal with four main sections: specific aims, background and significance, preliminary studies, and experimental design and methods. The Department of Pharmaceutical Sciences *Dissertation Proposal* document provides detailed instructions on the preparation of a dissertation proposal and associated required forms and may be found here (https://bouve.northeastern.edu/pharmsci/).

The dissertation proposal must be defended orally before the students' dissertation committee and signed by all dissertation committee members *before students undertake their planned dissertation research.* Upon dissertation approval, the copies of the signed proposal approval cover sheet (https://bouve.northeastern.edu/pdf/dissertation-proposal-approval-form.pdf) must be submitted to the department's director of graduate studies and to the Bouvé College of Health Sciences Graduate Office.

BIANNUAL REVIEW

Dissertation committees meet routinely at six-month intervals, but no less than once a year, to evaluate students' research progress and to be presented with written and oral progress reports on the direction and status of the research. Progress reports should be written in a brief format, identical to that described for the formal dissertation (see *Instructions for the Preparation of the Thesis*). Unsatisfactory productivity provides the basis for a warning by the dissertation committee and/or the Graduate Committee. Two such warnings will result in a student's dismissal from the program.

Registration for Dissertation

Advisor consent and completion of all coursework (with the exception of the colloquium course) must be documented before students register for the first dissertation course. Students must register for Dissertation Term 1 (PHSC 9990) and Dissertation Term 2 (PHSC 9991). Students must register for **Dissertation Continuation (PHSC 9996)** each semester thereafter until the dissertation has been successfully defended. Students are given a maximum of five years after establishing degree candidacy to complete all PhD degree requirements.

Publications and Presentations

Prior to completion of PhD training, candidates must present their research either as a poster or podium presentation at a regional or national scientific conference. Also prior to completion, the student must have submitted (preferably, published) at least one manuscript in a peer-reviewed journal that reflects original findings and laboratory work from the candidate's dissertation research.

PhD Dissertation Preparation

Detailed guidelines for the format and content of the written dissertation are given in Instructions for Preparation of the Dissertation found here (https://bouve.northeastern.edu/pharmsci/). The completed dissertation document should be reviewed first by the dissertation advisor. Feedback from the advisor should be incorporated into the dissertation draft before its distribution to the dissertation committee. The completed dissertation should be delivered to all dissertation committee members no later than two weeks before the scheduled oral defense.

PHARMACEUTICAL SCIENCES COLLOQUIUM

All PhD candidates nearing completion of their research are required to present their dissertation findings at the department's Pharmaceutical Sciences Colloquium. These presentations should be scheduled at least six months before anticipated completion of the dissertation. In turn, the dissertation should be completed no later than one year after the colloquium presentation. Students must register for Pharmaceutical Science Colloquium (PHSC 6810) during the semester that the colloquium presentation is to be given.

ORAL DISSERTATION DEFENSE

The oral dissertation defense takes place after students complete their PhD dissertation research and all other requirements for the PhD degree. The oral defense deals with the subject matter of the dissertation, significant developments in the field, and students' background knowledge in their field of concentration.

The dissertation committee conducts the final defense. The committee may recommend that the student clarify, amplify, or rewrite portions of the dissertation *before the final defense is scheduled.* Once the committee concurs that that written dissertation document is acceptable, a date is chosen for the final oral examination.

At least two weeks prior to the defense, students should inform the director of graduate studies in the Department of Pharmaceutical Sciences the date of defense, so that advance announcement may be distributed. The final defense is open to anyone who wishes to attend and typically lasts at least two hours. After presentation of the work by the student in a seminar format, and responses to audience and committee questions, the committee meets first with the student for any follow-up discussion and then in executive session to decide whether the student has defended the dissertation successfully.

The committee's decision is then announced to the student. If the committee's vote is favorable, the student incorporates committee suggestions and corrections, if applicable, and the dissertation is signed and passed on to the department's director of graduate studies. Requests for a second defense are highly irregular but may be permitted in the event that the previous oral defense was judged by the committee to be highly promising but inadequate in one critical aspect.

Deadline

The final dissertation must be written, defended, and approved at least two weeks before the university commencement deadline. Students must submit signed copies of their dissertations to the website designated by the university and must abide by any embargo sanctioned by the student's principal dissertation advisor and/or dissertation committee. The students should apply for graduation before the final dissertation defense, on the assumption that the dissertation will be approved. If the dissertation committee decides that more time is required to complete the dissertation beyond the commencement date, then the application for graduation can be withdrawn and a new one submitted pending final dissertation approval.

Please visit Bouvé College of Health Sciences Program Learning Outcomes (https://bouve.northeastern.edu/learning-outcomes/) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Qualifying examination
Doctoral candidacy status
Doctoral dissertation committee
Dissertation proposal
Biannual review
Pharmaceutical Sciences Colloquium
Oral dissertation defense

Core Requirements

A grade of C– or higher is required in each course.

Code	Title	Hours
Seminar		
Complete the following (repeatable) course twice:		2
PHSC 6300	Pharmaceutical Science Seminar	
Required Core		
PHSC 5100	Concepts in Pharmaceutical Science	2
PHSC 5102	Concepts in Pharmaceutical Science 2	2
PHSC 5212	Research Skills and Ethics	2
PHSC 6213	Ethical Problems in Health Sciences Research	2
PHSC 7020	Scientific Writing: Thesis Proposal	2
Medicinal Chemistry and Drug Discovery		
CHEM 5626	Organic Synthesis 1	3
CHEM 5628	Principles of Spectroscopy of Organic Compounds	3

CHEM 5672	Organic Synthesis 2	3
CHEM 5676	Bioorganic Chemistry	3
PHSC 5400	Principles of Drug Design	3
PHSC 6222	The Chemistry and Biology of Drugs of Abuse	2
PHSC 6224	Behavioral Pharmacology and Drug Discovery	2
PHSC 6290	Biophysical Methods in Drug Discovery	2

Electives

Code	Title	Hours
Complete 6 semester hours in the following subject areas:		6
BIOL, BIOT, CHEM, NNMD, PHSC, PMCL, PMST		

Research and Dissertation

Code	Title	Hours
Research		
PHSC 8940	Doctoral Training and Research	1
Proposal Preparation		
PHSC 9681	Doctoral Proposal	2
Dissertation		
PHSC 9990	Dissertation Term 1	1-3
PHSC 9991	Dissertation Term 2	1-3
Colloquium		
PHSC 6810	Pharmaceutical Science Colloquium	1

Program Credit/GPA Requirements

45 total semester hours required
Minimum 3.000 GPA required

Plan of Study

Year 1

Fall	Hours	Spring	Hours
Core requirements/ electives	8	Core requirements/ electives	8
PHSC 6300	1	PHSC 6300	1
	9		9

Year 2

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
Core requirements/ electives	8	Core requirements/ electives	8	PHSC 7020[1]	2
	8		8		2

Year 3

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 8940	1	PHSC 8986 or 9681[2]	0	PHSC 9681[2]	2
	1		0		2

Year 4

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 9990	1-3	PHSC 9991	1-3	PHSC 9996	0
	1-3		1-3		0

Year 5

Fall	Hours	Spring	Hours
PHSC 6810[3]	1	PHSC 9996	0
	1		0

Total Hours: 42-46

1 Scientific Writing: Thesis Proposal (PHSC 7020)l must be taken the summer before the qualifying exams.

2 Doctoral Proposal (PHSC 9681) may be taken in spring of third year but must be taken by fall of fourth year.

3 Pharmaceutical Science Colloquium (PHSC 6810) must be taken six months before dissertation defense.

Advanced Entry PhD Program Requirements

Advanced entry into the Medicinal Chemistry and Drug Discovery PhD program requires a master's degree in pharmaceutical sciences or a related area. An applicant's transcripts are required to be reviewed by the admissions committee to ensure they are eligible to be in the advanced entry program. Completion of the PhD program requires 12 additional credits, focusing on various advanced research courses and successful defense of the dissertation.

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review
Qualifying examination
Dissertation committee
Dissertation proposal
Dissertation defense

Core Requirements

A grade of C– or higher is required in each course.

Code	Title	Hours
Seminar		
Complete the following (repeatable) course twice:		2
PHSC 6300	Pharmaceutical Science Seminar	
Colloquium		
PHSC 6810	Pharmaceutical Science Colloquium	1

Research and Dissertation

Code	Title	Hours
Qualifying Examination		
PHSC 8940	Doctoral Training and Research	1
Proposal Preparation		
PHSC 9681	Doctoral Proposal	2
Dissertation		
PHSC 9990	Dissertation Term 1	3
PHSC 9991	Dissertation Term 2	3

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

Pharmaceutical Sciences, PhD

Students studying pharmaceutical sciences will be thoroughly exposed to the fundamentals of physical pharmacy and pharmaceutics and trained in several specialized areas, including:

- Novel drug delivery systems
- Nanomedical technologies
- Biopharmaceutics and pharmacokinetics

With exposure to these facets of the pharmaceutical sciences, successful graduates are poised to understand and assimilate the field of modern pharmaceutics. A PhD degree in pharmaceutics is a research degree. While coursework plays an important role, students become active participants in the science of pharmaceutics in the laboratory. Faculty research in pharmaceutical sciences covers a broad range of scientific interests, including pharmacokinetic toxicodynamics of anticancer agents; use of novel biomaterials and synthetic polymeric systems in designing small-molecule drug delivery systems for small molecules, proteins, and nucleic acids; passive and active targeting of therapeutic agents for cancer and cardiovascular diseases; novel delivery systems for immunostimulating purposes; and mathematical modeling of endogenous compounds.

Journal Club Participation

The Department of Pharmaceutical Sciences sponsors weekly journal clubs at which students present and evaluate current scientific literature in their fields of study. Students must attend one of these journal clubs (Pharmaceutics & Drug Delivery Journal Club, Pharmacology Journal Club, or Medicinal Chemistry & Drug Discovery Journal Club), chosen in consultation with their advisors.

Attendance at one of these journal clubs is required each and every academic semester as an integral part of the PhD curriculum, throughout students' entire progression toward the PhD. Attendance is recorded by sign-up sheet. All PhD students must participate full-time in journal club for course credit, Pharmaceutical Science Seminar (PHSC 6300), at least twice during their course of study. Failure to attend journal club regularly may result in sanctions such as probation or dismissal from the PhD program. Any student who does not comply with these (or any other) conditions required in the PhD program faces potential dismissal.

Colloquium Attendance

All PhD students, regardless of program, are required to attend the weekly Pharmaceutical Science Colloquium series. Announcements of times and locations will be distributed weekly to students by email to their university email addresses. Attendance is recorded by sign-up sheet. One excused absence is permitted per semester. Failure to attend colloquia may result in sanctions such as probation or dismissal from the PhD program.

Internship Requirements and Regulations for Department of Pharmaceutical Sciences

Internships provide an experiential component of the graduate curriculum that fosters professional development through work in industry and hospitals.

After PhD candidates have completed their dissertation research and are working on their dissertations, they are able, with the express permission of their PhD advisor, to participate in an internship if they choose. They are never allowed to intern while they are serving as teaching assistants.

1. Students are responsible for finding their own internship and must be honest and accurate representing their experiences on their resumés. Students are responsible for tracking this experience on their resumés as there will be no detailed record on students' transcripts of these opportunities.
2. Students must not accept more than one position. They must honor the first offer accepted. Any student not adhering to this requirement will not be allowed to participate.
3. International students must register for Pharmaceutical Science Internship (PHSC 6401) and follow instructions to receive Curricular Practical Training (CPT) authorization from the Office of Global Services (https://international.northeastern.edu/ogs/) every semester they work. This applies to part-time jobs and volunteer opportunities. International students cannot engage in full-time CPT authorization totaling more than 52 weeks. Doing so will eliminate the possibility of engaging in the post-graduation benefit of Post-Completion Optional Practical Training (Post-OPT).
4. In order to receive a grade for the course, students must write at least two learning goals within the first two weeks of the internship and a one- to two-page paper describing what they learned, mid- and end of semester. Supervisors for internships will reply to a questionnaire about students' performance.
5. Taking internship must not extend international students' visas.
6. There are no vacations on co-op/internships. Companies' sick time policies may vary. Students should check with their employers. For all other matters, please see the University-wide Academic Policies and Procedures (p. 23) and/or Bouvé College of Health Sciences Academic Policies and Procedures (p. 251).

Milestones

QUALIFYING EXAMINATION

The PhD qualifying examination is required for students in all four programs under the auspices of the Department of Pharmaceutical Sciences: pharmacology, medicinal chemistry, biomedical sciences, and pharmaceutical sciences. Students from each of the four programs will take the exams together, regardless of program focus.

Doctoral students should select a dissertation advisor in the second year of the program and are expected to begin research and demonstrate satisfactory proficiency in the laboratory before taking the PhD qualifying examination.

The examination tests the candidates' knowledge and skills in core courses and program content areas. The overall PhD qualifying examination consists of three written exams and one oral exam. The qualifying examination is taken as a course, Doctoral Training and Research (PHSC 8940), no later than during the fall semester of the students' third year, after having successfully completed the first two years and all the core courses of their respective programs.

At least three departmental faculty will contribute questions for the written exams, and no one faculty member will write more than the equivalent of one entire exam. All students qualified to sit for the exams are expected to take them at the times announced.

The format for the written exams may vary among programs (e.g., faculty in some disciplines may ask a series of comprehensive essay questions, whereas others may provide research publications(s) from the biomedical literature and ask questions based upon the publications' content). The written exams are scheduled within two weeks of each other and graded by the providers of the question(s).

- Written exam 1 reflects students' knowledge of the core course material

- Written exam 2 reflects students' knowledge of their program material
- Written exam 3 requires that students write an NIH F31 grant proposal

A score of at least 70 percent is required to pass each written exam. Students must pass all three written portions of the PhD qualifying examination prior to taking the oral exam. Students who fail one written exam will have one opportunity to retake and pass that examination. A student who fails two written exams will be required to withdraw from the PhD program.

During the oral exam, students defend their NIH F31 grant proposal before an examination committee of four faculty members: the dissertation advisor, at least two other Department of Pharmaceutical Sciences faculty members, and at least one member from outside the department. This committee is convened only for the oral exam and does not need to be the same committee for the student's dissertation committee in future semesters.

Members of the oral examination committee are selected by the student, after consultation with the dissertation advisor and/or the director of graduate studies. The oral exam for each student will be scheduled within approximately two months after successful completion of the written exams. The oral exam is graded on a pass/fail basis. Students who fail the oral exam on the first attempt may retake the exam within a time period designated by the examination committee not to exceed six months. Those who fail twice will be dismissed from the program.

Students who do not successfully pass the PhD qualifying examination but have earned sufficient course credits may petition to receive the MS degree.

DOCTORAL CANDIDACY STATUS

Doctoral students who have completed a minimum of 33 semester hours of graduate credit beyond the bachelor's degree and who have passed the written and oral qualifying examinations shall be admitted to candidacy status for the PhD degree.

DOCTORAL DISSERTATION COMMITTEE

Doctoral students must complete a dissertation that embodies the results of extended research and makes an original contribution to their field. This work should give evidence of candidates' abilities to conduct independent investigation and interpret the results of their research in a professional manner. The doctoral dissertation advisor serves as chairperson of the dissertation committee, which consists of no fewer than five members. Selection of an advisor is by mutual consent of the student and a member of the faculty, with approval by the director of graduate studies in the Department of Pharmaceutical Sciences. At least two members of the committee must be faculty members in the Department of Pharmaceutical Sciences. At least one member is to be selected from outside the department. Committee members are chosen for their expertise in students' research areas.

DISSERTATION PROPOSAL DEFENSE

Within a year after successful completion of the PhD qualifying examination, but no later than the beginning of the fall semester of the fourth year, students must prepare and defend a written proposal detailing their planned dissertation project. Failure to do so will be regarded as failure to progress in the PhD program and will result in a warning from the director of graduate studies of the Department of Pharmaceutical Sciences.

Students who do not correct this deficiency within one semester will be placed on academic probation. Students on academic probation must complete the dissertation proposal defense and return to nonprobationary status within one semester or will be dismissed from the PhD program.

The dissertation proposal should be no more than 50 double-spaced pages (12-point font minimum and one-half-inch margins on all sides). This page limit excludes references but includes figures, figure legends, and tables. Aside from these exceptions, the proposal should otherwise conform to the format and structure of an NIH grant proposal with four main sections: specific aims, background and significance, preliminary studies, and experimental design and methods. The Department of Pharmaceutical Sciences *Dissertation Proposal* document provides detailed instructions on the preparation of a dissertation proposal and associated required forms and may be found here (https://bouve.northeastern.edu/pharmsci/).

The dissertation proposal must be defended orally before the students' dissertation committee and signed by all dissertation committee members *before students undertake their planned dissertation research.* Upon dissertation approval, the copies of the signed proposal approval cover sheet (https://bouve.northeastern.edu/pdf/dissertation-proposal-approval-form.pdf) must be submitted to the department's director of graduate studies and to the Bouvé College of Health Sciences Graduate Office.

BIANNUAL REVIEW

Dissertation committees meet routinely at six-month intervals, but no less than once a year, to evaluate students' research progress and to be presented with written and oral progress reports on the direction and status of the research. Progress reports should be written in a brief format, identical to that described for the formal dissertation (see *Instructions for the Preparation of the Thesis*). Unsatisfactory productivity provides the basis for a warning by the dissertation committee and/or the Graduate Committee. Two such warnings will result in a student's dismissal from the program.

Registration for Dissertation

Advisor consent and completion of all coursework (with the exception of the colloquium course) must be documented before students register for the first dissertation course. Students must register for Dissertation Term 1 (PHSC 9990) and Dissertation Term 2 (PHSC 9991). Students must register for Dissertation Continuation (PHSC 9996) each semester thereafter until the dissertation has been successfully defended. Students are given a maximum of five years after establishing degree candidacy to complete all PhD degree requirements.

Publications and Presentations

Prior to completion of PhD training, candidates must present their research either as a poster or podium presentation at a regional or national scientific conference. Also prior to completion, the student must have submitted (preferably, published) at least one manuscript in a peer-reviewed journal that reflects original findings and laboratory work from the candidate's dissertation research.

PhD Dissertation Preparation

Detailed guidelines for the format and content of the written dissertation are given in Instructions for Preparation of the Dissertation found here (https://bouve.northeastern.edu/pharmsci/). The completed dissertation document should be reviewed first by the dissertation advisor. Feedback from the advisor should be incorporated into the dissertation draft before its distribution to the dissertation committee. The completed dissertation should be delivered to all dissertation committee members no later than two weeks before the scheduled oral defense.

PHARMACEUTICAL SCIENCES COLLOQUIUM

All PhD candidates nearing completion of their research are required to present their dissertation findings at the department's Pharmaceutical

Sciences Colloquium. These presentations should be scheduled at least six months before anticipated completion of the dissertation. In turn, the dissertation should be completed no later than one year after the colloquium presentation. Students must register for Pharmaceutical Science Colloquium (PHSC 6810) during the semester that the colloquium presentation is to be given.

ORAL DISSERTATION DEFENSE

The oral dissertation defense takes place after students complete their PhD dissertation research and all other requirements for the PhD degree. The oral defense deals with the subject matter of the dissertation, significant developments in the field, and students' background knowledge in their field of concentration.

The dissertation committee conducts the final defense. The committee may recommend that the student clarify, amplify, or rewrite portions of the dissertation *before the final defense is scheduled.* Once the committee concurs that that written dissertation document is acceptable, a date is chosen for the final oral examination.

At least two weeks prior to the defense, students should inform the director of graduate studies in the Department of Pharmaceutical Sciences the date of defense, so that advance announcement may be distributed. The final defense is open to anyone who wishes to attend and typically lasts at least two hours. After presentation of the work by the student in a seminar format, and responses to audience and committee questions, the committee meets first with the student for any follow-up discussion and then in executive session to decide whether the student has defended the dissertation successfully.

The committee's decision is then announced to the student. If the committee's vote is favorable, the student incorporates committee suggestions and corrections, if applicable, and the dissertation is signed and passed on to the department's director of graduate studies. Requests for a second defense are highly irregular but may be permitted in the event that the previous oral defense was judged by the committee to be highly promising but inadequate in one critical aspect.

Deadline

The final dissertation must be written, defended, and approved at least two weeks before the university commencement deadline. Students must submit signed copies of their dissertations to the website designated by the university and must abide by any embargo sanctioned by the student's principal dissertation advisor and/or dissertation committee. The students should apply for graduation before the final dissertation defense, on the assumption that the dissertation will be approved. If the dissertation committee decides that more time is required to complete the dissertation beyond the commencement date, then the application for graduation can be withdrawn and a new one submitted pending final dissertation approval.

Please visit Bouvé College of Health Sciences Program Learning Outcomes (https://bouve.northeastern.edu/learning-outcomes/) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Qualifying examination
Doctoral candidacy status
Doctoral dissertation committee
Dissertation proposal
Biannual review
Pharmaceutical Sciences Colloquium
Oral dissertation defense

Core Requirements

A grade of C– or higher is required in each course.

Code	Title	Hours
Seminar		
Complete the following (repeatable) course twice:		2
PHSC 6300	Pharmaceutical Science Seminar	
Required Core		
Complete 18–20 semester hours from the following:		
PHSC 5100	Concepts in Pharmaceutical Science	2
PHSC 5102	Concepts in Pharmaceutical Science 2	2
PHSC 5212	Research Skills and Ethics	2
PHSC 5300	Pharmaceutical Biochemistry [1]	2-4
or PHSC 7010	Pharmaceutical Sciences Laboratory	
PHSC 5310	Cellular Physiology	2
PHSC 6213	Ethical Problems in Health Sciences Research	2
PHSC 6214	Experimental Design and Biostatistics	2
PHSC 6216	Human Physiology and Pathophysiology	2
PHSC 7020	Scientific Writing: Thesis Proposal	2
Pharmaceutics		
PMST 6250	Advanced Physical Pharmacy	2
PMST 6252	Pharmacokinetics and Drug Metabolism	3
PMST 6254	Advanced Drug Delivery Systems	3

Electives

Code	Title	Hours
Complete 9–11 semester hours from the following subject areas: [1]		9-11
BIOL, BIOT, CHEM, NNMD, PHSC, PMCL, PMST		

[1] Students who opt to complete 4-credit Pharmaceutical Sciences Laboratory (PHSC 7010) in the core requirements may complete the degree with 9 elective credits; all other students must complete 11 elective credits.

Research and Dissertation

Code	Title	Hours
Qualifying Examination		
PHSC 8940	Doctoral Training and Research	1
Proposal Preparation		
PHSC 9681	Doctoral Proposal	2
Dissertation		
PHSC 9990	Dissertation Term 1	3
PHSC 9991	Dissertation Term 2	1-3
Colloquium		
PHSC 6810	Pharmaceutical Science Colloquium	1

Program Credit/GPA Requirements

45 total semester hours required
Minimum 3.000 GPA required

Plan of Study

Year 1

Fall	Hours	Spring	Hours
Core requirements/ electives	8	Core requirements/ electives	8
PHSC 6300	1	PHSC 6300	1
	9		9

Year 2

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
Core requirements/ electives	8	Core requirements/ electives	8	PHSC 7020[1]	2
	8		8		2

Year 3

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 8940	1	PHSC 8986 or 9681[2]	0	PHSC 9681[2]	2
	1		0		2

Year 4

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 9990	1-3	PHSC 9991	1-3	PHSC 9996	0
	1-3		1-3		0

Year 5

Fall	Hours	Spring	Hours
PHSC 6810[3]	1	PHSC 9996	0
	1		0

Total Hours: 42-46

1. Scientific Writing: Thesis Proposal (PHSC 7020) must be taken the summer before the qualifying exams.
2. Doctoral Proposal (PHSC 9681) may be taken in spring of third year but must be taken before fall of fourth year.
3. Pharmaceutical Science Colloquium (PHSC 6810) must be taken six months before dissertation defense.

Advanced Entry PhD Program Requirements

Advanced entry into the PhD program in pharmaceutical sciences requires a master's degree in pharmaceutical sciences or related area. An applicant's transcripts are required to be reviewed by the admissions committee to ensure they are eligible to be in the advanced entry program. Completion of the PhD program requires 12 additional credits focusing on various advanced research courses.

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review
Qualifying examination
Dissertation committee
Dissertation proposal
Dissertation defense

Core Requirements

A grade of C– or higher is required in each course.

Code	Title	Hours
Seminar		
Complete the following (repeatable) course twice:		2
PHSC 6300	Pharmaceutical Science Seminar	
Colloquium		
PHSC 6810	Pharmaceutical Science Colloquium	1

Research and Dissertation

Code	Title	Hours
Qualifying Examination		
PHSC 8940	Doctoral Training and Research	1
Proposal Preparation		
PHSC 9681	Doctoral Proposal	2
Dissertation		
PHSC 9990	Dissertation Term 1	3
PHSC 9991	Dissertation Term 2	3

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

Pharmaceutics and Drug Delivery, PhD

Students studying pharmaceutics and drug delivery will be thoroughly exposed to the fundamentals of physical pharmacy and pharmaceutics and trained in several specialized areas, including:

- Novel drug delivery systems
- Nanomedical technologies
- Biopharmaceutics and pharmacokinetics

With exposure to these facets of the pharmaceutical sciences, successful graduates are poised to understand and assimilate the field of modern pharmaceutics. A PhD degree in pharmaceutics is a research degree. While coursework plays an important role, students become active participants in the science of pharmaceutics in the laboratory. Faculty research in pharmaceutical sciences covers a broad range of scientific interests, including pharmacokinetic toxicodynamics of anticancer agents; use of novel biomaterials and synthetic polymeric systems in designing small-molecule drug delivery systems for small molecules, proteins, and nucleic acids; passive and active targeting of therapeutic agents for cancer and cardiovascular diseases; novel delivery systems for immunostimulating purposes; and mathematical modeling of endogenous compounds.

Journal Club Participation

The Department of Pharmaceutical Sciences sponsors weekly journal clubs at which students present and evaluate current scientific literature in their fields of study. Students must attend one of these journal clubs (Pharmaceutics & Drug Delivery Journal Club, Pharmacology Journal Club, or Medicinal Chemistry & Drug Discovery Journal Club), chosen in consultation with their advisors.

Attendance at one of these journal clubs is required each and every academic semester as an integral part of the PhD curriculum, throughout students' entire progression toward the PhD. Attendance is recorded by sign-up sheet. All PhD students must participate full-time in journal club for course credit, Pharmaceutical Science Seminar (PHSC 6300),

at least twice during their course of study. Failure to attend journal club regularly may result in sanctions such as probation or dismissal from the PhD program. Any student who does not comply with these (or any other) conditions required in the PhD program faces potential dismissal.

Colloquium Attendance

All PhD students, regardless of program, are required to attend the weekly Pharmaceutical Science Colloquium series. Announcements of times and locations will be distributed weekly to students by email to their university email addresses. Attendance is recorded by sign-up sheet. One excused absence is permitted per semester. Failure to attend colloquia may result in sanctions such as probation or dismissal from the PhD program.

Internship Requirements and Regulations for Department of Pharmaceutical Sciences

Internships provide an experiential component of the graduate curriculum that fosters professional development through work in industry and hospitals.

After PhD candidates have completed their dissertation research and are working on their dissertations, they are able, with the express permission of their PhD advisor, to participate in an internship if they choose. They are never allowed to intern while they are serving as teaching assistants.

1. Students are responsible for finding their own internship and must be honest and accurate representing their experiences on their resumés. Students are responsible for tracking this experience on their resumés as there will be no detailed record on students' transcripts of these opportunities.
2. Students must not accept more than one position. They must honor the first offer accepted. Any student not adhering to this requirement will not be allowed to participate.
3. International students must register for the internship course Pharmaceutical Science Internship (PHSC 6401) and follow instructions to receive Curricular Practical Training (CPT) authorization from the Office of Global Services (https://international.northeastern.edu/ogs/) every semester they work. This applies to part-time jobs and volunteer opportunities. International students cannot engage in full-time CPT authorization totaling more than 52 weeks. Doing so will eliminate the possibility of engaging in the post-graduation benefit of Post-Completion Optional Practical Training (Post-OPT).
4. In order to receive a grade for the course, students must write at least two learning goals within the first two weeks of the internship and a one- to two-page paper describing what they learned, mid- and end of semester. Supervisors for internships will reply to a questionnaire about students' performance.
5. Taking internship must not extend international students' visas.
6. There are no vacations on co-op/internships. Companies' sick time policies may vary. Students should check with their employers. For all other matters, please see the University-wide Academic Policies and Procedures (p. 23) and/or Bouvé College of Health Sciences Academic Policies and Procedures (p. 251).

Milestones

QUALIFYING EXAMINATION

The PhD qualifying examination is required for students in all four programs under the auspices of the Department of Pharmaceutical Sciences: pharmacology, medicinal chemistry, biomedical sciences, and pharmaceutical sciences. Students from each of the four programs will take the exams together, regardless of program focus.

Doctoral students should select a dissertation advisor in the second year of the program and are expected to begin research and demonstrate satisfactory proficiency in the laboratory before taking the PhD qualifying examination.

The examination tests the candidates' knowledge and skills in core courses and program content areas. The overall PhD qualifying examination consists of three written exams and one oral exam. The qualifying examination is taken as a course, Doctoral Training and Research (PHSC 8940), no later than during the fall semester of the students' third year, after having successfully completed the first two years and all the core courses of their respective programs.

At least three departmental faculty will contribute questions for the written exams, and no one faculty member will write more than the equivalent of one entire exam. All students qualified to sit for the exams are expected to take them at the times announced.

The format for the written exams may vary among programs (e.g., faculty in some disciplines may ask a series of comprehensive essay questions, whereas others may provide research publications(s) from the biomedical literature and ask questions based upon the publications' content). The written exams are scheduled within two weeks of each other and graded by the providers of the question(s).

- Written exam 1 reflects students' knowledge of the core course material
- Written exam 2 reflects students' knowledge of their program material
- Written exam 3 requires that students write an NIH F31 grant proposal

A score of at least 70 percent is required to pass each written exam. Students must pass all three written portions of the PhD qualifying examination prior to taking the oral exam. Students who fail one written exam will have one opportunity to retake and pass that examination. A student who fails two written exams will be required to withdraw from the PhD program.

During the oral exam, students defend their NIH F31 grant proposal before an examination committee of four faculty members: the dissertation advisor, at least two other Department of Pharmaceutical Sciences faculty members, and at least one member from outside the department. This committee is convened only for the oral exam and does not need to be the same committee for the student's dissertation committee in future semesters.

Members of the oral examination committee are selected by the student, after consultation with the dissertation advisor and/or the director of graduate studies. The oral exam for each student will be scheduled within approximately two months after successful completion of the written exams. The oral exam is graded on a pass/fail basis. Students who fail the oral exam on the first attempt may retake the exam within a time period designated by the examination committee not to exceed six months. Those who fail twice will be dismissed from the program.

Students who do not successfully pass the PhD qualifying examination but have earned sufficient course credits may petition to receive the MS degree.

DOCTORAL CANDIDACY STATUS

Doctoral students who have completed a minimum of 33 semester hours of graduate credit beyond the bachelor's degree and who have passed the written and oral qualifying examinations shall be admitted to candidacy status for the PhD degree.

DOCTORAL DISSERTATION COMMITTEE

Doctoral students must complete a dissertation that embodies the results of extended research and makes an original contribution to their field. This work should give evidence of candidates' abilities to conduct independent investigation and interpret the results of their research in a professional manner. The doctoral dissertation advisor serves as chairperson of the dissertation committee, which consists of no fewer than five members. Selection of an advisor is by mutual consent of the student and a member of the faculty, with approval by the director of graduate studies in the Department of Pharmaceutical Sciences. At least two members of the committee must be faculty members in the Department of Pharmaceutical Sciences. At least one member is to be selected from outside the department. Committee members are chosen for their expertise in students' research areas.

DISSERTATION PROPOSAL DEFENSE

Within a year after successful completion of the PhD qualifying examination, but no later than the beginning of the fall semester of the fourth year, students must prepare and defend a written proposal detailing their planned dissertation project. Failure to do so will be regarded as failure to progress in the PhD program and will result in a warning from the director of graduate studies of the Department of Pharmaceutical Sciences.

Students who do not correct this deficiency within one semester will be placed on academic probation. Students on academic probation must complete the dissertation proposal defense and return to nonprobationary status within one semester or will be dismissed from the PhD program.

The dissertation proposal should be no more than 50 double-spaced pages (12-point font minimum and one-half-inch margins on all sides). This page limit excludes references but includes figures, figure legends, and tables. Aside from these exceptions, the proposal should otherwise conform to the format and structure of an NIH grant proposal with four main sections: specific aims, background and significance, preliminary studies, and experimental design and methods. The Department of Pharmaceutical Sciences *Dissertation Proposal* document provides detailed instructions on the preparation of a dissertation proposal and associated required forms and may be found here (https://bouve.northeastern.edu/pharmsci/).

The dissertation proposal must be defended orally before the students' dissertation committee and signed by all dissertation committee members *before students undertake their planned dissertation research.* Upon dissertation approval, the copies of the signed proposal approval cover sheet (https://bouve.northeastern.edu/pdf/dissertation-proposal-approval-form.pdf) must be submitted to the department's director of graduate studies and to the Bouvé College of Health Sciences Graduate Office.

BIANNUAL REVIEW

Dissertation committees meet routinely at six-month intervals, but no less than once a year, to evaluate students' research progress and to be presented with written and oral progress reports on the direction and status of the research. Progress reports should be written in a brief format, identical to that described for the formal dissertation (see *Instructions for the Preparation of the Thesis*). Unsatisfactory productivity provides the basis for a warning by the dissertation committee and/or the Graduate Committee. Two such warnings will result in a student's dismissal from the program.

Registration for Dissertation

Advisor consent and completion of all coursework (with the exception of the colloquium course) must be documented before students register for the first dissertation course. Students must register for Dissertation Term 1 (PHSC 9990) and Dissertation Term 2 (PHSC 9991). Students must register for **Dissertation Continuation (PHSC 9996)** each semester thereafter until the dissertation has been successfully defended. Students are given a maximum of five years after establishing degree candidacy to complete all PhD degree requirements.

Publications and Presentations

Prior to completion of PhD training, candidates must present their research either as a poster or podium presentation at a regional or national scientific conference. Also prior to completion, the student must have submitted (preferably, published) at least one manuscript in a peer-reviewed journal that reflects original findings and laboratory work from the candidate's dissertation research.

PhD Dissertation Preparation

Detailed guidelines for the format and content of the written dissertation are given in Instructions for Preparation of the Dissertation found here (https://bouve.northeastern.edu/pharmsci/). The completed dissertation document should be reviewed first by the dissertation advisor. Feedback from the advisor should be incorporated into the dissertation draft before its distribution to the dissertation committee. The completed dissertation should be delivered to all dissertation committee members no later than two weeks before the scheduled oral defense.

PHARMACEUTICAL SCIENCES COLLOQUIUM

All PhD candidates nearing completion of their research are required to present their dissertation findings at the department's Pharmaceutical Sciences Colloquium. These presentations should be scheduled at least six months before anticipated completion of the dissertation. In turn, the dissertation should be completed no later than one year after the colloquium presentation. Students must register for Pharmaceutical Science Colloquium (PHSC 6810) during the semester that the colloquium presentation is to be given.

ORAL DISSERTATION DEFENSE

The oral dissertation defense takes place after students complete their PhD dissertation research and all other requirements for the PhD degree. The oral defense deals with the subject matter of the dissertation, significant developments in the field, and students' background knowledge in their field of concentration.

The dissertation committee conducts the final defense. The committee may recommend that the student clarify, amplify, or rewrite portions of the dissertation *before the final defense is scheduled.* Once the committee concurs that that written dissertation document is acceptable, a date is chosen for the final oral examination.

At least two weeks prior to the defense, students should inform the director of graduate studies in the Department of Pharmaceutical Sciences the date of defense, so that advance announcement may be distributed. The final defense is open to anyone who wishes to attend and typically lasts at least two hours. After presentation of the work by the student in a seminar format, and responses to audience and committee questions, the committee meets first with the student for any follow-up discussion and then in executive session to decide whether the student has defended the dissertation successfully.

The committee's decision is then announced to the student. If the committee's vote is favorable, the student incorporates committee suggestions and corrections, if applicable, and the dissertation is signed and passed on to the department's director of graduate studies. Requests for a second defense are highly irregular but may be permitted in the event that the previous oral defense was judged by the committee to be highly promising but inadequate in one critical aspect.

Deadline

The final dissertation must be written, defended, and approved at least two weeks before the university commencement deadline. Students must submit signed copies of their dissertations to the website designated by the university and must abide by any embargo sanctioned by the student's principal dissertation advisor and/or dissertation committee. The students should apply for graduation before the final dissertation defense, on the assumption that the dissertation will be approved. If the dissertation committee decides that more time is required to complete the dissertation beyond the commencement date, then the application for graduation can be withdrawn and a new one submitted pending final dissertation approval.

Please visit Bouvé College of Health Sciences Program Learning Outcomes (https://bouve.northeastern.edu/learning-outcomes/) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Qualifying examination
Doctoral candidacy status
Doctoral dissertation committee
Dissertation proposal
Biannual review
Pharmaceutical Science Colloquium
Oral dissertation defense

Core Requirements

A grade of C– or higher is required in each course.

Code	Title	Hours
Seminar		
Complete the following (repeatable) course twice:		2
PHSC 6300	Pharmaceutical Science Seminar	
Required Core		
Complete 18–20 semester hours from the following:		18-20
PHSC 5100	Concepts in Pharmaceutical Science	
PHSC 5102	Concepts in Pharmaceutical Science 2	
PHSC 5212	Research Skills and Ethics	
PHSC 5300	Pharmaceutical Biochemistry [1]	
or PHSC 7010	Pharmaceutical Sciences Laboratory	
PHSC 5310	Cellular Physiology [1]	
or PHSC 7010	Pharmaceutical Sciences Laboratory	
PHSC 6213	Ethical Problems in Health Sciences Research	
PHSC 6214	Experimental Design and Biostatistics	
PHSC 6216	Human Physiology and Pathophysiology	
PHSC 7020	Scientific Writing: Thesis Proposal	
Pharmaceutics		
PMST 6250	Advanced Physical Pharmacy	2
PMST 6252	Pharmacokinetics and Drug Metabolism	3
PMST 6254	Advanced Drug Delivery Systems	3

Electives

Code	Title	Hours
Complete 9–11 semester hours from the following subject areas: [1]		9-11
BIOL, BIOT, CHEM, NNMD, PHSC, PMCL, PMST		

Research and Dissertation

Code	Title	Hours
Qualifying Examination		
PHSC 8940	Doctoral Training and Research	1
Proposal Preparation		
PHSC 9681	Doctoral Proposal	2
Dissertation		
PHSC 9990	Dissertation Term 1	3
PHSC 9991	Dissertation Term 2	1-3
Colloquium		
PHSC 6810	Pharmaceutical Science Colloquium	1

[1] Students who opt to complete 4-credit Pharmaceutical Sciences Laboratory (PHSC 7010) in the core requirements may complete the degree with 9 elective credits; all other students must complete 11 elective credits.

Program Credit/GPA Requirements

45 total semester hours required
Minimum 3.000 GPA required

Advanced Entry Program Requirements

Advanced entry into the Pharmaceutics and Drug Delivery PhD program requires a master's degree in pharmaceutical sciences or related area. An applicant's transcripts are required to be reviewed by the admissions committee to ensure they are eligible to be in the advanced entry program. Completion of the PhD program requires 12 additional credits focusing on various advanced research courses.

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review
Qualifying examination
Dissertation committee
Dissertation proposal
Dissertation defense

Core Requirements

A grade of C– or higher is required in each course.

Code	Title	Hours
Seminar		
Complete the following (repeatable) course twice:		2
PHSC 6300	Pharmaceutical Science Seminar	
Colloquium		
PHSC 6810	Pharmaceutical Science Colloquium	1

Research and Dissertation

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Qualifying Examination		
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Proposal Preparation		
PHSC 9681	Doctoral Proposal	2
Dissertation		
PHSC 9990	Dissertation Term 1	3
PHSC 9991	Dissertation Term 2	3

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

Pharmacology, PhD

The pharmacology PhD enables students to specialize in the study of the actions of drugs and their effects in living systems. In addition to the opportunity for developing a sound knowledge base through coursework and seminars, the program is designed to strengthen students' ability to understand and evaluate critically current pharmacology literature, informing the students' independent laboratory research that advances our understanding of drugs, their actions, and their pharmacotherapeutic applications. Recent graduates with a pharmacology PhD have found employment in academic and industrial research positions.

Journal Club Participation

The Department of Pharmaceutical Sciences sponsors weekly journal clubs at which students present and evaluate current scientific literature in their fields of study. Students must attend one of these journal clubs (Pharmaceutics & Drug Delivery Journal Club, Pharmacology Journal Club, or Medicinal Chemistry & Drug Discovery Journal Club), chosen in consultation with their advisors.

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Doctoral students who have completed a minimum of 33 semester hours of graduate credit beyond the bachelor's degree and who have passed the written and oral qualifying examinations shall be admitted to candidacy status for the PhD degree.

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DISSERTATION PROPOSAL DEFENSE

Within a year after successful completion of the PhD qualifying examination, but no later than the beginning of the fall semester of the fourth year, students must prepare and defend a written proposal detailing their planned dissertation project. Failure to do so will be regarded as failure to progress in the PhD program and will result in a warning from the director of graduate studies of the Department of Pharmaceutical Sciences.

Students who do not correct this deficiency within one semester will be placed on academic probation. Students on academic probation must complete the dissertation proposal defense and return to nonprobationary status within one semester or will be dismissed from the PhD program.

The dissertation proposal should be no more than 50 double-spaced pages (12-point font minimum and one-half-inch margins on all sides). This page limit excludes references but includes figures, figure legends, and tables. Aside from these exceptions, the proposal should otherwise conform to the format and structure of an NIH grant proposal with four main sections: specific aims, background and significance, preliminary studies, and experimental design and methods. The Department of Pharmaceutical Sciences *Dissertation Proposal* document provides detailed instructions on the preparation of a dissertation proposal and associated required forms and may be found here (https://bouve.northeastern.edu/pharmsci/).

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BIANNUAL REVIEW

Dissertation committees meet routinely at six-month intervals, but no less than once a year, to evaluate students' research progress and to be presented with written and oral progress reports on the direction and status of the research. Progress reports should be written in a brief format, identical to that described for the formal dissertation (see *Instructions for the Preparation of the Thesis*). Unsatisfactory productivity provides the basis for a warning by the dissertation committee and/or the Graduate Committee. Two such warnings will result in a student's dismissal from the program.

Registration for Dissertation

Advisor consent and completion of all coursework (with the exception of the colloquium course) must be documented before students register for the first dissertation course. Students must register for Dissertation Term 1 (PHSC 9990) and Dissertation Term 2 (PHSC 9991). Students must register for **Dissertation Continuation (PHSC 9996)** each semester thereafter until the dissertation has been successfully defended. Students are given a maximum of five years after establishing degree candidacy to complete all PhD degree requirements.

Publications and Presentations

Prior to completion of PhD training, candidates must present their research either as a poster or podium presentation at a regional or national scientific conference. Also prior to completion, the student must have submitted (preferably, published) at least one manuscript in a peer-reviewed journal that reflects original findings and laboratory work from the candidate's dissertation research.

PhD Dissertation Preparation

Detailed guidelines for the format and content of the written dissertation are given in Instructions for Preparation of the Dissertation found here (https://bouve.northeastern.edu/pharmsci/). The completed dissertation document should be reviewed first by the dissertation advisor. Feedback from the advisor should be incorporated into the dissertation draft before its distribution to the dissertation committee. The completed dissertation should be delivered to all dissertation committee members no later than two weeks before the scheduled oral defense.

PHARMACEUTICAL SCIENCES COLLOQUIUM

All PhD candidates nearing completion of their research are required to present their dissertation findings at the department's Pharmaceutical

Sciences Colloquium. These presentations should be scheduled at least six months before anticipated completion of the dissertation. In turn, the dissertation should be completed no later than one year after the colloquium presentation. Students must register for Pharmaceutical Science Colloquium (PHSC 6810) during the semester that the colloquium presentation is to be given.

ORAL DISSERTATION DEFENSE

The oral dissertation defense takes place after students complete their PhD dissertation research and all other requirements for the PhD degree. The oral defense deals with the subject matter of the dissertation, significant developments in the field, and students' background knowledge in their field of concentration.

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The committee's decision is then announced to the student. If the committee's vote is favorable, the student incorporates committee suggestions and corrections, if applicable, and the dissertation is signed and passed on to the department's director of graduate studies. Requests for a second defense are highly irregular but may be permitted in the event that the previous oral defense was judged by the committee to be highly promising but inadequate in one critical aspect.

Deadline

The final dissertation must be written, defended, and approved at least two weeks before the university commencement deadline. Students must submit signed copies of their dissertations to the website designated by the university and must abide by any embargo sanctioned by the student's principal dissertation advisor and/or dissertation committee. The students should apply for graduation before the final dissertation defense, on the assumption that the dissertation will be approved. If the dissertation committee decides that more time is required to complete the dissertation beyond the commencement date, then the application for graduation can be withdrawn and a new one submitted pending final dissertation approval.

Please visit Bouvé College of Health Sciences Program Learning Outcomes (https://bouve.northeastern.edu/learning-outcomes/) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Qualifying examination
Doctoral candidacy status
Doctoral dissertation committee
Dissertation proposal
Biannual review
Pharmaceutical Sciences Colloquium
Oral dissertation defense

Core Requirements

A grade of C– or higher is required in each course.

Code	Title	Hours
Seminar		
Complete the following (repeatable) course twice:		2
PHSC 6300	Pharmaceutical Science Seminar	
Required Core		
Complete 18–20 semester hours from the following:		18-20
PHSC 5100	Concepts in Pharmaceutical Science	
PHSC 5102	Concepts in Pharmaceutical Science 2	
PHSC 5212	Research Skills and Ethics	
PHSC 5300	Pharmaceutical Biochemistry [3]	
or PHSC 7010	Pharmaceutical Sciences Laboratory	
PHSC 5310	Cellular Physiology	
PHSC 6213	Ethical Problems in Health Sciences Research	
PHSC 6214	Experimental Design and Biostatistics	
PHSC 6216	Human Physiology and Pathophysiology	
PHSC 7020	Scientific Writing: Thesis Proposal	
Pharmacology		
PMCL 6260	Pharmacology 1 [1]	2
PMCL 6261	Pharmacology 2 [2]	2
PMCL 6262	Receptor Pharmacology [1]	2

Electives

Code	Title	Hours
Complete 11–13 semester hours from the following subject areas: [3]		11-13
BIOL, BIOT, CHEM, NNMD, PHSC, PMCL, PMST		

1 Pharmacology 1 (PMCL 6260) and Receptor Pharmacology (PMCL 6262) are only offered in even-numbered years in spring semester (example: Spring 2020).

2 Pharmacology 2 (PMCL 6261) is only offered in odd-numbered years in spring semester (example: Spring 2021). Pharmacology 1 does not have to be taken before Pharmacology 2.

3 Students who opt to complete 4-credit PHSC 7010 in the core requirements may complete the degree with 11 elective credits; all other students must complete 13 elective credits.

Research & Dissertation

Code	Title	Hours
Research		
PHSC 8940	Doctoral Training and Research	1
Proposal Preparation		
PHSC 9681	Doctoral Proposal	2
Dissertation		
PHSC 9990	Dissertation Term 1	3
PHSC 9991	Dissertation Term 2	1-3
Colloquium		
PHSC 6810	Pharmaceutical Science Colloquium	1

Program Credit/GPA Requirements

45 total semester hours required
Minimum 3.000 GPA required

Plan of Study

Year 1

Fall	Hours	Spring	Hours
Core requirements/ electives	8	Core requirements/ electives	8
PHSC 6300	1	PHSC 6300	1
	9		9

Year 2

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
Core requirements/ electives	8	Core requirements/ electives	8	PHSC 7020[1]	2
	8		8		2

Year 3

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 8940	1	PHSC 8986 or 9681[2]	0	PHSC 9681[2]	2
	1		0		2

Year 4

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 9990	1-3	PHSC 9991	1-3	PHSC 9996	0
	1-3		1-3		0

Year 5

Fall	Hours	Spring	Hours
PHSC 6810[3]	1	PHSC 9996	0
	1		0

Total Hours: 42-46

1. Scientific Writing: Thesis Proposal (PHSC 7020) must be taken the summer before the qualifying exams.
2. Doctoral Proposal (PHSC 9681) may be taken in spring of third year but must be taken before fall of fourth year.
3. Pharmaceutical Science Colloquium (PHSC 6810) must be taken six months before dissertation defense.

Advanced Entry PhD Program Requirements

Advanced entry into the PhD in Pharmacology requires a master's degree in pharmaceutical sciences or a related area. An applicant's transcripts are required to be reviewed by the admissions committee to ensure they are eligible to be in the advanced entry program. Completion of the PhD program requires 12 additional credits, focusing on various advanced research courses and successful defense of the dissertation.

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review
Qualifying examination
Dissertation committee
Dissertation proposal
Dissertation defense

Core Requirements

A grade of C– or higher is required in each course.

Code	Title	Hours
Seminar		
Complete the following (repeatable) course twice:		2
PHSC 6300	Pharmaceutical Science Seminar	
Colloquium		
PHSC 6810	Pharmaceutical Science Colloquium	1

Research & Dissertation

Code	Title	Hours
Qualifying Examination		
PHSC 8940	Doctoral Training and Research	1
Proposal Preparation		
PHSC 9681	Doctoral Proposal	2
Dissertation		
PHSC 9990	Dissertation Term 1	3
PHSC 9991	Dissertation Term 2	3

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

Pharmacy, PharmD

Program requirements that follow relate to the final year of the six-year Doctor of Pharmacy (PharmD) program only. For information regarding years one through five of this program, please see the *Undergraduate Catalog* Doctor of Pharmacy (Pharmacy, PharmD) webpage.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Complete 36 semester hours in the following range:		36
PHMD 6440 to PHMD 6474		

Program Credit/GPA Requirements

36 total semester hours required
Minimum 3.000 GPA required

Pharmacy, PharmD—Direct Entry

The School of Pharmacy offers the Doctor of Pharmacy degree (PharmD). The direct-entry admission pathway for this program requires that students complete a BS or BA from an accredited institution with a preferred prerequisite grade-point average (GPA) of 3.000. Only grades of C (2.000) or higher are acceptable to fulfill a prerequisite course. The following prerequisite courses and credits are required:

Requirements	Credits
Chemistry 1 and 2 (1 lab)	7
General Biology 1 and 2 (1 lab)	7

Calculus	3
Organic Chemistry 1 and 2 (w/labs)	8
Biochemistry	3
Human Physiology 1 and 2	8
Physics	3
Arts/Humanities/Social Studies	4

Direct entry into the first professional year of the PharmD program offers students a four-year graduate course of study that fully integrates campus-based learning with experiential learning, including the university's signature cooperative education (co-op) program, to provide students with the knowledge, skills, and abilities necessary to succeed in the pharmacy profession. Our students promote and ensure the safe and effective use of drugs and provide medication therapy management services. In addition to preparing and dispensing prescribed medications, our students provide information to patients about medications and their uses; advise physicians, other prescribers, and other healthcare practitioners on medication selection, dosages, interactions, and adverse effects; and monitor patient responses to drug therapy.

Our students are well equipped to provide patient care services in a variety of settings. Most of our graduates work in community pharmacies or in healthcare facilities such as hospitals and ambulatory clinics. Additional practice opportunities exist in health maintenance organizations, private practice groups, long-term-care facilities, home healthcare, the Public Health Service, the armed services, and law enforcement and regulatory agencies such as the Federal Drug Administration (FDA) or Drug Enforcement Administration (DEA). Graduates may also find employment in drug development, marketing and research within the pharmaceutical industry, colleges of pharmacy, and professional association management. In addition, many of our graduates go on to pharmacy practice residencies, fellowships, and leading graduate programs.

Doctor of Pharmacy students are admitted with the expectation that by working with faculty, staff, and each other, they will develop the knowledge, skills, and attitudes necessary for academic and professional success. Students follow academic progression plans for their respective years of graduation. Any deviation from the prescribed curriculum will require faculty/staff permission and an approved plan of study from the School of Pharmacy Academic Standing Committee.

The curriculum includes both Introductory Pharmacy Practice Experiences (IPPEs, fulfilled with cooperative education) and Advanced Pharmacy Practice Experiences (APPEs). These pharmacy practice experiences are provided primarily under the direct supervision of qualified pharmacist preceptors and occasionally with other qualified healthcare professionals. The school is affiliated with many world-class practice sites throughout the United States, providing students with access to experienced clinicians and scholars. Although every effort is made to accommodate individual circumstances and requests, students should be prepared to travel outside the Boston area to complete some of their pharmacy practice experiences. Availability of a car may be required, as some sites are not accessible by public transportation. All expenses associated with pharmacy practice experiences, including travel and housing, are the responsibility of the student.

IPPEs are competitive placements that are based on job availability in a geographic region. The placements are facilitated by School of Pharmacy cooperative education coordinators. Students are required to earn satisfactory (S) grades on one IPPE in a community setting and on one IPPE in an institutional/hospital practice setting.

APPE placements are provided based on site/preceptor availability and the final approval of the School of Pharmacy Office of Experiential Education (OEE). Students may be able to petition the OEE for out-of-system APPEs; however, availability for such requests is limited.

To be eligible for a PharmD, a student must successfully complete all courses in the curriculum, including the IPPEs/co-op and APPEs; meet the academic progression standards of the program; meet the technical standards of the program; and satisfy all other requirements as stated. The pharmacy program is fully accredited by the Accreditation Council for Pharmacy Education (ACPE) (https://www.acpe-accredit.org/) and adheres to the standards established by ACPE.

Pharmacy graduates must meet specific requirements to qualify for professional licensure in the state where they plan to practice as a registered pharmacist. These requirements include graduating from an accredited school of pharmacy, passing national and state board examinations, and completing internship hours. The internship is a period of practical experience conducted under the supervision of a registered pharmacist. Massachusetts requires 1,500 internship hours, all of which are satisfied through completion of IPPEs (co-op) and APPEs.

Professional and/or legal exigencies arise from time to time, which may necessitate changes in a pharmacy course, progression, and/or graduation requirements. Students should review their status with academic advisers on a timely basis and refer to current publications for updated information.

Requirements for the PharmD Pharmacy Practice Experiences (PPEs)

Requirements for the successful completion of the PharmD PPEs include:

1. Evidence of health clearance from University Health and Counseling Services before placements at any PPE site.

2. Satisfactory completion of any additional site-specific requirements including, but not limited to, criminal record information (CORI), urine drug screens, and verification of immunization status. All fees associated with these requirements are the responsibility of the student.

Management of Positive Urine Drug Screens

If the student learns the urine drug screen (test #1) is positive, the student will notify the OEE (pharmacyoee@northeastern.edu) and immediately complete a second urine screen (test #2). A professional concern form will be completed based on test #1 results.

If urine screen test #2 is negative (-), the student will be allowed to continue the PPEs. However, the student will be asked to complete a random urine screen (test #3) at a time determined by the OEE. If this urine screen (test #3) is positive (+), the student will be administratively removed from the active PPEs and graduation may be delayed. A second professional concern form will be completed, based on test #3 results. The return to PPEs will occur once a repeat urine test is negative. That repeat negative test will be followed up by a random urine screen at a time determined by the OEE.

If the urine screen (test #2) is positive (+), the student will be administratively removed from the PPEs and graduation may be delayed. The return to PPEs will occur once a repeat urine screen is negative. That negative screen will be followed up by a random urine screen at a time determined by the OEE. A second professional concern form will be completed based on a positive test #3 result.

3. Adherence to the school's code of professional conduct and university's code of conduct policies while off-campus.

4. Maintenance of an active pharmacy intern license in every state where the student completes an experience.

5. Compliance with site-specific requirements (via site descriptions) and completion of site requests within specified deadlines.

Undergraduate students who fail to complete these requirements as directed will likely incur grade penalties and may experience a delay of graduation or dismissal from the pharmacy program.

PROGRAM POLICIES

Students are expected to adhere to the policies and standards of their program major as stated to progress through their curriculum as planned. Students seeking any exceptions to the program policies and standards specified for their program major must present a petition before the School of Pharmacy Academic Standing Committee.

Given programmatic requirements, coupled with concerns over the loss of therapeutic knowledge, requests for a General Leave of Absence (p. 32), other than Medical or Emergency Leave of Absence:

- Must comply with all stated Northeastern University general policies, regardless of the academic year.
- May be made at any time period during the P1 or P2 years.
- During the P3 academic year, any request for a general leave must be made no later than February 1 of the given academic year. Requests after this date will not be permitted.
- During the P4 academic year, requests for a general leave cannot be made at any time.

SOP—Professional Code of Conduct (https://bouve.northeastern.edu/assets/uploads/sites/5/2014/08/sop-code-professional-conduct.pdf)

Preprofessional and professional-year students are expected to adhere to the Code of Professional Conduct. (https://bouve.northeastern.edu/assets/uploads/sites/5/2014/08/sop-code-professional-conduct.pdf)

Students are eligible to begin APPEs following successful completion of all didactic coursework. Completing didactic coursework during P4 year is prohibited.

TECHNICAL STANDARDS FOR THE DOCTOR OF PHARMACY PROGRAM

The PharmD program at Northeastern University is a rigorous and challenging academic program that requires students to possess specific characteristics and abilities within the cognitive, affective, and psychomotor domains, referred to here as technical standards. To successfully progress in and ultimately complete the didactic, laboratory, and experiential components of the PharmD program, students must meet the standards described below.

Intellectual Abilities

Students must have well-developed problem-solving and critical-thinking skills. Cognitive function must be appropriate to integrate, evaluate, and apply information gained through measurement, analysis, calculation, and reasoning. Students must have the capacity to learn efficiently in classroom, laboratory, small group and experiential settings, and through independent study. Students are required to demonstrate the ability to integrate course content knowledge with clinical practice applications to optimize medication therapy management.

Communication Skills

Students must be able to communicate effectively with colleagues, professors, patients, families, and healthcare providers. This includes efficiently comprehending, speaking, reading, and writing in English. Students must be able to process and use appropriate nonverbal cues and be proficient in the use of electronic communication media.

Behavioral and Social Attributes

Students must demonstrate professionalism, maturity, integrity, honesty, compassion, and respect when relating to others. Students must have sufficient mental and emotional health to complete work and responsibilities using good judgment. Students must be able to tolerate and adapt to stressful workloads and situations and modify behavior based on constructive criticism. Students must be able to function in accordance with the legal, ethical, and professional standards of practice.

Observation and Motor Skills

Students must have functional use of visual, auditory, and tactile senses. Students must be able to observe and perform experiments, physical assessments, patient interviews, and medication order processing. Students must be able to distinguish physical characteristics of medications by inspection. Students must have coordination of gross and fine muscular movements sufficient to perform pharmacy-related tasks including compounding and dispensing medications, administering medications, and using computers and other technology necessary for learning and professional practice

ACADEMIC DISMISSAL FROM MAJOR

PharmD students in the Bouvé College of Health Sciences will be dismissed from their major effective the following academic semester for any of the reasons noted below:

- Failure to earn a grade of C or better in three professional courses, regardless of remediation. Within the PharmD program, each specific professional course (with separate registration number) will be counted as a separate failure even if content is related.
- Failure to earn the minimum required grade in the same course twice.
- Failure to maintain a GPA of 3.000 after one semester of probation.
- The expected graduation date may not change more than twice.

The PharmD program monitors and promotes the development of professional behaviors in its students in order to ensure appropriate professionalism in the classroom, local and global communities, and clinical settings. Breach of adherence to these standards may result in dismissal from the program.

ACADEMIC APPEALS

Students who believe that they were erroneously, capriciously, or otherwise unfairly treated in an academic or cooperative education decision may petition to appeal the decision. Refer to the Bouvé College of Health Sciences Academic Affairs Appeals Process (p. 254) and the Northeastern University Academic Appeals Policies and Procedures (http://catalog.northeastern.edu/undergraduate/academic-policies-procedures/academic-appeals-policies-procedures/).

PROGRAM STUDENT LEARNING OUTCOMES

Please visit Bouvé College Learning Outcomes (https://bouve.northeastern.edu/bchs/about/learning-outcomes/) for the specific student learning outcomes for this program.

Program Requirements

Pharmacy Major (PharmD) Grade and Progression Requirement

To progress into the subsequent semester of professional courses, students must receive a grade of C or better in all PHMD and PHSC

courses, as well as in any course completed to fulfill the professional elective requirement.

For pharmacy students, an unsatisfactory grade (U) in a co-op will be counted as a professional course deficiency.

Students who incur an incomplete grade in a prerequisite course may not progress into the subsequent courses(s). Any exceptions will be determined by protocols established by the program, after consultation with the student's academic adviser.

Core Requirements

Code	Title	Hours
SEMESTER 1		
PHMD 1201 and PHMD 1202	Introduction to Pharmacy Practice and Lab for PHMD 1201	3
PHMD 2350	Healthcare Systems	3
PHSC 3411	Pharmaceutics 1	4
PHSC 4501	Pharmacology/Medicinal Chemistry 1	5
SEMESTER 2		
PHMD 6964	Co-op Work Experience (Introductory Pharmacy Practice Experience) [1]	0
SEMESTER 3		
PHMD 2310 and PHMD 2311	Professional Communication in Pharmacy Practice and Lab for PHMD 2310	2.5
PHMD 5250	Pharmacy Care Management	4
PHSC 3412	Pharmaceutics 2	4
PHSC 3419	Pharmaceutics Laboratory	1
PHSC 4502	Pharmacology/Medicinal Chemistry 2	5
SEMESTER 4		
PHMD 6964	Co-op Work Experience (Introductory Pharmacy Practice Experience) [1]	0
SEMESTER 5		
PHMD 3450	Research Methodology and Biostatistics	3
PHMD 4611	Comprehensive Disease Management 1	6
PHMD 4612	Comprehensive Disease Management 1 Seminar	1
PHSC 2330	Immunology	3
PHSC 3430	Pharmacokinetics and Biopharmaceutics	3
SEMESTER 6, 7, or 8		
PHMD 5600	Pharmacy Capstone	4
SEMESTER 6		
PHMD 4621	Comprehensive Disease Management 2	6
PHMD 4622	Comprehensive Disease Management 2 Seminar	1
PHMD 4623	Comprehensive Disease Management 2 Skills Lab	0.5
PHMD 5330	Jurisprudence	3
PHSC 5360	Anti-Infectives	4
SEMESTER 7		
PHMD 4631	Comprehensive Disease Management 3	6
PHMD 4632	Comprehensive Disease Management 3 Seminar	1
PHMD 4633	Comprehensive Disease Management 3 Skills Lab	0.5
PHMD 5560	Applied Drug Information	2
SEMESTER 8		
PHMD 4641	Comprehensive Disease Management 4	6
PHMD 4642	Comprehensive Disease Management 4 Seminar	1
PHMD 4643	Comprehensive Disease Management 4 Skills Lab	0.5
PHMD 5270	Economic Evaluation of Pharmaceuticals and Pharmacy Practice	2
PHMD 5450	Advanced Pharmacy Practice Experience Preparatory Seminar	1
SEMESTERS 9, 10, 11		
Complete 36 credit hours of Advanced Pharmacy Practice Experience (APPE) from the following:		36
PHMD 6440	Internal Medicine Advanced Pharmacy Practice Experience	
PHMD 6441	Acute Care Advanced Pharmacy Practice Experience	
PHMD 6442	Ambulatory Care Advanced Pharmacy Practice Experience	
PHMD 6443	Community Advanced Pharmacy Practice Experience	
PHMD 6445	Ambulatory Care Elective Advanced Pharmacy Practice Experience	
PHMD 6446	Psychiatry Advanced Pharmacy Practice Experience	
PHMD 6447	Community Elective Advanced Pharmacy Practice Experience	
PHMD 6448	Long Term Care Advanced Pharmacy Practice Experience	
PHMD 6449	Geriatrics Advanced Pharmacy Practice Experience	
PHMD 6450	Pediatrics Advanced Pharmacy Practice Experience	
PHMD 6451	Neonatology Advanced Pharmacy Practice Experience	
PHMD 6452	Critical Care Advanced Pharmacy Practice Experience	
PHMD 6453	Surgery Advanced Pharmacy Practice Experience	
PHMD 6454	Cardiology Advanced Pharmacy Practice Experience	
PHMD 6456	Drug Information Advanced Pharmacy Practice Experience	
PHMD 6457	Oncology Advanced Pharmacy Practice Experience	
PHMD 6461	Infectious Disease Advanced Pharmacy Practice Experience	
PHMD 6462	Pharmacy Industry Advanced Pharmacy Practice Experience	
PHMD 6463	Pharmacy Administration Advanced Pharmacy Practice Experience	
PHMD 6464	Regulatory Advanced Pharmacy Practice Experience	

PHMD 6465	Managed Care Advanced Pharmacy Practice Experience
PHMD 6466	Transplantation Advanced Pharmacy Practice Experience
PHMD 6467	Directed Practice Advanced Pharmacy Practice Experience
PHMD 6468	International Advanced Pharmacy Practice Experience
PHMD 6469	Management Advanced Pharmacy Practice Experience
PHMD 6470	Education Advanced Pharmacy Practice Experience
PHMD 6471	Research 1 Advanced Pharmacy Practice Experience
PHMD 6472	Research 2 Advanced Pharmacy Practice Experience
PHMD 6473	Radiopharmacy Advanced Pharmacy Practice Experience
PHMD 6474	Public Health Advanced Pharmacy Practice Experience

[1] For pharmacy students, an unsatisfactory grade (U) in a co-op will be counted as a professional course deficiency.

Elective Requirements

Code	Title	Hours
Open Electives		
A minimum of 6 semester hours of open electives is required. Additional electives may be required to fulfill the total semester hours for your program.		6
Professional Electives		
Complete at least 2 semester hours from the following:		2
CAEP 3480	Counseling Theories and Practice	
CAEP 6203	Understanding Culture and Diversity	
HINF 5101	Introduction to Health Informatics and Health Information Systems	
HINF 5407	Business Application of Decision Support in Healthcare	
HINF 6205	Creation and Application of Medical Knowledge	
HINF 6404	Patient Engagement Informatics and Analytics	
HLTH 1510	Introduction to Healthcare Ethics	
HLTH 2100	Interprofessional Ethics for Individual and Population Health	
HLTH 2302	Alternative Medicine	
HLTH 5002	Mindfulness: Theory and Practice	
HLTH 5135	Developing an Interdisciplinary Approach to Health Management for Older Adults	
HLTH 5280	The (in)Visibility of (dis)Ability in Society	
HLTH 5730	Global Perspectives in Disability and Health	
HSCI 1105	Human Nutrition	
HSCI 2350	Advanced Nutrition in Health and Disease	
HSCI 2500	Public Health Nutrition in the Community	
HSCI 5230	Clinical Nutrition Applications in Health and Disease	
NRSG 1205	Wellness	
PHMD 3600	Leadership and Advocacy in Health Professions	
PHMD 4350	Exploring Academic Careers	
PHMD 4581	Cancer Chemotherapy	
PHMD 4585	Research Methods in Health Systems	
PHMD 4700	Principles in General Medicine	
PHMD 4890	Contemporary Issues in Geriatric Pharmacy	
PHMD 4991	Research	
PHMD 4992	Directed Study	
PHMD 5223	Evidence-Based Medicine	
PHMD 5575	Pharmaceutical Industry	
PHMD 5675	Ambulatory Care Pharmacy Practice in Urban Health	
PHMD 5900	Self-Care and Nonprescription Medications: A Team-Based Approach	
PHSC 4991	Research	
PHSC 4992	Directed Study	
PHSC 5100	Concepts in Pharmaceutical Science	
PHSC 5400	Principles of Drug Design	
PHSC 5500	Repurposing Drugs for Cancer Immunotherapies	
PHSC 5555	Pharmaceutical Toxicology	
PHSC 6218	Biomedical Chemical Analysis	
PHSC 6222	The Chemistry and Biology of Drugs of Abuse	
PHSC 6224	Behavioral Pharmacology and Drug Discovery	
PHSC 6290	Biophysical Methods in Drug Discovery	
PHTH 1270	Introduction to Global Health	
PHTH 5222	Health Advocacy	
PHTH 5226	Strategic Management and Leadership in Healthcare	
PHTH 5230	Global Health	
PHTH 5232	Evaluating Healthcare Quality	
PHTH 5234	Economic Perspectives on Health Policy	
PHTH 5300	Project Management in Public Health	
PHTH 5310	Budget Principles in Public Health	
PHTH 5320	Grant Writing in Public Health	
PHTH 6320	Qualitative Methods in Health and Illness	
PMST 6250	Advanced Physical Pharmacy	
PMST 6252	Pharmacokinetics and Drug Metabolism	
PMST 6254	Advanced Drug Delivery Systems	
SLPA 1101	Introduction to Communication Disorders	
SLPA 1555	Communication Disorders in Movies	

Progression Requirements

To progress into the subsequent semester of professional courses, students must receive a grade of C or better in all PHMD and PHSC courses, as well as any course completed to fulfill the professional elective requirements.

Program Credit/GPA Requirements

130 total semester hours required
Minimum 3.000 GPA required

Plan of Study

Sample Plan of Study

Year 1

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHMD 1201 and PHMD 1202	3	PHMD 6964 (IPPE)	0	PHMD 2310 and PHMD 2311	2.5
PHMD 2350	3			PHMD 5250	4
PHSC 3411	4			PHSC 3412	4
PHSC 4501	5			PHSC 3419	1
				PHSC 4502	5
	15		0		16.5

Year 2

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHMD 6964 (IPPE)	0	PHSC 2330	3	PHMD 4621	6
		PHSC 3430	3	PHMD 4622	1
		PHMD 3450	3	PHMD 4623	0.5
		PHMD 4611	6	PHMD 5330	3
		PHMD 4612	1	PHSC 5360	4
				Elective or capstone	4
	0		16		18.5

Year 3

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHMD 4631	6	PHMD 4641	6	APPE (choose from PHMD 6440–PHMD 6474)	6
PHMD 4632	1	PHMD 4642	1	APPE (choose from PHMD 6440–PHMD 6474)	6
PHMD 4633	0.5	PHMD 4643	0.5		
PHMD 5560	2	PHMD 5270	2		
Electives and/or capstone	3-8	PHMD 5450	1		
		Electives and/or capstone	3-4		
		Professional elective	2		
	12.5-17.5		15.5-16.5		12

Year 4

Fall	Hours	Spring	Hours
APPE (choose from PHMD 6440–PHMD 6474)	6	APPE (choose from PHMD 6440–PHMD 6474)	6
APPE (choose from PHMD 6440–PHMD 6474)	6	APPE (choose from PHMD 6440–PHMD 6474)	6
	12		12

Total Hours: 130-136

Biomedical Sciences, MS

The science and research surrounding human health and disease are becoming more interdisciplinary. In response to this trend, the biomedical sciences MS program allows students to focus on areas across the biomedical sciences to gain training in human (patho)physiology and the application of existing and potential therapeutic approaches to treat disease. The Master of Science in Biomedical Sciences curriculum is particularly appropriate both for those entering as well as those currently employed in the field, including research technicians, clinical laboratory workers, science teachers, and science administrators. For those currently employed, the program can enhance performance in a present position or open new employment opportunities. Graduates of the program will be well-prepared to enter related PhD programs at the university.

Curriculum Requirements

All MS programs in the Department of Pharmaceutical Sciences require a set of core courses taken by every MS student, regardless of program. In addition, students in each program are required to take a defined set of discipline-specific courses and several general electives. The number of specialized and elective courses differs somewhat among programs. The MS degree may be completed on either a full-time or part-time basis and may include an optional research thesis. International students are required to attend the program on a full-time basis.

Internship Requirements and Regulations for Department of Pharmaceutical Sciences

Internships provide an experiential component of the graduate curriculum that fosters professional development through work in industry and hospitals.

1. In order to participate in an internship, students must complete two semesters with a grade-point average (GPA) of 3.200 or better; be in good academic standing; and have no instances of academic dishonesty, no blocks on enrollment, and no repeated courses.
2. Students are in school full-time in addition to working on their internships.
3. There are no vacations on co-op/internships. Companies' sick time policies may vary. Students should check with their employers.
4. Students are responsible for finding their own internship and must be honest and accurate representing their experiences on their resumés. Prior to looking for an internship, students must

have their faculty advisor approve their resumé and ascertain to the best of his or her ability that the skills and training of students are as presented.

5. Students must not accept more than one position. They must honor the first offer accepted.
6. In order to receive a grade for the course, students must write at least two learning goals and a paper describing what they learned, mid- and end of semester. Supervisors for internships will reply to a questionnaire about students' performance.
7. International students must register for Pharmaceutical Science Internship (PHSC 6401) and follow instructions to receive Curricular Practical Training (CPT) authorization from the Office of Global Services every semester they work. This applies to part-time jobs and volunteer opportunities. International students cannot engage in full-time CPT authorization totaling more than 52 weeks. Doing so will eliminate the possibility of engaging in the post-graduation benefit of Post-Completion Optional Practical Training (Post-OPT).
8. Students receive 1 academic credit per semester for the Pharmaceutical Science Internship course (PHSC 6401). If students want to do an internship for a fourth semester they may do so, but students will only receive a maximum of 3 credits for the Pharmaceutical Science Internship course (PHSC 6401). The 4th credit for the Pharmaceutical Science Internship course (PHSC 6401) will not be added to the student's degree.
9. Taking internship must not extend international students' visas.

General Policies Common to all MS Programs in the Department of Pharmaceutical Sciences

GRADING POLICY

Students are expected to maintain a grade-point average (GPA) of 3.000 (B) or higher in all coursework. Students whose cumulative GPA falls below 3.000 will receive written notification from the Bouvé Office of Graduate Student Services that they have been placed on academic probation. A student must clear the deficiency and return to nonprobationary status within one semester, unless the course that must be retaken is not offered during the probationary semester. In such a case, the course to be retaken must be completed during the next semester that it is offered, and the GPA must be restored to at least 3.000. Failure to remediate the deficiencies and return to nonprobationary status within the established time limit will result in dismissal from the MS program. Refer to the Bouvé College of Health Sciences policy on Academic Dismissal (p. 256) and Academic Probation Policy (p. 256) for full details.

PROGRESSION REQUIREMENT

Bouvé College of Health Sciences policy specifies that students register for coursework or continuation credit each semester of the academic year (fall and spring semesters) after they are matriculated as full- or part-time students. Moreover, international students are required to maintain full-time student status during each academic term; consult the Office of Global Services (https://international.northeastern.edu/ogs/) for specific requirements. Domestic students who are not able to register for courses during a particular semester must petition the director of graduate studies in the department for exemption, in writing, and state the reasons for the exemption and their plan for resuming their studies. Approval of the petition will preserve student status in the MS program.

All MS students are expected to complete the degree requirements within two years if enrolled on a full-time basis, or within three to five years if enrolled on a part-time basis. If progress toward the degree is slowed or interrupted for personal reasons, the student so affected must petition the pharmaceutical sciences department graduate committee for an extension, detailing the anticipated time to completion. If an extension is approved, the student will be directed to meet with his or her academic advisor to devise a formal plan to achieve completion of the degree.

Course credits earned in the Bouvé College of Health Sciences Graduate School or accepted for transfer from another institution and not applied to obtain a previous degree are valid for a maximum of seven years. Refer to the Bouvé College of Health Sciences Academic Progression Policies and Procedures (p. 256) for details.

ACADEMIC HONESTY AND RESEARCH INTEGRITY

The Department of Pharmaceutical Sciences has a zero-tolerance policy regarding academic dishonesty and violations of research integrity. It is each student's responsibility to understand and adhere to Northeastern University's Academic Integrity Policy (http://www.northeastern.edu/osccr/academic-integrity-policy/). Definitions of plagiarism, cheating, fabrication, falsification, unauthorized collaboration, and actions that facilitate academic or research dishonesty can be found on the Office of Student Conduct and Conflict Resolution website (http://www.northeastern.edu/osccr/). The lack of knowledge of these definitions does not excuse the student's responsibility for upholding them. Offenses of academic honesty and research integrity are egregious violations of ethical standards and may result in disciplinary actions including the student's immediate dismissal from the graduate program.

Please visit Bouvé College of Health Sciences Program Learning Outcomes (https://bouve.northeastern.edu/learning-outcomes/) for the specific student learning outcomes for this program.

MASTER OF SCIENCE THESIS OPTION

Students who undertake a thesis are expected to report the results of extended research in a written thesis document and make an original contribution to their field. This work should give evidence of the students' abilities to conduct independent research and interpret their research results in an acceptable manner. Arrangements are made by students interested in the thesis option with individual laboratory directors as to the availability of MS-student research positions and the specific research focus.

Thesis Registration

Students may receive a maximum of 4 semester hours (SH) of credit for MS thesis research. Students should register for Thesis (PHSC 6990), twice for 2 SH each during the fall and spring semesters of their second full year of study, or after completing 15 credits of study. If completion of the thesis requires additional time, students should register for Thesis Continuation (PHSC 6996) (0 SH).

Thesis Committee

Each student's thesis committee should be composed of at least three members: two from the sponsoring program and one from outside the student's program. The outside member may be a Northeastern University faculty member. The director of graduate studies for the pharmaceutical sciences department may appoint additional members, as considered necessary for student development. The student's major advisor, in whose laboratory the research is being conducted, will serve as committee chairperson. The student, after consulting with the committee chair, is responsible for calling all thesis committee meetings.

Thesis Proposal

The thesis proposal should be no more than 50 double-spaced pages (12-point font minimum and one-half-inch margins on all sides). This page limit excludes references but includes figures, figure legends, and tables. Aside from these exceptions, the proposal should conform to the format and structure of an NIH grant proposal with four sections: specific aims, background and significance, preliminary

studies, and experimental design and methods. See the Department of Pharmaceutical Sciences "Thesis Proposal" document for detailed instructions on the preparation of a thesis proposal and the required forms located on the pharmaceutical sciences homepage (https://bouve.northeastern.edu/pharmsci/).

The thesis proposal must be defended orally before the thesis committee and signed by all thesis committee members before the student undertakes the planned research. The signed cover page of the proposal should be submitted to the director of graduate studies, pharmaceutical sciences department, and to the Bouvé College of Health Sciences Graduate Office.

Thesis Final Defense

The final defense is taken after the student completes the thesis research and all other requirements for the MS degree. The defense deals with the subject matter of the thesis, significant developments in the field, and student's background knowledge in their field of specialization. The thesis committee conducts the final defense.

At least two weeks prior to the expected date of the oral defense, the written thesis must be circulated to the student's thesis committee. After initial committee evaluation, recommendation may be made that the student clarify or rewrite portions of the thesis before scheduling the final defense. After the thesis committee concurs that the thesis is acceptable, a date is chosen for the final oral examination. At least two weeks prior to the defense, the student should inform the director of graduate studies in the pharmaceutical sciences department so that an announcement can be distributed to faculty and students. The final defense is open to anyone who wishes to attend and typically lasts at least two hours. After presentation of the work by the student, and responses to audience and committee questions, the student's committee meets in executive session to decide whether the student has successfully defended the thesis. The committee's decision is then announced to the student. If the committee's vote is favorable, the student incorporates committee suggestions and the dissertation is signed off and passed on to the director of graduate studies in the department. Requests for a second defense are unusual but may be permitted if the original oral defense was judged significantly inadequate.

Thesis Deadline

The thesis should be written, defended, and signed at least two weeks before the university commencement deadline. Students must submit signed copies of the thesis to the online site designated by the university.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of C– or higher is required in each course.

Code	Title	Hours
Required Core		
Complete 14–16 semester hours from the following:		14-16
PHSC 5100	Concepts in Pharmaceutical Science	
PHSC 5102	Concepts in Pharmaceutical Science 2	
PHSC 5212	Research Skills and Ethics	
or PHSC 6213	Ethical Problems in Health Sciences Research	
PHSC 5300	Pharmaceutical Biochemistry [1]	
or PHSC 7010	Pharmaceutical Sciences Laboratory	
PHSC 5310	Cellular Physiology	
PHSC 6214	Experimental Design and Biostatistics	
PHSC 6216	Human Physiology and Pathophysiology	

Electives

Code	Title	Hours
Complete 17–19 semester hours in the following subject areas: [1]		17-19
PHSC, PMCL, PMST, BIOL, CHEM, NNMD, BIOT		

Thesis Option

Thesis credits may count toward the required elective hours.

Code	Title	Hours
Thesis research should be taken twice:		4
PHSC 6990	Thesis	
Thesis continuation may be taken if additional time is needed to complete the thesis.		
PHSC 6996	Thesis Continuation	

[1] Students who opt to complete 4-credit Pharmaceutical Sciences Laboratory (PHSC 7010) in the core requirements may complete the degree with 17 elective credits; all other students must complete 19 elective credits.

Program Credit/GPA Requirements

33 total semester hours required
Minimum 3.000 GPA required

Medicinal Chemistry, MS

The medicinal chemistry MS program integrates aspects of contemporary medicinal chemistry and pharmacology, emphasizing topics most relevant to therapeutics design, discovery, and action. The core curriculum focuses on a combination of synthetic organic chemistry, bioorganic chemistry, analytical chemistry, and pharmacology courses. Specialized, in-depth electives are offered in these areas. The program is designed to develop students' knowledge of medicinal chemistry through design, synthesis, and pharmacological profiling of novel pharmacotherapeutics as applied to helping solve unmet medical needs. For this purpose, many program graduates have established research careers in the pharmaceutical/biotech industry. Undergraduate prerequisites are general chemistry, organic chemistry, and biochemistry or cell/molecular biology.

Curriculum Requirements

All MS programs in the Department of Pharmaceutical Sciences require a set of core courses taken by every MS student, regardless of program. In addition, students in each program are required to take a defined set of discipline-specific courses and several general electives. The number of specialized and elective courses differs somewhat among programs. The MS degree may be completed on either a full-time or part-time basis and may include an optional research thesis. International students are required to attend the program on a full-time basis.

Internship Requirements and Regulations for Department of Pharmaceutical Sciences

Internships provide an experiential component of the graduate curriculum that fosters professional development through work in industry and hospitals.

1. In order to participate in an internship, students must complete two semesters with a grade-point average (GPA) of 3.200 or better; be in good academic standing; and have no instances of academic dishonesty, no blocks on enrollment, and no repeated courses.
2. Students are in school full-time in addition to working on their internships.
3. There are no vacations on co-op/internships. Companies' sick time policies may vary. Students should check with their employers.
4. Students are responsible for finding their own internship and must be honest and accurate representing their experiences on their resumés. Prior to looking for an internship, students must have their faculty advisor approve their resumé and ascertain to the best of his or her ability that the skills and training of students are as presented.
5. Students must not accept more than one position. They must honor the first offer accepted.
6. In order to receive a grade for the course, students must write at least two learning goals and a paper describing what they learned, mid- and end of semester. Supervisors for internships will reply to a questionnaire about students' performance.
7. International students must register for Pharmaceutical Science Internship (PHSC 6401) and follow instructions to receive Curricular Practical Training (CPT) authorization from the Office of Global Services every semester they work. This applies to part-time jobs and volunteer opportunities. International students cannot engage in full-time CPT authorization totaling more than 52 weeks. Doing so will eliminate the possibility of engaging in the post-graduation benefit of Post-Completion Optional Practical Training (Post-OPT).
8. Students receive 1 academic credit per semester for Pharmaceutical Science Internship (PHSC 6401). If students want to do an internship for a fourth semester they may do so, but students will only receive a maximum of 3 credits for Pharmaceutical Science Internship (PHSC 6401). The 4th credit for Pharmaceutical Science Internship (PHSC 6401) will not be added to the student's degree.
9. Taking internship must not extend international students' visas.

General Policies Common to all MS Programs in the Department of Pharmaceutical Sciences

GRADING POLICY

Students are expected to maintain a grade-point average (GPA) of 3.000 (B) or higher in all coursework. Students whose cumulative GPA falls below 3.000 will receive written notification from the Bouvé Office of Graduate Student Services that they have been placed on academic probation. A student must clear the deficiency and return to nonprobationary status within one semester, unless the course that must be retaken is not offered during the probationary semester. In such a case, the course to be retaken must be completed during the next semester that it is offered, and the GPA must be restored to at least 3.000. Failure to remediate the deficiencies and return to nonprobationary status within the established time limit will result in dismissal from the MS program. Refer to the Bouvé College of Health Sciences policy on Academic Dismissal (p. 256) and Academic Probation Policy (p. 256) for full details.

PROGRESSION REQUIREMENT

Bouvé College of Health Sciences policy specifies that students register for coursework or continuation credit each semester of the academic year (fall and spring semesters) after they are matriculated as full- or part-time students. Moreover, international students are required to maintain full-time student status during each academic term; consult the Office of Global Services (https://international.northeastern.edu/ogs/) for specific requirements. Domestic students who are not able to register for courses during a particular semester must petition the director of graduate studies in the department for exemption, in writing, and state the reasons for the exemption and their plan for resuming their studies. Approval of the petition will preserve student status in the MS program.

All MS students are expected to complete the degree requirements within two years if enrolled on a full-time basis, or within three to five years if enrolled on a part-time basis. If progress toward the degree is slowed or interrupted for personal reasons, the student so affected must petition the pharmaceutical sciences department graduate committee for an extension, detailing the anticipated time to completion. If an extension is approved, the student will be directed to meet with his or her academic advisor to devise a formal plan to achieve completion of the degree.

Course credits earned in the Bouvé College of Health Sciences Graduate School or accepted for transfer from another institution and not applied to obtain a previous degree are valid for a maximum of seven years. Refer to the Bouvé College of Health Sciences Academic Progression Policies and Procedures (p. 256) for details.

ACADEMIC HONESTY AND RESEARCH INTEGRITY

The Department of Pharmaceutical Sciences has a zero-tolerance policy regarding academic dishonesty and violations of research integrity. It is each student's responsibility to understand and adhere to Northeastern University's Academic Integrity Policy (http://www.northeastern.edu/osccr/academic-integrity-policy/). Definitions of plagiarism, cheating, fabrication, falsification, unauthorized collaboration, and actions that facilitate academic or research dishonesty can be found on the Office of Student Conduct and Conflict Resolution website (http://www.northeastern.edu/osccr/). The lack of knowledge of these definitions does not excuse the student's responsibility for upholding them. Offenses of academic honesty and research integrity are egregious violations of ethical standards and may result in disciplinary actions including the student's immediate dismissal from the graduate program.

Please visit Bouvé College of Health Sciences Program Learning Outcomes (https://bouve.northeastern.edu/learning-outcomes/) for the specific student learning outcomes for this program.

MASTER OF SCIENCE THESIS OPTION

Students who undertake a thesis are expected to report the results of extended research in a written thesis document and make an original contribution to their field. This work should give evidence of the students' abilities to conduct independent research and interpret their research results in an acceptable manner. Arrangements are made by students interested in the thesis option with individual laboratory directors as to the availability of MS-student research positions and the specific research focus.

Thesis Registration

Students may receive a maximum of 4 semester hours (SH) of credit for MS thesis research. Students should register for Thesis (PHSC 6990), twice for 2 SH each during the fall and spring semesters of their second full year of study, or after completing 15 credits of study. If completion of the thesis requires additional time, students should register for Thesis Continuation (PHSC 6996) (0 SH).

Thesis Committee

Each student's thesis committee should be composed of at least three members: two from the sponsoring program and one from outside the student's program. The outside member may be a Northeastern University faculty member. The director of graduate studies for the pharmaceutical sciences department may appoint additional members, as considered necessary for student development. The student's major advisor, in whose laboratory the research is being conducted, will serve as

committee chairperson. The student, after consulting with the committee chair, is responsible for calling all thesis committee meetings.

Thesis Proposal

The thesis proposal should be no more than 50 double-spaced pages (12-point font minimum and one-half-inch margins on all sides). This page limit excludes references but includes figures, figure legends, and tables. Aside from these exceptions, the proposal should conform to the format and structure of an NIH grant proposal with four sections: specific aims, background and significance, preliminary studies, and experimental design and methods. See the Department of Pharmaceutical Sciences "Thesis Proposal" document for detailed instructions on the preparation of a thesis proposal and the required forms located on the pharmaceutical sciences homepage (https://bouve.northeastern.edu/pharmsci/).

The thesis proposal must be defended orally before the thesis committee and signed by all thesis committee members before the student undertakes the planned research. The signed cover page of the proposal should be submitted to the director of graduate studies, pharmaceutical sciences department, and to the Bouvé College of Health Sciences Graduate Office.

Thesis Final Defense

The final defense is taken after the student completes the thesis research and all other requirements for the MS degree. The defense deals with the subject matter of the thesis, significant developments in the field, and student's background knowledge in their field of specialization. The thesis committee conducts the final defense.

At least two weeks prior to the expected date of the oral defense, the written thesis must be circulated to the student's thesis committee. After initial committee evaluation, recommendation may be made that the student clarify or rewrite portions of the thesis before scheduling the final defense. After the thesis committee concurs that the thesis is acceptable, a date is chosen for the final oral examination. At least two weeks prior to the defense, the student should inform the director of graduate studies in the pharmaceutical sciences department so that an announcement can be distributed to faculty and students. The final defense is open to anyone who wishes to attend and typically lasts at least two hours. After presentation of the work by the student, and responses to audience and committee questions, the student's committee meets in executive session to decide whether the student has successfully defended the thesis. The committee's decision is then announced to the student. If the committee's vote is favorable, the student incorporates committee suggestions and the dissertation is signed off and passed on to the director of graduate studies in the department. Requests for a second defense are unusual but may be permitted if the original oral defense was judged significantly inadequate.

Thesis Deadline

The thesis should be written, defended, and signed at least two weeks before the university commencement deadline. Students must submit signed copies of the thesis to the online site designated by the university.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of C– or higher is required in each course.

Code	Title	Hours
Required Core		
PHSC 5100	Concepts in Pharmaceutical Science	2
PHSC 5102	Concepts in Pharmaceutical Science 2	2
PHSC 5212	Research Skills and Ethics	2
or PHSC 6213	Ethical Problems in Health Sciences Research	
Chemistry		
CHEM 5626	Organic Synthesis 1	3
CHEM 5628	Principles of Spectroscopy of Organic Compounds	3
CHEM 5672	Organic Synthesis 2	3
CHEM 5676	Bioorganic Chemistry	3
PHSC 5400	Principles of Drug Design	3
PHSC 6222	The Chemistry and Biology of Drugs of Abuse	2
PHSC 6224	Behavioral Pharmacology and Drug Discovery	2
PHSC 6290	Biophysical Methods in Drug Discovery	2

Electives

Code	Title	Hours
Complete 6 semester hours in the following subject areas:		6
BIOL, BIOT, CHEM, NNMD, PHSC, PMCL, PMST		

Thesis Option

Thesis credits may count toward the required elective hours.

Code	Title	Hours
Thesis research should be taken twice:		4
PHSC 6990	Thesis [1]	
Thesis continuation may be taken if additional time is needed to complete the thesis.		
PHSC 6996	Thesis Continuation	

Program Credit/GPA Requirements

33 total semester hours required
Minimum 3.000 GPA required

Medicinal Chemistry & Drug Discovery, MS

The Medicinal Chemistry & Drug Discovery MS program integrates aspects of contemporary medicinal chemistry and pharmacology, emphasizing topics most relevant to therapeutics design, discovery, and action. The core curriculum focuses on a combination of synthetic organic chemistry, bioorganic chemistry, analytical chemistry, and pharmacology courses. Specialized, in-depth electives are offered in these areas. The program is designed to develop students' knowledge of medicinal chemistry through design, synthesis, and pharmacological profiling of novel pharmacotherapeutics as applied to helping solve unmet medical needs. For this purpose, many program graduates have established research careers in the pharmaceutical/biotech industry. Undergraduate prerequisites are general chemistry, organic chemistry, and biochemistry or cell/molecular biology.

Curriculum Requirements

All MS programs in the Department of Pharmaceutical Sciences require a set of core courses taken by every MS student, regardless of program. In addition, students in each program are required to take a defined set of discipline-specific courses and several general electives. The number of specialized and elective courses differs somewhat among programs. The MS degree may be completed on either a full-time or part-time basis

and may include an optional research thesis. International students are required to attend the program on a full-time basis.

Internship Requirements and Regulations for Department of Pharmaceutical Sciences

Internships provide an experiential component of the graduate curriculum that fosters professional development through work in industry and hospitals.

1. In order to participate in an internship, students must complete two semesters with a grade-point average (GPA) of 3.200 or better; be in good academic standing; and have no instances of academic dishonesty, no blocks on enrollment, and no repeated courses.
2. Students are in school full-time in addition to working on their internships.
3. There are no vacations on co-op/internships. Companies' sick time policies may vary. Students should check with their employers.
4. Students are responsible for finding their own internship and must be honest and accurate representing their experiences on their resumés. Prior to looking for an internship, students must have their faculty advisor approve their resumé and ascertain to the best of his or her ability that the skills and training of students are as presented.
5. Students must not accept more than one position. They must honor the first offer accepted.
6. In order to receive a grade for the course, students must write at least two learning goals and a paper describing what they learned, mid- and end of semester. Supervisors for internships will reply to a questionnaire about students' performance.
7. International students must register for Pharmaceutical Science Internship (PHSC 6401) and follow instructions to receive Curricular Practical Training (CPT) authorization from the Office of Global Services every semester they work. This applies to part-time jobs and volunteer opportunities. International students cannot engage in full-time CPT authorization totaling more than 52 weeks. Doing so will eliminate the possibility of engaging in the post-graduation benefit of Post-Completion Optional Practical Training (Post-OPT).
8. Students receive 1 academic credit per semester for the Pharmaceutical Science Internship course (PHSC 6401). If students want to do an internship for a fourth semester they may do so, but students will only receive a maximum of 3 credits for the Pharmaceutical Science Internship course (PHSC 6401). The 4th credit for the Pharmaceutical Science Internship course (PHSC 6401) will not be added to the student's degree.
9. Taking internship must not extend international students' visas.

General Policies Common to all MS Programs in the Department of Pharmaceutical Sciences

GRADING POLICY

Students are expected to maintain a grade-point average (GPA) of 3.000 (B) or higher in all coursework. Students whose cumulative GPA falls below 3.000 will receive written notification from the Bouvé Office of Graduate Student Services that they have been placed on academic probation. A student must clear the deficiency and return to nonprobationary status within one semester, unless the course that must be retaken is not offered during the probationary semester. In such a case, the course to be retaken must be completed during the next semester that it is offered, and the GPA must be restored to at least 3.000. Failure to remediate the deficiencies and return to nonprobationary status within the established time limit will result in dismissal from the MS program. Refer to the Bouvé College of Health Sciences policy on Academic Dismissal (p. 256) and Academic Probation Policy (p. 256) for full details.

PROGRESSION REQUIREMENT

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MASTER OF SCIENCE THESIS OPTION

Students who undertake a thesis are expected to report the results of extended research in a written thesis document and make an original contribution to their field. This work should give evidence of the students' abilities to conduct independent research and interpret their research results in an acceptable manner. Arrangements are made by students interested in the thesis option with individual laboratory directors as to the availability of MS-student research positions and the specific research focus.

Thesis Registration

Students may receive a maximum of 4 semester hours (SH) of credit for MS thesis research. Students should register for Thesis (PHSC 6990), twice for 2 SH each during the fall and spring semesters of their second full year of study, or after completing 15 credits of study. If completion

of the thesis requires additional time, students should register for Thesis Continuation (PHSC 6996) (0 SH).

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Thesis Final Defense
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Thesis Deadline
The thesis should be written, defended, and signed at least two weeks before the university commencement deadline. Students must submit signed copies of the thesis to the online site designated by the university.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

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Code	Title	Hours
Required Core		
PHSC 5100	Concepts in Pharmaceutical Science	2
PHSC 5102	Concepts in Pharmaceutical Science 2	2
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or PHSC 6213	Ethical Problems in Health Sciences Research	
Medicinal Chemistry & Drug Discovery		
CHEM 5626	Organic Synthesis 1	3
CHEM 5628	Principles of Spectroscopy of Organic Compounds	3
CHEM 5672	Organic Synthesis 2	3
CHEM 5676	Bioorganic Chemistry	3
PHSC 5400	Principles of Drug Design	3
PHSC 6222	The Chemistry and Biology of Drugs of Abuse	2
PHSC 6224	Behavioral Pharmacology and Drug Discovery	2
PHSC 6290	Biophysical Methods in Drug Discovery	2

Electives

Code	Title	Hours
Complete 6 semester hours in the following subject areas:		6
BIOL, BIOT, CHEM, NNMD, PHSC, PMCL, PMST		

Thesis Option

Thesis credits may count toward the required elective hours.

Code	Title	Hours
Thesis research should be taken twice:		4
PHSC 6990	Thesis	
Thesis continuation may be taken if additional time is needed to complete the thesis.		
PHSC 6996	Thesis Continuation	

Program Credit/GPA Requirements

33 total semester hours required
Minimum 3.000 GPA required

Pharmaceutical Sciences, MS

Just as cars are useless without roads, drugs are useless without effective delivery systems. This is especially important in contemporary pharmaceutical research, as new chemical entities may be either too hydrophobic (e.g., many anticancer drugs) or hydrophilic and highly labile (e.g., nucleic acids). The Bouvé College of Health Sciences School of Pharmacy pharmaceutics students and faculty are developing the routes for bringing small-molecule drugs and biological therapies directly to target cells responsible for major diseases.

Our comprehensive pharmaceutical sciences MS program includes faculty members in pharmaceutics and drug development specializing in the use and delivery of therapeutics. The program faculty seeks to

improve the understanding and description of how chemical and physical properties of drugs and dosage forms affect drug performance in healthy and diseased systems. Graduate students may choose from programs concentrating in:

- Novel drug delivery systems
- Biopharmaceutics and pharmacokinetics
- Physical pharmacy and polymeric dosage form development
- Drug metabolism

With a strong focus on nanotechnology-based advanced delivery systems that address contemporary therapeutic needs, the pharmaceutical sciences program also gives students opportunities to study with some of the world's top pharmaceutics researchers. Students in the pharmaceutical sciences MS program have the option of performing industrial internships (typically during the summer) in some of the most prestigious pharmaceutical and biotechnology companies in the Boston area.

Curriculum Requirements

All MS programs in the Department of Pharmaceutical Sciences require a set of core courses taken by every MS student, regardless of program. In addition, students in each program are required to take a defined set of discipline-specific courses and several general electives. The number of specialized and elective courses differs somewhat among programs. The MS degree may be completed on either a full-time or part-time basis and may include an optional research thesis. International students are required to attend the program on a full-time basis.

Internship Requirements and Regulations for Department of Pharmaceutical Sciences

Internships provide an experiential component of the graduate curriculum that fosters professional development through work in industry and hospitals.

1. In order to participate in an internship, students must complete two semesters with a grade-point average (GPA) of 3.200 or better; be in good academic standing; and have no instances of academic dishonesty, no blocks on enrollment, and no repeated courses.
2. Students are in school full-time in addition to working on their internships.
3. There are no vacations on co-op/internships. Companies' sick time policies may vary. Students should check with their employers.
4. Students are responsible for finding their own internship and must be honest and accurate representing their experiences on their resumés. Prior to looking for an internship, students must have their faculty advisor approve their resumé and ascertain to the best of his or her ability that the skills and training of students are as presented.
5. Students must not accept more than one position. They must honor the first offer accepted.
6. In order to receive a grade for the course, students must write at least two learning goals and a paper describing what they learned, mid- and end of semester. Supervisors for internships will reply to a questionnaire about students' performance.
7. International students must register for Pharmaceutical Science Internship (PHSC 6401) and follow instructions to receive Curricular Practical Training (CPT) authorization from the Office of Global Services every semester they work. This applies to part-time jobs and volunteer opportunities. International students cannot engage in full-time CPT authorization totaling more than 52 weeks. Doing so will eliminate the possibility of engaging in the post-graduation benefit of Post-Completion Optional Practical Training (Post-OPT).
8. Students receive 1 academic credit per semester for Pharmaceutical Science Internship (PHSC 6401). If students want to do an internship for a fourth semester they may do so, but students will only receive a maximum of 3 credits for Pharmaceutical Science Internship (PHSC 6401). The 4th credit for Pharmaceutical Science Internship (PHSC 6401) will not be added to the student's degree.
9. Taking internship must not extend international students' visas.

General Policies Common to all MS Programs in the Department of Pharmaceutical Sciences

GRADING POLICY

Students are expected to maintain a grade-point average (GPA) of 3.000 (B) or higher in all coursework. Students whose cumulative GPA falls below 3.000 will receive written notification from the Bouvé Office of Graduate Student Services that they have been placed on academic probation. A student must clear the deficiency and return to nonprobationary status within one semester, unless the course that must be retaken is not offered during the probationary semester. In such a case, the course to be retaken must be completed during the next semester that it is offered, and the GPA must be restored to at least 3.000. Failure to remediate the deficiencies and return to nonprobationary status within the established time limit will result in dismissal from the MS program. Refer to the Bouvé College of Health Sciences policy on Academic Dismissal (p. 256) and Academic Probation Policy (p. 256) for full details.

PROGRESSION REQUIREMENT

Bouvé College of Health Sciences policy specifies that students register for coursework or continuation credit each semester of the academic year (fall and spring semesters) after they are matriculated as full- or part-time students. Moreover, international students are required to maintain full-time student status during each academic term; consult the Office of Global Services (https://international.northeastern.edu/ogs/) for specific requirements. Domestic students who are not able to register for courses during a particular semester must petition the director of graduate studies in the department for exemption, in writing, and state the reasons for the exemption and their plan for resuming their studies. Approval of the petition will preserve student status in the MS program.

All MS students are expected to complete the degree requirements within two years if enrolled on a full-time basis, or within three to five years if enrolled on a part-time basis. If progress toward the degree is slowed or interrupted for personal reasons, the student so affected must petition the pharmaceutical sciences department graduate committee for an extension, detailing the anticipated time to completion. If an extension is approved, the student will be directed to meet with his or her academic advisor to devise a formal plan to achieve completion of the degree.

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ACADEMIC HONESTY AND RESEARCH INTEGRITY

The Department of Pharmaceutical Sciences has a zero-tolerance policy regarding academic dishonesty and violations of research integrity. It is each student's responsibility to understand and adhere to Northeastern University's Academic Integrity Policy (http://www.northeastern.edu/osccr/academic-integrity-policy/). Definitions of plagiarism, cheating, fabrication, falsification, unauthorized collaboration, and actions that facilitate academic or research dishonesty can be found on the Office of Student Conduct and Conflict Resolution website (http://www.northeastern.edu/osccr/). The lack of knowledge of these

definitions does not excuse the student's responsibility for upholding them. Offenses of academic honesty and research integrity are egregious violations of ethical standards and may result in disciplinary actions including the student's immediate dismissal from the graduate program.

Please visit Bouvé College of Health Sciences Program Learning Outcomes (https://bouve.northeastern.edu/learning-outcomes/) for the specific student learning outcomes for this program.

MASTER OF SCIENCE THESIS OPTION

Students who undertake a thesis are expected to report the results of extended research in a written thesis document and make an original contribution to their field. This work should give evidence of the students' abilities to conduct independent research and interpret their research results in an acceptable manner. Arrangements are made by students interested in the thesis option with individual laboratory directors as to the availability of MS-student research positions and the specific research focus.

Thesis Registration

Students may receive a maximum of 4 semester hours (SH) of credit for MS thesis research. Students should register for Thesis (PHSC 6990), twice for 2 SH each during the fall and spring semesters of their second full year of study, or after completing 15 credits of study. If completion of the thesis requires additional time, students should register for Thesis Continuation (PHSC 6996) (0 SH).

Thesis Committee

Each student's thesis committee should be composed of at least three members: two from the sponsoring program and one from outside the student's program. The outside member may be a Northeastern University faculty member. The director of graduate studies for the pharmaceutical sciences department may appoint additional members, as considered necessary for student development. The student's major advisor, in whose laboratory the research is being conducted, will serve as committee chairperson. The student, after consulting with the committee chair, is responsible for calling all thesis committee meetings.

Thesis Proposal

The thesis proposal should be no more than 50 double-spaced pages (12-point font minimum and one-half-inch margins on all sides). This page limit excludes references but includes figures, figure legends, and tables. Aside from these exceptions, the proposal should conform to the format and structure of an NIH grant proposal with four sections: specific aims, background and significance, preliminary studies, and experimental design and methods. See the Department of Pharmaceutical Sciences "Thesis Proposal" document for detailed instructions on the preparation of a thesis proposal and the required forms located on the pharmaceutical sciences homepage (https://bouve.northeastern.edu/pharmsci/).

The thesis proposal must be defended orally before the thesis committee and signed by all thesis committee members before the student undertakes the planned research. The signed cover page of the proposal should be submitted to the director of graduate studies, pharmaceutical sciences department, and to the Bouvé College of Health Sciences Graduate Office.

Thesis Final Defense

The final defense is taken after the student completes the thesis research and all other requirements for the MS degree. The defense deals with the subject matter of the thesis, significant developments in the field, and student's background knowledge in their field of specialization. The thesis committee conducts the final defense.

At least two weeks prior to the expected date of the oral defense, the written thesis must be circulated to the student's thesis committee. After initial committee evaluation, recommendation may be made that the student clarify or rewrite portions of the thesis before scheduling the final defense. After the thesis committee concurs that the thesis is acceptable, a date is chosen for the final oral examination. At least two weeks prior to the defense, the student should inform the director of graduate studies in the pharmaceutical sciences department so that an announcement can be distributed to faculty and students. The final defense is open to anyone who wishes to attend and typically lasts at least two hours. After presentation of the work by the student, and responses to audience and committee questions, the student's committee meets in executive session to decide whether the student has successfully defended the thesis. The committee's decision is then announced to the student. If the committee's vote is favorable, the student incorporates committee suggestions and the dissertation is signed off and passed on to the director of graduate studies in the department. Requests for a second defense are unusual but may be permitted if the original oral defense was judged significantly inadequate.

Thesis Deadline

The thesis should be written, defended, and signed at least two weeks before the university commencement deadline. Students must submit signed copies of the thesis to the online site designated by the university.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of C– or higher is required in each course.

Code	Title	Hours
Required Core		
Complete 14–16 semester hours from the following:		
PHSC 5100	Concepts in Pharmaceutical Science	
PHSC 5102	Concepts in Pharmaceutical Science 2	
PHSC 5212	Research Skills and Ethics	
or PHSC 6213	Ethical Problems in Health Sciences Research	
PHSC 5300	Pharmaceutical Biochemistry [1]	
or PHSC 7010	Pharmaceutical Sciences Laboratory	
PHSC 5310	Cellular Physiology	
PHSC 6214	Experimental Design and Biostatistics	
PHSC 6216	Human Physiology and Pathophysiology	
Pharmaceutics		
PMST 6250	Advanced Physical Pharmacy	2
PMST 6252	Pharmacokinetics and Drug Metabolism	3
PMST 6254	Advanced Drug Delivery Systems	3

Electives

Code	Title	Hours
Complete 9–11 semester hours from the following subject areas: [1]		9-11
BIOL, BIOT, CHEM, NNMD, PHSC, PMCL, PMST		

Thesis Option

Thesis credits may count toward the required elective hours.

Code	Title	Hours
Thesis research should be taken twice:		4
PHSC 6990	Thesis	
Thesis continuation may be taken if additional time is needed to complete the thesis.		
PHSC 6996	Thesis Continuation	

[1] Students who opt to complete 4-credit Pharmaceutical Sciences Laboratory (PHSC 7010) in the core requirements may complete the degree with 9 elective credits; all other students must complete 11 elective credits.

Program Credit/GPA Requirements

33 total semester hours required
Minimum 3.000 GPA required

Pharmaceutics and Drug Delivery, MS

Just as cars are useless without roads, drugs are useless without effective delivery systems. This is especially important in contemporary pharmaceutical research, as new chemical entities may be either too hydrophobic (e.g., many anticancer drugs) or hydrophilic and highly labile (e.g., nucleic acids). The Bouvé College of Health Sciences School of Pharmacy Pharmaceutics and Drug Delivery students and faculty are developing the routes for bringing small-molecule drugs and biological therapies directly to target cells responsible for major diseases.

Our comprehensive Pharmaceutics and Drug Delivery MS program includes faculty members in pharmaceutics and drug development specializing in the use and delivery of therapeutics. The program faculty seeks to improve the understanding and description of how chemical and physical properties of drugs and dosage forms affect drug performance in healthy and diseased systems. Graduate students may choose from programs concentrating in:

- Novel drug delivery systems
- Biopharmaceutics and pharmacokinetics
- Physical pharmacy and polymeric dosage form development
- Drug metabolism

With a strong focus on nanotechnology-based advanced delivery systems that address contemporary therapeutic needs, the pharmaceutical sciences program also gives students opportunities to study with some of the world's top pharmaceutics researchers. Students in the Pharmaceutics and Drug Delivery MS program have the option of performing industrial internships (typically during the summer) in some of the most prestigious pharmaceutical and biotechnology companies in the Boston area.

Please visit Bouvé College Learning Outcomes (https://bouve.northeastern.edu/learning-outcomes/) for the specific student learning outcomes for this program.

Curriculum Requirements

All MS programs in the Department of Pharmaceutical Sciences require a set of core courses taken by every MS student, regardless of program. In addition, students in each program are required to take a defined set of discipline-specific courses and several general electives. The number of specialized and elective courses differs somewhat among programs. The MS degree may be completed on either a full-time or part-time basis and may include an optional research thesis. International students are required to attend the program on a full-time basis.

Internship Requirements and Regulations for Department of Pharmaceutical Sciences

Internships provide an experiential component of the graduate curriculum that fosters professional development through work in industry and hospitals.

1. In order to participate in an internship, students must complete two semesters with a grade-point average (GPA) of 3.200 or better; be in good academic standing; and have no instances of academic dishonesty, no blocks on enrollment, and no repeated courses.
2. Students are in school full-time in addition to working on their internships.
3. There are no vacations on co-op/internships. Companies' sick time policies may vary. Students should check with their employers.
4. Students are responsible for finding their own internship and must be honest and accurate representing their experiences on their resumés. Prior to looking for an internship, students must have their faculty advisor approve their resumé and ascertain to the best of his or her ability that the skills and training of students are as presented.
5. Students must not accept more than one position. They must honor the first offer accepted.
6. In order to receive a grade for the course, students must write at least two learning goals and a paper describing what they learned, mid- and end of semester. Supervisors for internships will reply to a questionnaire about students' performance.
7. International students must register for Pharmaceutical Science Internship (PHSC 6401) and follow instructions to receive Curricular Practical Training (CPT) authorization from the Office of Global Services every semester they work. This applies to part-time jobs and volunteer opportunities. International students cannot engage in full-time CPT authorization totaling more than 52 weeks. Doing so will eliminate the possibility of engaging in the post-graduation benefit of Post-Completion Optional Practical Training (Post-OPT).
8. Students receive 1 academic credit per semester for the Pharmaceutical Science Internship course (PHSC 6401). If students want to do an internship for a fourth semester they may do so, but students will only receive a maximum of 3 credits for the Pharmaceutical Science Internship course (PHSC 6401). The 4th credit for the Pharmaceutical Science Internship course (PHSC 6401) will not be added to the student's degree.
9. Taking internship must not extend international students' visas.

General Policies Common to all MS Programs in the Department of Pharmaceutical Sciences

GRADING POLICY

Students are expected to maintain a grade-point average (GPA) of 3.000 (B) or higher in all coursework. Students whose cumulative GPA falls below 3.000 will receive written notification from the Bouvé Office of Graduate Student Services that they have been placed on academic probation. A student must clear the deficiency and return to nonprobationary status within one semester, unless the course that must be retaken is not offered during the probationary semester. In such a case, the course to be retaken must be completed during the next semester that it is offered, and the GPA must be restored to at least 3.000. Failure to remediate the deficiencies and return to nonprobationary status within the established time limit will result in dismissal from the MS program. Refer to the Bouvé College of Health Sciences policy on Academic Dismissal (p. 256) and Academic Probation Policy (p. 256) for full details.

PROGRESSION REQUIREMENT

Bouvé College of Health Sciences policy specifies that students register for coursework or continuation credit each semester of the academic year (fall and spring semesters) after they are matriculated as full- or part-time students. Moreover, international students are required to maintain full-time student status during each academic term; consult the Office of Global Services (https://international.northeastern.edu/ogs/) for specific requirements. Domestic students who are not able to register for courses during a particular semester must petition the director of graduate studies in the department for exemption, in writing, and state the reasons for the exemption and their plan for resuming their studies. Approval of the petition will preserve student status in the MS program.

All MS students are expected to complete the degree requirements within two years if enrolled on a full-time basis, or within three to five years if enrolled on a part-time basis. If progress toward the degree is slowed or interrupted for personal reasons, the student so affected must petition the pharmaceutical sciences department graduate committee for an extension, detailing the anticipated time to completion. If an extension is approved, the student will be directed to meet with his or her academic advisor to devise a formal plan to achieve completion of the degree.

Course credits earned in the Bouvé College of Health Sciences Graduate School or accepted for transfer from another institution and not applied to obtain a previous degree are valid for a maximum of seven years. Refer to the Bouvé College of Health Sciences Academic Progression Policies and Procedures (p. 256) for details.

ACADEMIC HONESTY AND RESEARCH INTEGRITY

The Department of Pharmaceutical Sciences has a zero-tolerance policy regarding academic dishonesty and violations of research integrity. It is each student's responsibility to understand and adhere to Northeastern University's Academic Integrity Policy (http://www.northeastern.edu/osccr/academic-integrity-policy/). Definitions of plagiarism, cheating, fabrication, falsification, unauthorized collaboration, and actions that facilitate academic or research dishonesty can be found on the Office of Student Conduct and Conflict Resolution website (http://www.northeastern.edu/osccr/). The lack of knowledge of these definitions does not excuse the student's responsibility for upholding them. Offenses of academic honesty and research integrity are egregious violations of ethical standards and may result in disciplinary actions including the student's immediate dismissal from the graduate program.

Please visit Bouvé College of Health Sciences Program Learning Outcomes (https://bouve.northeastern.edu/learning-outcomes/) for the specific student learning outcomes for this program.

MASTER OF SCIENCE THESIS OPTION

Students who undertake a thesis are expected to report the results of extended research in a written thesis document and make an original contribution to their field. This work should give evidence of the students' abilities to conduct independent research and interpret their research results in an acceptable manner. Arrangements are made by students interested in the thesis option with individual laboratory directors as to the availability of MS-student research positions and the specific research focus.

Thesis Registration

Students may receive a maximum of 4 semester hours (SH) of credit for MS thesis research. Students should register for Thesis (PHSC 6990), twice for 2 SH each during the fall and spring semesters of their second full year of study, or after completing 15 credits of study. If completion of the thesis requires additional time, students should register for Thesis Continuation (PHSC 6996) (0 SH).

Thesis Committee

Each student's thesis committee should be composed of at least three members: two from the sponsoring program and one from outside the student's program. The outside member may be a Northeastern University faculty member. The director of graduate studies for the pharmaceutical sciences department may appoint additional members, as considered necessary for student development. The student's major advisor, in whose laboratory the research is being conducted, will serve as committee chairperson. The student, after consulting with the committee chair, is responsible for calling all thesis committee meetings.

Thesis Proposal

The thesis proposal should be no more than 50 double-spaced pages (12-point font minimum and one-half-inch margins on all sides). This page limit excludes references but includes figures, figure legends, and tables. Aside from these exceptions, the proposal should conform to the format and structure of an NIH grant proposal with four sections: specific aims, background and significance, preliminary studies, and experimental design and methods. See the Department of Pharmaceutical Sciences "Thesis Proposal" document for detailed instructions on the preparation of a thesis proposal and the required forms located on the pharmaceutical sciences homepage (https://bouve.northeastern.edu/pharmsci/).

The thesis proposal must be defended orally before the thesis committee and signed by all thesis committee members before the student undertakes the planned research. The signed cover page of the proposal should be submitted to the director of graduate studies, pharmaceutical sciences department, and to the Bouvé College of Health Sciences Graduate Office.

Thesis Final Defense

The final defense is taken after the student completes the thesis research and all other requirements for the MS degree. The defense deals with the subject matter of the thesis, significant developments in the field, and student's background knowledge in their field of specialization. The thesis committee conducts the final defense.

At least two weeks prior to the expected date of the oral defense, the written thesis must be circulated to the student's thesis committee. After initial committee evaluation, recommendation may be made that the student clarify or rewrite portions of the thesis before scheduling the final defense. After the thesis committee concurs that the thesis is acceptable, a date is chosen for the final oral examination. At least two weeks prior to the defense, the student should inform the director of graduate studies in the pharmaceutical sciences department so that an announcement can be distributed to faculty and students. The final defense is open to anyone who wishes to attend and typically lasts at least two hours. After presentation of the work by the student, and responses to audience and committee questions, the student's committee meets in executive session to decide whether the student has successfully defended the thesis. The committee's decision is then announced to the student. If the committee's vote is favorable, the student incorporates committee suggestions and the dissertation is signed off and passed on to the director of graduate studies in the department. Requests for a second defense are unusual but may be permitted if the original oral defense was judged significantly inadequate.

Thesis Deadline

The thesis should be written, defended, and signed at least two weeks before the university commencement deadline. Students must submit signed copies of the thesis to the online site designated by the university.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of C– or higher is required in each course.

Code	Title	Hours
Required Core		
Complete 14–16 semester hours from the following:		14-16
PHSC 5100	Concepts in Pharmaceutical Science	
PHSC 5102	Concepts in Pharmaceutical Science 2	
PHSC 5212	Research Skills and Ethics	
or PHSC 6213	Ethical Problems in Health Sciences Research	
PHSC 5300	Pharmaceutical Biochemistry [1]	
or PHSC 7010	Pharmaceutical Sciences Laboratory	
PHSC 5310	Cellular Physiology	
PHSC 6214	Experimental Design and Biostatistics	
PHSC 6216	Human Physiology and Pathophysiology	
Pharmaceutics and Drug Delivery		
PMST 6250	Advanced Physical Pharmacy	2
PMST 6252	Pharmacokinetics and Drug Metabolism	3
PMST 6254	Advanced Drug Delivery Systems	3

Electives

Code	Title	Hours
Complete 9–11 semester hours from the following subject areas: [1]		9-11
BIOL, BIOT, CHEM, NNMD, PHSC, PMCL, PMST		

Thesis Option

Thesis credits may count toward the required elective hours.

Code	Title	Hours
Thesis research should be taken twice:		4
PHSC 6990	Thesis	
Thesis continuation may be taken if additional time is needed to complete the thesis.		
PHSC 6996	Thesis Continuation	

[1] Students who opt to complete 4-credit Pharmaceutical Sciences Laboratory (PHSC 7010) in the core requirements may complete the degree with 9 elective credits; all other students must complete 11 elective credits.

Program Credit/GPA Requirements

33 total semester hours required
Minimum 3.000 GPA required

Pharmacology, MS

Graduate education in pharmacology embodies the principles and mechanisms of drug action in biological systems. Through coursework, seminars, and conferences, students in the pharmacology MS program gain exposure to both classical and recent approaches that have led to the development of current theories of drug action and therapeutic application. Pharmacology should not be confused with pharmacy programs or training, which lead to professional licensure as a pharmacist and involve medication management.

Curriculum Requirements

All MS programs in the Department of Pharmaceutical Sciences require a set of core courses taken by every MS student, regardless of program. In addition, students in each program are required to take a defined set of discipline-specific courses and several general electives. The number of specialized and elective courses differs somewhat among programs. The MS degree may be completed on either a full-time or part-time basis and may include an optional research thesis. International students are required to attend the program on a full-time basis.

Internship Requirements and Regulations for Department of Pharmaceutical Sciences

Internships provide an experiential component of the graduate curriculum that fosters professional development through work in industry and hospitals.

1. In order to participate in an internship, students must complete two semesters with a grade-point average (GPA) of 3.200 or better; be in good academic standing; and have no instances of academic dishonesty, no blocks on enrollment, and no repeated courses.
2. Students are in school full-time in addition to working on their internships.
3. There are no vacations on co-op/internships. Companies' sick time policies may vary. Students should check with their employers.
4. Students are responsible for finding their own internship and must be honest and accurate representing their experiences on their resumés. Prior to looking for an internship, students must have their faculty advisor approve their resumé and ascertain to the best of his or her ability that the skills and training of students are as presented.
5. Students must not accept more than one position. They must honor the first offer accepted.
6. In order to receive a grade for the course, students must write at least two learning goals and a paper describing what they learned, mid- and end of semester. Supervisors for internships will reply to a questionnaire about students' performance.
7. International students must register for Pharmaceutical Science Internship (PHSC 6401) and follow instructions to receive Curricular Practical Training (CPT) authorization from the Office of Global Services every semester they work. This applies to part-time jobs and volunteer opportunities. International students cannot engage in full-time CPT authorization totaling more than 52 weeks. Doing so will eliminate the possibility of engaging in the post-graduation benefit of Post-Completion Optional Practical Training (Post-OPT).
8. Students receive 1 academic credit per semester for the Pharmaceutical Science Internship course (PHSC 6401). If students want to do an internship for a fourth semester they may do so, but students will only receive a maximum of 3 credits for the Pharmaceutical Science Internship course (PHSC 6401). The 4th credit for the Pharmaceutical Science Internship course (PHSC 6401) will not be added to the student's degree.
9. Taking internship must not extend international students' visas.

General Policies Common to all MS Programs in the Department of Pharmaceutical Sciences

GRADING POLICY

Students are expected to maintain a grade-point average (GPA) of 3.000 (B) or higher in all coursework. Students whose cumulative GPA falls below 3.000 will receive written notification from the Bouvé Office of Graduate Student Services that they have been placed on academic probation. A student must clear the deficiency and return to nonprobationary status within one semester, unless the course that must be retaken is not offered during the probationary semester. In such a case, the course to be retaken must be completed during the next semester that it is offered, and the GPA must be restored to at least 3.000. Failure to remediate the deficiencies and return to nonprobationary status within the established time limit will result in dismissal from the MS program. Refer to the Bouvé College of Health Sciences policy on Academic Dismissal (p. 256) and Academic Probation Policy (p. 256) for full details.

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MASTER OF SCIENCE THESIS OPTION

Students who undertake a thesis are expected to report the results of extended research in a written thesis document and make an original contribution to their field. This work should give evidence of the students' abilities to conduct independent research and interpret their research results in an acceptable manner. Arrangements are made by students interested in the thesis option with individual laboratory directors as to the availability of MS-student research positions and the specific research focus.

Thesis Registration

Students may receive a maximum of 4 semester hours (SH) of credit for MS thesis research. Students should register for Thesis (PHSC 6990), twice for 2 SH each during the fall and spring semesters of their second full year of study, or after completing 15 credits of study. If completion of the thesis requires additional time, students should register for Thesis Continuation (PHSC 6996) (0 SH).

Thesis Committee

Each student's thesis committee should be composed of at least three members: two from the sponsoring program and one from outside the student's program. The outside member may be a Northeastern University faculty member. The director of graduate studies for the pharmaceutical sciences department may appoint additional members, as considered necessary for student development. The student's major advisor, in whose laboratory the research is being conducted, will serve as committee chairperson. The student, after consulting with the committee chair, is responsible for calling all thesis committee meetings.

Thesis Proposal

The thesis proposal should be no more than 50 double-spaced pages (12-point font minimum and one-half-inch margins on all sides). This page limit excludes references but includes figures, figure legends, and tables. Aside from these exceptions, the proposal should conform to the format and structure of an NIH grant proposal with four sections: specific aims, background and significance, preliminary studies, and experimental design and methods. See the Department of Pharmaceutical Sciences "Thesis Proposal" document for detailed instructions on the preparation of a thesis proposal and the required forms located on the pharmaceutical sciences homepage (https://bouve.northeastern.edu/pharmsci/).

The thesis proposal must be defended orally before the thesis committee and signed by all thesis committee members before the student undertakes the planned research. The signed cover page of the proposal should be submitted to the director of graduate studies, pharmaceutical sciences department, and to the Bouvé College of Health Sciences Graduate Office.

Thesis Final Defense

The final defense is taken after the student completes the thesis research and all other requirements for the MS degree. The defense deals with the subject matter of the thesis, significant developments in the field, and student's background knowledge in their field of specialization. The thesis committee conducts the final defense.

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two weeks prior to the defense, the student should inform the director of graduate studies in the pharmaceutical sciences department so that an announcement can be distributed to faculty and students. The final defense is open to anyone who wishes to attend and typically lasts at least two hours. After presentation of the work by the student, and responses to audience and committee questions, the student's committee meets in executive session to decide whether the student has successfully defended the thesis. The committee's decision is then announced to the student. If the committee's vote is favorable, the student incorporates committee suggestions and the dissertation is signed off and passed on to the director of graduate studies in the department. Requests for a second defense are unusual but may be permitted if the original oral defense was judged significantly inadequate.

Thesis Deadline

The thesis should be written, defended, and signed at least two weeks before the university commencement deadline. Students must submit signed copies of the thesis to the online site designated by the university.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of C– or higher is required in each course.

Code	Title	Hours
Required Core		
Complete 14–16 semester hours from the following:		14-16
PHSC 5100	Concepts in Pharmaceutical Science	
PHSC 5102	Concepts in Pharmaceutical Science 2	
PHSC 5212	Research Skills and Ethics	
or PHSC 6213	Ethical Problems in Health Sciences Research	
PHSC 5300	Pharmaceutical Biochemistry [3]	
or PHSC 7010	Pharmaceutical Sciences Laboratory	
PHSC 5310	Cellular Physiology	
PHSC 6214	Experimental Design and Biostatistics	
PHSC 6216	Human Physiology and Pathophysiology	
Pharmacology		
PMCL 6260	Pharmacology 1 [1]	2
PMCL 6261	Pharmacology 2 [2]	2
PMCL 6262	Receptor Pharmacology [1]	2

Electives

Code	Title	Hours
Complete 11–13 semester hours from the following subject areas: [3]		11-13
BIOL, BIOT, CHEM, NNMD, PHSC, PMCL, PMST		

Thesis Option

Thesis credits may count toward the required elective hours.

Code	Title	Hours
Thesis research should be taken twice.		4
PHSC 6990	Thesis	
Thesis continuation may be taken if additional time is needed to complete the thesis.		
PHSC 6996	Thesis Continuation	

1. Pharmacology 1 (PMCL 6260) and Receptor Pharmacology (PMCL 6262) are only offered in even-numbered years in the spring semester (example: Spring 2020).
2. Pharmacology 2 (PMCL 6261) is only offered in odd-numbered years in the spring semester (example: Spring 2021). Pharmacology 1 does not have to be taken before Pharmacology 2.
3. Students who opt to complete 4-credit Pharmaceutical Sciences Laboratory (PHSC 7010) in the core requirements may complete the degree with 11 elective credits; all other students must complete 13 elective credits.

Program Credit/GPA Requirements

33 total semester hours required
Minimum 3.000 GPA required

Pharmacy, PharmD—Direct Entry / Public Health, MPH

The School of Pharmacy and the Department of Health Sciences offer a combined Doctor of Pharmacy (PharmD) and Master of Public Health (MPH) program.

The combined PharmD/MPH program recognizes and reinforces the importance of public health in pharmacy practice. Central to addressing public health concerns, and in particular those associated with racial and ethnic health disparities, the program is committed to building a strong, diverse, and activist public health workforce. The goal of the program is to graduate professionals who are well educated in the complex issues associated with disparate health status and healthcare access. The combined PharmD/MPH program allows qualified and interested students an opportunity to achieve their goal of obtaining a more robust understanding of public health through an MPH degree while also completing their PharmD.

Refer to the School of Pharmacy PharmD – Direct Entry (p. 328) and Department of Health Sciences Master of Public Health (p. 288) pages of this catalog for program requirements and technical standards. Students must adhere to all PharmD and MPH program standards, policies, and requirements as listed in the catalog, unless otherwise specified.

The Northeastern University Master of Public Health Program is accredited by the Council on Education for Public Health (CEPH). CEPH is an independent agency recognized by the U.S. Department of Education to accredit schools of public health and public health programs outside of schools of public health.

School of Law

James R. Hackney, JD, Dean

Julian M. Fray, JD, LLM, Associate Dean for Digital Strategy
Kristin Madison, JD, PhD, Associate Dean for Academic Affairs
Kerry E. Gallivan, MBA, Associate Dean for Administration and Finance
Rachel E. Rosenbloom, MA, JD, Associate Dean for Experiential Education
Kara W. Swanson, JD, PhD, Associate Dean for Research

Northeastern University School of Law (https://www.northeastern.edu/law/)
416 Huntington Avenue
Boston, MA 02115
617.373.5149

Today's legal environment demands that attorneys be nimble, entrepreneurial, and savvy; in all of these regards, graduates of the School of Law excel. Our curriculum, taught by nationally recognized faculty, provides students with a superior understanding of how the law applies in real settings, a strong ethical framework, and the experience to strategically pursue their professional objectives. Our co-op program sets us apart from all other law schools—our JD students complete many hours of work in law offices, judges' chambers, corporations, nonprofit organizations, and government. As a result of their co-op experiences, Northeastern JD students are not just sitting in classes hearing about the rapid changes in the legal world—they live them.

Our community also provides a refreshing refutation of the law school stereotype as a place of ruthless competition and blind ambition. Instead, we cultivate an atmosphere that is collaborative, collegial, and supportive. Our students' eagerness to work in teams, help one another, and share their experiences reflects that ethos. Our faculty and staff are exceptionally supportive of students—not only because our small community encourages extensive student-faculty interaction but also because they share their students' passion for justice.

In addition to offering both full-time and part-time JD programs, the School of Law offers on-campus and online LLM programs for lawyers, a Master of Legal Studies program for nonlawyers, and a number of other programs. Our suite of LLM opportunities is offered for both those who hold a U.S. law degree and those who hold a first professional law degree from a law school outside of the United States.

Programs

Juris Doctor

- Law (p. 347)

Master of Laws

- Law (p. 349)
- Law (p. 350)—Experiential
- Law—Online

Master of Legal Studies

- Legal Studies—Online (p. 352)

Master of Science

- Media Advocacy (p. 57)

Graduate Certificates

- Business Law (p. 354)
- Healthcare Compliance (p. 354)
- Health Law (p. 354)
- Human Resources Law (p. 355)
- Intellectual Property Law (p. 356)
- United States Law (p. 358)

For JD students only:

- Health Law and Policy (p. 355)
- Poverty Law and Economic Justice (p. 356)
- Privacy Law (p. 357)
- Women, Gender, Sexuality, and the Law (p. 358)

Dual Degrees

- Law, JD / Accounting and Business Administration, MSAMBA (p. 97)
- Law, JD / Business Administration, MBA (p. 359)
- Law, JD / Creative Practice Leadership, MS (p. 66)
- Law, JD / Criminology and Criminal Justice, MS (p. 360)
- Law, JD / Criminology and Justice Policy, PhD (p. 360)
- Law, JD / Public Health, MPH (p. 360)
- Law, JD / Public Policy, MPP (p. 361)
- Law, LLM / Business Administration, MBA (p. 361)

Academic Policies and Procedures

Academic policies of the School of Law are provided in the applicable Student Information Handbook, which can be found on the website of the School of Law Office of Academic and Student Affairs (https://www.northeastern.edu/lawstudentaffairs/).

Law, JD

Overview

Students at Northeastern University School of Law gain unparalleled networking opportunities from the moment they walk in the door. While many law schools talk about offering work experience, Northeastern Law has been the nation's leader in experiential legal education for five decades. Northeastern launched its Cooperative Legal Education Program in 1968 and today offers the largest and most extensive hands-on professional program in the country. Students devote several of their upper-level terms to working full-time as legal professionals. Through the co-op program, students have the opportunity to experience various fields of law in multiple practice settings.

Northeastern Law students gain real work experience and networking opportunities that far exceed the offerings of other law schools. With more than 1,500 employers in more than 40 states and a number of countries around the world, Northeastern students create professional networks in legal offices ranging from large firms in Boston to government agencies in Washington, D.C., to human rights organizations in Geneva. Through these connections and with access to the more than 8,000 alumni, Northeastern Law students graduate with not only a resumé packed full of experience but also a network that is unrivaled.

The School of Law offers a curriculum that provides students the tools they will need to pursue a successful legal career. In their first year, JD students complete required coursework. In their second and third years, they explore areas of interest by completing multiple full-time co-ops and taking courses that provide insight into many areas of the law.

Interdisciplinary Graduate Certificates

The School of Law offers JD students the option to pursue one of the following interdisciplinary graduate certificates:

- Health Law and Policy (p. 355)
- Human Rights Law (p. 356)
- Poverty Law and Economic Justice (p. 356)
- Privacy Law (p. 357)
- Women, Gender, Sexuality, and the Law (p. 358)

Dual Degrees

The School of Law offers multiple dual degrees (p. 359).

For a more comprehensive description of policies, procedures, and requirements pertaining to the JD program, please refer to the School of Law's website *(*https://www.northeastern.edu/lawstudentaffairs/*).*

Full-Time Option

Complete all courses and requirements described below.

Milestones

Code	Title	Hours
Public Interest Requirement [1]		
Upper-Level Rigorous Writing Requirement [2]		
Experiential Education Requirement [2]		
Co-op Requirement: Co-ops corresponding to three terms [3]		
Note: All courses used to satisfy JD requirements must be completed with a passing grade. Students must satisfactorily complete all JD requirements, including the public interest requirement, the upper-level rigorous writing requirement, the experiential education requirement, and the co-op requirement.		

First-Year Course Requirements

Code	Title	Hours
Fall Term		
LAW 6100	Civil Procedure	5
LAW 6105	Property	4
LAW 6106	Torts	4
LAW 6160	Legal Skills in Social Context	2
LAW 6165	LSSC: Legal Research and Writing Component	2
Spring Term		
LAW 6101	Constitutional Law	4
LAW 6102	Contracts	5
LAW 6103	Criminal Justice	4
LAW 6160	Legal Skills in Social Context	2
LAW 6165	LSSC: Legal Research and Writing Component	2

Upper-Level Course Requirements

Code	Title	Hours
Professional Responsibility		
LAW 7443	Professional Responsibility	3
Electives		
Complete 46 credits of elective coursework.		46

Rules and policies applicable to elective coursework are described in the School of Law Student Information Handbook.

Program Credit Requirement

83 total credits required: 34 credits earned during the first year and a minimum of 49 credits earned during upper-level academic terms.

1. Information about the public interest requirement is provided in the Student Information Handbook.
2. The same course cannot be used to satisfy both the rigorous writing and experiential education requirements.
3. Transfer students should consult the Student Information Handbook for applicable requirements. All students with questions about satisfying co-op requirements should consult the Center for Co-op and Career Development.

Part-Time Option

Complete all courses and requirements described below.

Milestones

Code	Title	Hours
Public Interest Requirement [1]		
Upper-Level Rigorous Writing Requirement [2]		
Experiential Education Requirement [2]		
Part-time co-ops corresponding to two terms; a field placement and associated seminar; and 350 hours of relevant work experience [3]		
Note: All courses used to satisfy JD requirements must be completed with a passing grade. Students must satisfactorily complete all JD requirements, including the public interest requirement, the upper-level rigorous writing requirement, the experiential education requirement, and the co-op, field placement, and relevant work experience requirement.		

First-Year Course Requirements

Code	Title	Hours
Students will take the following courses during their first four semesters:		
LAW 6100	Civil Procedure	5
LAW 6101	Constitutional Law	4
LAW 6102	Contracts	5
LAW 6103	Criminal Justice	4
LAW 6105	Property	4
LAW 6106	Torts	4
LAW 6160	Legal Skills in Social Context	2
LAW 6165	LSSC: Legal Research and Writing Component	2
LAW 6160	Legal Skills in Social Context	2
LAW 6165	LSSC: Legal Research and Writing Component	2

Upper-Level Course Requirements

Code	Title	Hours
Field Placement		
LAW 7945	Field Placement Seminar	1
or LAW 7947	Public Interest Field Placement Seminar	
LAW 7946	Field Placement	7
or LAW 7948	Public Interest Field Placement	
Professional Responsibility		
LAW 7443	Professional Responsibility	3
Electives		
Complete 38 credits of LAW courses not already taken to fulfill another requirement.		38

Rules and policies applicable to upper-level courses are described in the School of Law Student Information Handbook.

Program Credit Requirement

83 total credit hours required.

1. Information about the public interest requirement is provided in the Student Information Handbook.
2. The same course cannot be used to satisfy both the rigorous writing and experiential education requirements.

[3] Transfer students should consult the Student Information Handbook for applicable requirements. All students with questions about the nature of these requirements should consult the Student Information Handbook and the Center for Co-op and Career Development.

Law, LLM

Law, LLM Program Requirements

The LLM program offers a rigorous curriculum that will provide you with a comprehensive foundation in legal theory and practice as well as the freedom to explore and refine your career interests. LLM students may choose the general program, which offers maximum flexibility to let you take the courses you want and need — to qualify for a US bar exam or to do whatever you choose as a lawyer who wants to make a difference — or one of our concentrations, which provide a competitive advantage in specific fields of interest.

Concentration Options

This LLM program offers several concentrations:

- Health Policy and Law
- Human Rights and Economic Development
- Intellectual Property and Innovation
- International Business Law

Note: Students may choose a concentration area, but are not required to complete a concentration.

Complete all courses and requirements listed below unless otherwise indicated.

Foundational Courses

These foundational courses are required for any student who obtained their first law degree outside the United States:

Code	Title	Hours
LAW 6301	Intensive Introduction to American Law and Legal Institutions	2
LAW 6302	Intensive Introduction to Legal Research and Writing for LLM Students	2

Electives

Code	Title	Hours
Students must take at least 20 credits of LAW electives if they took the foundational courses; they must take at least 24 credits of LAW electives if not required to take foundational courses. Courses taken to fulfill concentration requirements count toward the elective requirement.		20 or 24

Concentration Options

Students may choose to pursue a concentration by completing the listed requirements. Courses taken to fulfill concentration requirements count toward the elective requirement for the LLM degree.

- Health Policy and Law (p. 349)
- H (p.)uman Rights and Economic Development (p.)
- Intellectual Property and Innovation (p. 350)
- International Business Law (p. 350)

Health Policy and Law

Code	Title	Hours
Core Course		
Complete the following course:		
LAW 7335	Health Law	3
Relevant Elective Courses		
Complete at least two of the following:		6-7
LAW 7494	Bioethics and the Law	
LAW 7512	Problems in Public Health Law	
LAW 7527	Public Health Legal Clinic	
LAW 7588	Reproductive and Sexual Rights and Health	
LAW 7600	Current Issues in Health Law and Policy	
LAW 7606	Drug Law and Policy	
LAW 7619	Healthcare Fraud and Abuse Law	
LAW 7681	Law and Biotechnology	
LAW 7685	Human Rights, IP, and Access to Medicines	

Students must also complete a paper related to health law. To fulfill this requirement, a paper must satisfy the criteria of the JD rigorous writing requirement.

Human Rights and Economic Development

Code	Title	Hours
Core Courses		
Complete one of the following courses:		3
LAW 7338	International Law	
LAW 7491	International Human Rights and the Global Economy	
LAW 7525	Law and Economic Development	
LAW 7580	Community Economic Development	
LAW 7651	Human Rights in the United States	
LAW 7666	Human Rights, the Environment, Development and Community Resilience	
LAW 7685	Human Rights, IP, and Access to Medicines	
Relevant Elective Courses		
Complete at least two additional courses from the core course list or the following list:		5-16
LAW 7336	Immigration Law	
LAW 7358	Social Welfare Law	
LAW 7538	International Environmental Law	
LAW 7550	Refugee and Asylum Law	
LAW 7559	International Trade	
LAW 7569	International and Foreign Legal Research	
LAW 7588	Reproductive and Sexual Rights and Health	
LAW 7597	Civil Rights and Restorative Justice Clinic	
LAW 7600	Current Issues in Health Law and Policy	
LAW 7610	Community Business Law Clinic	
LAW 7657	Immigrant Justice Clinic	

LAW 7676	Energy Justice: Theory, Law, and Policy for a Just Clean Energy Transition

Students must also complete a paper related to human rights and/or economic development. To fulfill this requirement, a paper must satisfy the criteria of the JD rigorous writing requirement.

Intellectual Property and Innovation

Code	Title	Hours
Core Courses		
Choose 2 courses from the following list:		6-7
LAW 7369	Intellectual Property	
LAW 7501	Patent Law	
LAW 7590	Copyright Law	
LAW 7638	Trademark Law	
or LAW 7521	Branding Law and Practice	
Relevant Elective Courses		
Complete at least two additional courses from the core course list or the following list:		6-11
LAW 7303	Antitrust	
LAW 7417	Entertainment Law	
LAW 7565	Intellectual Property Transactions Practice	
LAW 7633	IP CO-LAB Clinic	
LAW 7640	Information Security Law	
LAW 7685	Human Rights, IP, and Access to Medicines	

Students must also complete a clinic or paper related to Intellectual Property and Innovation. To fulfill this requirement, a paper must satisfy the criteria of the JD rigorous writing requirement. A clinic that counts toward the four-course requirement may not be used to also satisfy this requirement.

International Business Law

Code	Title	Hours
Core Courses		
Complete one course from the following list:		3
LAW 7525	Law and Economic Development	
LAW 7559	International Trade	
LAW 7603	International Business Transactions	
Relevant Elective Courses		
Complete at least two additional courses from the core course list or the following list:		4-7
LAW 7323	Corporations	
LAW 7336	Immigration Law	
LAW 7338	International Law	
LAW 7491	International Human Rights and the Global Economy	
LAW 7538	International Environmental Law	
LAW 7554	International Investment Arbitration and Litigation Practice	
LAW 7569	International and Foreign Legal Research	
LAW 7676	Energy Justice: Theory, Law, and Policy for a Just Clean Energy Transition	

Students must also complete a paper related to international business law. To fulfill this requirement, a paper must satisfy the criteria of the JD rigorous writing requirement.

Program Credit Requirement

24 total hours required.

For additional information regarding the LLM program and its requirements, please see the LLM Student Information Handbook.

Law, LLM—Experiential Program Requirements

The Experiential LLM program offers a rigorous curriculum that is designed to provide you with a comprehensive foundation in legal theory and practice as well as the freedom to explore and refine your career interests. Experiential LLM students may choose the general program, which offers maximum flexibility to let you take the courses you want and need—to qualify for a U.S. bar exam or to do whatever you choose as a lawyer who wants to make a difference—or one of our concentrations, which provide a competitive advantage in specific fields of interest. Students in the full-time Experiential LLM program deepen their knowledge and expand their expertise by taking a full-time co-op or equivalent experiential alternative during one quarter.

Concentration Options

The Experiential LLM program offers several concentrations:

- Health Policy and Law
- Human Rights and Economic Development
- Intellectual Property and Innovation
- International Business Law

Note: Students may choose a concentration area but are not required to complete a concentration.

Complete all courses and requirements listed below unless otherwise indicated.

Foundational Courses

These foundational courses are required for any student who obtained their first law degree outside the United States:

Code	Title	Hours
LAW 6301	Intensive Introduction to American Law and Legal Institutions	2
LAW 6302	Intensive Introduction to Legal Research and Writing for LLM Students	2
LAW 6315	Legal Research and Writing for LLM Students: Preparing for Co-op	2

Electives

Code	Title	Hours
Students must take at least 18 credits of LAW electives if they took the foundational courses; they must take at least 24 credits of LAW electives if not required to take foundational courses. Courses taken to fulfill concentration requirements count toward the elective requirement.		18-24

Concentration Options

Students may choose to pursue a concentration by completing the listed requirements. Courses taken to fulfill concentration requirements count toward the elective requirement for the LLM degree.

- Health Policy and Law (p. 351)
- Human Rights and Economic Development (p. 351)
- Intellectual Property and Innovation (p. 351)
- International Business Law (p. 351)

Health Policy and Law

Code	Title	Hours
Core Course		
LAW 7335	Health Law	3
Relevant Elective Courses		
Complete at least two of the following:		6-7
LAW 7494	Bioethics and the Law	
LAW 7512	Problems in Public Health Law	
LAW 7527	Public Health Legal Clinic	
LAW 7588	Reproductive and Sexual Rights and Health	
LAW 7600	Current Issues in Health Law and Policy	
LAW 7606	Drug Law and Policy	
LAW 7619	Healthcare Fraud and Abuse Law	
LAW 7681	Law and Biotechnology	
LAW 7685	Human Rights, IP, and Access to Medicines	

Students must also complete a paper related to health law. To fulfill this requirement, a paper must satisfy the criteria of the JD rigorous writing requirement.

Human Rights and Economic Development

Code	Title	Hours
Core Courses		
Complete one of the following:		3
LAW 7338	International Law	
LAW 7491	International Human Rights and the Global Economy	
LAW 7525	Law and Economic Development	
LAW 7580	Community Economic Development	
LAW 7651	Human Rights in the United States	
LAW 7666	Human Rights, the Environment, Development and Community Resilience	
LAW 7685	Human Rights, IP, and Access to Medicines	
Relevant Elective Courses		
Complete at least two additional courses from the core course list or from the following:		5-16
LAW 7336	Immigration Law	
LAW 7358	Social Welfare Law	
LAW 7538	International Environmental Law	
LAW 7550	Refugee and Asylum Law	
LAW 7559	International Trade	
LAW 7569	International and Foreign Legal Research	
LAW 7588	Reproductive and Sexual Rights and Health	
LAW 7597	Civil Rights and Restorative Justice Clinic	
LAW 7600	Current Issues in Health Law and Policy	
LAW 7610	Community Business Law Clinic	
LAW 7657	Immigrant Justice Clinic	
LAW 7676	Energy Justice: Theory, Law, and Policy for a Just Clean Energy Transition	

Students must also complete a co-op or paper related to human rights and/or economic development. To fulfill this requirement, a paper must satisfy the criteria of the JD rigorous writing requirement.

Intellectual Property and Innovation

Code	Title	Hours
Core Courses		
Complete two of the following:		6-7
LAW 7369	Intellectual Property	
LAW 7501	Patent Law	
LAW 7590	Copyright Law	
LAW 7638	Trademark Law	
or LAW 7521	Branding Law and Practice	
Relevant Elective Courses		
Complete at least two additional courses from the core course list or from the following:		6-11
LAW 7303	Antitrust	
LAW 7417	Entertainment Law	
LAW 7565	Intellectual Property Transactions Practice	
LAW 7633	IP CO-LAB Clinic	
LAW 7640	Information Security Law	
LAW 7685	Human Rights, IP, and Access to Medicines	

Students must also complete a co-op, clinic, or paper related to intellectual property and innovation. To fulfill this requirement, a paper must satisfy the criteria of the JD rigorous writing requirement. A clinic that counts toward the four-course requirement may not be used to also satisfy this requirement.

International Business Law

Code	Title	Hours
Core Courses		
Complete one of the following:		3
LAW 7525	Law and Economic Development	
LAW 7559	International Trade	
LAW 7603	International Business Transactions	
Relevant Elective Courses		
Complete at least two additional courses from the core course list or from the following:		4-7
LAW 7323	Corporations	
LAW 7336	Immigration Law	
LAW 7338	International Law	
LAW 7491	International Human Rights and the Global Economy	
LAW 7538	International Environmental Law	
LAW 7554	International Investment Arbitration and Litigation Practice	
LAW 7569	International and Foreign Legal Research	

LAW 7676	Energy Justice: Theory, Law, and Policy for a Just Clean Energy Transition

Students must also complete a co-op or paper related to international business law. To fulfill this requirement, a paper must satisfy the criteria of the JD rigorous writing requirement.

Experiential Requirement

Students must take one full-time co-op or equivalent experiential alternative of at least 12 weeks (or an equivalent period over multiple terms, for part-time students).

Program Credit Requirement

24 total hours required.

For additional information regarding the Experiential LLM program and its requirements, please see the LLM Student Information Handbook.

Law, LLM—Online

The online LLM program offers students an opportunity to receive specialized legal training beyond the training they have already received in a JD program or an equivalent law degree program outside the United States. The elective courses in the program will provide insight into legal issues in areas such as intellectual property, privacy, and business. Students interested in taking a bar exam will be able to strengthen their foundational knowledge of U.S. law by taking courses with content tested on bar examinations. The asynchronous online format affords flexibility with respect to the times and location at which students complete their work.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Foundational Course

This foundational course is required for any student who obtained their first law degree outside the United States.

Code	Title	Hours
LAW 6400	Introduction to U.S. Law and Legal System	2

Electives

Code	Title	Hours
Students must take at least 22 credits of LAW electives if they took the foundational course; they must take at least 24 credits of LAW electives if not required to take the foundational course.		22-24

Program Credit

24 total hours required.

Legal Studies, MLS—Online

The Master of Legal Studies program is designed for professionals who want a deeper understanding of law and legal concepts. Such professionals may be found in nonprofit organizations, foundations, financial services firms, pharmaceutical companies, insurance firms, compliance departments, or a host of other commercial and noncommercial settings. Examples of the professionals who would be interested in this degree are human resource professionals, claims representatives for insurance companies, professionals in healthcare organizations, bank loan officers, real estate brokers, risk managers, government affairs officers, management consultants advising organizations, development officers working on planned giving, and software entrepreneurs. They desire to know more about the law and to be able to deal more effectively with the lawyers with whom they interact during their professional lives. The degree includes concentrations in human resources law, business law, intellectual property law, health law, and public law and policy.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Foundation Courses

Code	Title	Hours
LS 6101	Introduction to Legal Studies 1: Law and Legal Reasoning	3
LS 6102	Introduction to Legal Studies 2	3

Core Courses

Code	Title	Hours
Complete at least four of the following:		12-18
LS 6110	Law of Information and Records	
LS 6120	Law and Strategy	
LS 6130	Negotiation and Advocacy	
LS 6140	Data Regulation and Compliance	
LS 6150	Law and Organizational Management	
LS 6155	Legal Foundations of Public Policy	

Electives

Code	Title	Hours
Students who do not take a concentration must take 6-12 credits from this list to complete the degree.		6-12
LS 6160	Regulation and Global Business Strategies	
LS 6170	Financial Transactions	
LS 6180	Health Law Survey	
LS 6181	Healthcare Regulation and Compliance	
LS 6182	Patient Records, Privacy, and Security	
LS 6183	Legal Perspectives of Healthcare Ethics	
LS 6210	Special Topics in Employee Rights and Employer Obligations	
LS 6211	Antidiscrimination Law	
LS 6212	Wages and Benefits	
LS 6230	Intellectual Property Survey	
LS 6231	Identifying and Securing Intellectual Property Rights	
LS 6232	Intellectual Property and Media	
LS 6233	Special Topics in Legal Studies	
LS 6235	Current Issues in Law and Public Policy	

Concentration Options

Students may choose to complete one of the concentrations described below. Students who pursue a concentration must take the two required foundation courses, at least four core courses, the courses listed in the concentration, and at least one additional course from the list of electives.

CONCENTRATION IN BUSINESS LAW

Code	Title	Hours
LS 6160	Regulation and Global Business Strategies	3
LS 6170	Financial Transactions	3
LS 6230	Intellectual Property Survey	3
or LS 6210	Special Topics in Employee Rights and Employer Obligations	

CONCENTRATION HEALTH LAW

Code	Title	Hours
LS 6180	Health Law Survey	3
LS 6181	Healthcare Regulation and Compliance	3
LS 6182	Patient Records, Privacy, and Security	3

CONCENTRATION IN HUMAN RESOURCES LAW

Code	Title	Hours
LS 6210	Special Topics in Employee Rights and Employer Obligations	3
LS 6211	Antidiscrimination Law	3
LS 6212	Wages and Benefits	3

CONCENTRATION IN INTELLECTUAL PROPERTY LAW

Code	Title	Hours
LS 6230	Intellectual Property Survey	3
LS 6231	Identifying and Securing Intellectual Property Rights	3
LS 6232	Intellectual Property and Media	3

CONCENTRATION IN PUBLIC LAW & POLICY

Code	Title	Hours
LS 6155	Legal Foundations of Public Policy	3
LS 6235	Current Issues in Law and Public Policy	3
Choose one of the following courses:		4
LPSC 7311	Strategizing Public Policy	
PPUA 6500	Principles of Public Administration	
PPUA 6502	Economic Analysis for Policy and Planning	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6507	Institutional Leadership and the Public Manager	
PPUA 6551	Nonprofit Organizations and Social Change	
PPUA 6552	The Nonprofit Sector in Civil Society and Public Affairs	

Program Credit/GPA Requirements

30 total semester hours required
Minimum 3.000 GPA required

Media Advocacy, MS

The Master of Science in Media Advocacy places particular focus on developing direct and indirect advocacy skills: that is, to influence government decision makers directly and to change minds indirectly through shifting public opinion. The program uniquely combines grounding in governmental structures and the legal system with sophisticated training in the latest communication techniques including social media, web communications, and videography, as well as data analytics and data-driven storytelling. Successful graduates will be empowered to promote the public agenda of employers ranging from mission-driven organizations, such as the ACLU or the Sierra Club, to industry leaders, such as hospitals and technology companies, to lobbying and strategic communications groups and political consulting firms.

Program Requirements

Core Requirements

Code	Title	Hours
JRNL 5400	Media and Advocacy in Theory and Practice	4
JRNL 5480	Research for Media Strategy	4
LW 6400	Law, Policy and Legal Argument	4
LW 7667	Law and Ethics of Advocacy	3

Electives

Code	Title	Hours
A minimum of 17 credits of electives is required. No more than 8 semester hours can be taken outside of the College of Arts, Media, and Design or the School of Law.		17
	Complete a minimum of 4 semester hours of coursework from the College of Arts, Media, and Design. Choose from recommended focus areas of JRNL, ARTD, ARTG, COMM, and INAM (additional areas may be chosen in consultation with your adviser).	
	Complete a minimum of 5 semester hours of coursework from the School of Law.	

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

Plan of Study

Sample One-and-a-Half Years with No Co-op

Year 1

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
JRNL 5400	4	JRNL 5480	4	Vacation	0	Vacation	0
LW 6400	4	Elective 2	3-4				
Elective 1	3-4	Elective 3	3-4				
	11-12		10-12		0		0

Year 2

Fall	Hours
LW 7667	3
Elective 4	3-4
Elective 5	3-4
Elective 6	3-4
	12-15

Total Hours: 33-39

Graduate Certificates

- Business Law (p. 354)
- Healthcare Compliance (p. 354)
- Health Law (p. 354)
- Human Resources Law (p. 355)

- Intellectual Property Law (p. 356)
- United States Law (p. 358)

For JD students only:

- Health Law and Policy (p. 355)
- Human Rights Law (p. 356)
- Poverty Law and Economic Justice (p. 356)
- Privacy Law (p. 357)
- Women, Gender, Sexuality, and the Law (p. 358)

Business Law, Graduate Certificate

The Graduate Certificate in Business Law is designed to provide professionals in large and small enterprises with an ability to recognize, navigate, and leverage the laws that regulate business organizations and transactions.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Requirements

Code	Title	Hours
LS 6102	Introduction to Legal Studies 2	3
LS 6160	Regulation and Global Business Strategies	3
LS 6170	Financial Transactions	3
Complete one of the following:		3
LS 6210	Special Topics in Employee Rights and Employer Obligations	
LS 6230	Intellectual Property Survey	

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

Healthcare Compliance, Graduate Certificate

The Graduate Certificate in Healthcare Compliance is designed to give law students, MBA students, and working professionals tools they need to successfully navigate the world of healthcare compliance. This 15-credit, one-year program jointly offered by the School of Law and the D'Amore-McKim School of Business gives students the opportunity to learn about the laws that govern the healthcare system while developing the business knowledge and skills critical to healthcare compliance.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Requirements

Code	Title	Hours
Required Courses		
LS 6182	Patient Records, Privacy, and Security	3
LS 6184	Healthcare Compliance 1	2
LS 6190	Introduction to Healthcare Compliance	1
LS 6192	Healthcare Compliance 2	2
LS 6193	Healthcare Compliance Capstone	1
Complete one of the following:		3
HINF 5105	The American Healthcare System (MBA students should take this course)	
LAW 7335	Health Law (Law students should take this course)	
LS 6180	Health Law Survey	
Elective		
Complete one of the following:		3
FINA 6200	Value Creation through Financial Decision Making	
HRMG 6220	Health Organization Management	
LAW 7344	Accounting/Finance for Lawyers	
LAW 7494	Bioethics and the Law	
LAW 7600	Current Issues in Health Law and Policy	
LAW 7619	Healthcare Fraud and Abuse Law	
LS 6110	Law of Information and Records	
LS 6120	Law and Strategy	
LS 6140	Data Regulation and Compliance	
PHTH 5232	Evaluating Healthcare Quality	
SCHM 6223	Managing Healthcare Supply Chain Operations	
STRT 6220	Strategic Management for Healthcare Organizations	

Program Credit/GPA Requirements

15 total semester hours required
Minimum 3.000 GPA required

Health Law, Graduate Certificate

Healthcare is a complex legal arena, as it encompasses several key stakeholders, from providers to patients to insurers. The Graduate Certificate in Health Law can help individuals recognize and navigate the varying legal needs in this space; an introductory course is paired with three courses tailored to the health industry.

The program helps to prepare graduates with the knowledge and skills to:

- Summarize and apply the appropriate statutes and regulations to concrete situations
- Examine legal regulations governing the provision and financing of healthcare services
- Gain an in-depth overview of health and compliance programs and the code of conduct for particular fields

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Requirements

Code	Title	Hours
LS 6102	Introduction to Legal Studies 2	3
LS 6180	Health Law Survey	3
LS 6181	Healthcare Regulation and Compliance	3
LS 6182	Patient Records, Privacy, and Security	3

Program Credit/GPA Requirements

12 total credits required
Minimum 3.000 GPA required

Health Law and Policy, Graduate Certificate

The Graduate Certificate in Health Law and Policy, open to all JD students, gives students the opportunity to deepen their knowledge and develop their expertise in the field of health law and policy.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Law Courses

Code	Title	Hours
LAW 7335	Health Law	3

Code	Title	Hours
In addition, complete one of the following:		3-8
LAW 7410	Domestic Violence Clinic	
LAW 7469	Disability Law	
LAW 7494	Bioethics and the Law	
LAW 7512	Problems in Public Health Law	
LAW 7527	Public Health Legal Clinic	
LAW 7536	Employment Law - Safety and Health	
LAW 7588	Reproductive and Sexual Rights and Health	
LAW 7600	Current Issues in Health Law and Policy	
LAW 7606	Drug Law and Policy	
LAW 7619	Healthcare Fraud and Abuse Law	
LAW 7681	Law and Biotechnology	
LAW 7685	Human Rights, IP, and Access to Medicines	

Required Non-Law Courses

Code	Title	Hours
Complete at least two courses totaling at least 6 semester hours from the following:		6-8
HINF 5200	Theoretical Foundations in Personal Health Informatics	
HINF 6335	Management Issues in Healthcare Information Technology	
HINF 6350	Public Health Surveillance and Informatics	
HRMG 6220	Health Organization Management	
PHTH 5120	Race, Ethnicity, and Health in the United States	
PHTH 5212	Public Health Administration and Policy	
PHTH 5214	Environmental Health	
PHTH 5222	Health Advocacy	
PHTH 5226	Strategic Management and Leadership in Healthcare	
PHTH 5230	Global Health	
PHTH 5232	Evaluating Healthcare Quality	
PHTH 5300	Project Management in Public Health	
PHTH 5310	Budget Principles in Public Health	
PHTH 5320	Grant Writing in Public Health	
PHTH 6200	Principles and History of Urban Health	
PHTH 6204	Society, Behavior, and Health	
PHTH 6208	Urban Community Health Assessment	
PHTH 6224	Social Epidemiology	
PPUA 5240	Health Policy and Politics	
SOCL 7267	Environment, Health, and Society	
SOCL 7287	Social Movements in Health	
STRT 6220	Strategic Management for Healthcare Organizations	

Additional Requirements

Co-op Requirement: Students must complete at least one co-op related to the certificate topic.

Writing Requirement: Students must complete a piece of substantial writing that meets the requirements of the JD upper-level rigorous writing requirement and that has a clear connection to the certificate topic.

For additional information on requirements associated with this certificate, please consult the JD program's Student Information Handbook.

Program Credit/GPA Requirements

12 total semester hours required, including at least 6 semester hours of LAW courses and at least 6 semester hours of non-LAW courses.

Students must receive a passing grade in all courses and satisfactorily complete all other requirements.

Human Resources Law, Graduate Certificate

The workplace has drastically changed in the past decade and keeps on evolving. This leads to many new human resources legal and regulation challenges. The Graduate Certificate in Human Resources Law is designed to provide professionals who work in human resources with the skills needed to recognize and navigate the many legal issues that arise within this heavily regulated field.

The program helps to prepare graduates with the knowledge and skills to:

- Summarize and apply the appropriate statutes and regulations to concrete situations
- Examine laws and regulations governing the management of people resources
- Gain an in-depth overview of human resources compliance programs and policies
- Leverage specialized knowledge in human resources law and regulations to achieve personal and institutional goals

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Requirements

Code	Title	Hours
LS 6102	Introduction to Legal Studies 2	3
LS 6210	Special Topics in Employee Rights and Employer Obligations	3
LS 6211	Antidiscrimination Law	3
LS 6212	Wages and Benefits	3

Program Credit/GPA Requirements

12 total credits required

Minimum 3.000 GPA required

Human Rights Law, Graduate Certificate

The Graduate Certificate in Human Rights Law, open to JD students, gives students the opportunity to deepen their knowledge and develop their expertise in the field of human rights law.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required LAW Courses

Code	Title	Hours
Complete one of the following:		3
LAW 7491	International Human Rights and the Global Economy	
LAW 7651	Human Rights in the United States	

Code	Title	Hours
In addition, complete one of the following:		3
LAW 7338	International Law	
LAW 7491	International Human Rights and the Global Economy	
LAW 7525	Law and Economic Development	
LAW 7651	Human Rights in the United States	
LAW 7685	Human Rights, IP, and Access to Medicines	

Required Non–LAW Courses

Code	Title	Hours
Complete two of the following:		6-8
PHIL 5001	Global Justice	
PHTH 5230	Global Health	
CRIM 7201	Global Criminology	
SOCL 7221	Globalization, Development, and Social Justice	
SOCL 7287	Social Movements in Health	
POLS 7325	Contemporary Issues in Third World Development	
POLS 7387	Global Governance	
PPUA 5264	Energy Democracy and Climate Resilience: Technology, Policy, and Social Change	
PPUA 5268	International Environmental Policy	

Additional Requirements

Co-op Requirement: Students must complete at least one co-op related to the certificate topic. Consult an advisor about the applicability of the JD co-op.

Writing Requirement: Students must complete a piece of substantial writing that meets the requirements of the JD upper-level rigorous writing requirement and that has a clear connection to the certificate topic.

For additional information on requirements associated with this certificate, please consult the JD program's *Student Information Handbook*.

Program Credit/GPA Requirements

12 total semester hours required, including at least 6 credits of LAW courses and at least 6 credits of non–LAW courses.

Students must receive a passing grade in all courses and satisfactorily complete all other requirements.

Intellectual Property Law, Graduate Certificate

The Graduate Certificate in Intellectual Property Law is designed to provide professionals who work in intellectual property, technology transfer, licensing, or related areas, as well as inventors and entrepreneurs, with the skills they need to recognize and protect intellectual property rights.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Requirements

Code	Title	Hours
LS 6102	Introduction to Legal Studies 2	3
LS 6230	Intellectual Property Survey	3
LS 6231	Identifying and Securing Intellectual Property Rights	3
LS 6232	Intellectual Property and Media	3

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

Poverty Law and Economic Justice, Graduate Certificate

The Graduate Certificate in Poverty Law and Economic Justice, open to all JD students, gives students the opportunity to deepen their knowledge and develop their expertise in the field of poverty law and economic justice.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Law Courses

Code	Title	Hours
Complete one of the following:		3-8
LAW 7358	Social Welfare Law	
LAW 7362	Poverty Law and Practice Clinic	
LAW 7525	Law and Economic Development	
LAW 7561	Private Litigation in the Public Interest	
LAW 7580	Community Economic Development	
LAW 7664	Law and Inequality	
LAW 7665	Housing Law	
LAW 7684	Anatomy of Autonomy	

Code	Title	Hours
In addition, complete one of the following:		3-8
LAW 7333	Family Law	
LAW 7335	Health Law	
LAW 7336	Immigration Law	

LAW 7350	Negotiation
LAW 7358	Social Welfare Law
LAW 7362	Poverty Law and Practice Clinic
LAW 7410	Domestic Violence Clinic
LAW 7428	State Local Government
LAW 7447	Quantitative Methods
LAW 7448	Employment Discrimination
LAW 7463	Nonprofit Organizations
LAW 7469	Disability Law
LAW 7487	Critical Race Theory
LAW 7488	Sexuality, Gender, and the Law
LAW 7491	International Human Rights and the Global Economy
LAW 7512	Problems in Public Health Law
LAW 7525	Law and Economic Development
LAW 7527	Public Health Legal Clinic
LAW 7530	Education Law
LAW 7535	Legal Interviewing Counseling
LAW 7540	Employment Law—Compensation, Benefits, and Retirement
LAW 7550	Refugee and Asylum Law
LAW 7561	Private Litigation in the Public Interest
LAW 7580	Community Economic Development
LAW 7582	Elder Law
LAW 7588	Reproductive and Sexual Rights and Health
LAW 7597	Civil Rights and Restorative Justice Clinic
LAW 7606	Drug Law and Policy
LAW 7607	Consumer Law
LAW 7608	American Legal Thought: Traditional and Critical
LAW 7610	Community Business Law Clinic
LAW 7657	Immigrant Justice Clinic
LAW 7664	Law and Inequality
LAW 7665	Housing Law
LAW 7679	Race and the Law
LAW 7684	Anatomy of Autonomy
LAW 7685	Human Rights, IP, and Access to Medicines

Required Non-Law Courses

Code	Title	Hours
Complete one of the following:		4
PPUA 5245	Education Policy in the United States	
PPUA 5270	Food Systems and Public Policy	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6551	Nonprofit Organizations and Social Change	
PPUA 6552	The Nonprofit Sector in Civil Society and Public Affairs	
SOCL 7221	Globalization, Development, and Social Justice	
SOCL 7227	Race and Ethnic Relations	
SOCL 7263	Social Psychology of Stratification	
SOCL 7268	Globalization and the City	
SOCL 7287	Social Movements in Health	

Code	Title	Hours
In addition, complete one of the following:		4
LPSC 5201	Law and the City	
LPSC 7311	Strategizing Public Policy	
LPSC 7312	Cities, Sustainability, and Climate Change	
PPUA 5245	Education Policy in the United States	
PPUA 5270	Food Systems and Public Policy	
PPUA 6201	The 21st-Century City: Urban Opportunities and Challenges in a Global Context	
PPUA 6502	Economic Analysis for Policy and Planning	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6509	Techniques of Program Evaluation	
PPUA 6551	Nonprofit Organizations and Social Change	
PPUA 6552	The Nonprofit Sector in Civil Society and Public Affairs	
SOCL 7221	Globalization, Development, and Social Justice	
SOCL 7227	Race and Ethnic Relations	
SOCL 7263	Social Psychology of Stratification	
SOCL 7268	Globalization and the City	
SOCL 7287	Social Movements in Health	

Additional Requirements

Co-op Requirement: Students must complete at least one co-op related to the certificate topic.

Writing Requirement: Students must complete a piece of substantial writing that meets the requirements of the JD upper-level rigorous writing requirement and that has a clear connection to the certificate topic.

For additional information on requirements associated with this certificate, please consult the JD program's Student Information Handbook.

Program Credit/GPA Requirements

12 total credits required, including at least 6 credits of LAW courses and at least 6 credits of non-LAW courses.

Students must receive a passing grade in all courses and satisfactorily complete all other requirements.

Privacy Law, Graduate Certificate

The Graduate Certificate in Privacy Law, open to all JD students, gives students the opportunity to deepen their knowledge and develop their expertise in the field of privacy law.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required LAW Courses

Code	Title	Hours
Complete at least two courses totaling at least 6 semester hours from the following:		6
LAW 7640	Information Security Law	
LAW 7672	Data Privacy Compliance in the 21st Century	
LAW 7675	Information Privacy Law	

Required Non-LAW Courses

Code	Title	Hours
Complete at least two courses totaling at least 6 semester hours from the following list:		6
BUSN 5001	Data-Driven and Technology-Enabled Value Creation in Digital Economy	
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
CY 6240	Special Topics in Privacy Law	
HINF 5101	Introduction to Health Informatics and Health Information Systems	
HINF 5102	Data Management in Healthcare	
HINF 5300	Personal Health Interface Design and Development	
JRNL 6202	Perspective on Journalism Ethics	
MKTG 6210	Marketing Research	
MKTG 6222	Digital Marketing	
MKTG 6226	Consumer Behavior	
PHIL 5005	Information Ethics	
PHIL 5010	AI Ethics	
POLS 7333	Science, Technology, and Public Policy	
POLS 7334	Social Networks	
POLS 7341	Security and Resilience Policy	
POLS 7441	Cyberconflict	
PPUA 5262	Big Data for Cities	

Additional Requirements

Co-op Requirement: Students must complete at least one co-op related to the certificate topic.

Writing Requirement: Students must complete a piece of substantial writing that meets the requirements of the JD upper-level rigorous writing requirement and that has a clear connection to the certificate topic.

For additional information on requirements associated with this certificate, please consult the JD program's Student Information Handbook.

Program Credit/GPA Requirements

12 total semester hours required, including at least 6 semester hours of LAW courses and at least 6 semester hours of non-LAW courses.

Students must receive a passing grade in all courses and satisfactorily complete all other requirements.

United States Law, Graduate Certificate

The Graduate Certificate in United States Law offers an introduction to U.S. law for students who have completed their law degree in countries other than the United States. The asynchronous, online format provides flexibility for students seeking to expand their knowledge of law.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Foundational Course

Code	Title	Hours
LAW 6400	Introduction to U.S. Law and Legal System	2

Electives

Code	Title	Hours
Complete at least 10 credits of electives from the following:		10
LAW 6401	Contracts	
LAW 6402	Torts	
LAW 6403	Constitutional Law	
LAW 6404	Civil Procedure	
LAW 6405	California Professional Responsibility	
LAW 7000	Copyright	
LAW 7001	Corporate Finance	
LAW 7002	Intellectual Property	
LAW 7004	Trademark	
LAW 7005	Mergers and Acquisitions	
LAW 7006	Secured Transactions	
LAW 7007	Securities Regulation	
LAW 7009	Intellectual Property and Technology Law	
LAW 7010	Insurance Law	
LAW 7011	Personal Income Tax	
LAW 7012	Business Organizations	
LAW 7672	Data Privacy Compliance in the 21st Century	

Program Credit

12 total hours required

For more information about rules and policies applicable to the graduate certificate, please see the applicable Student Information Handbook available through the School of Law Office of Academic and Student Affairs (https://www.northeastern.edu/lawstudentaffairs/) website.

Women, Gender, Sexuality, and the Law, Graduate Certificate

The Graduate Certificate in Women, Gender, Sexuality, and the Law, open to all JD students, gives students the opportunity to deepen their knowledge and develop their expertise in the area of women, gender, sexuality, and the law.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Law Courses

Code	Title	Hours
Take at least two courses totaling at least 6 semester hours from the following list:		6
LAW 7410	Domestic Violence Clinic	

LAW 7488	Sexuality, Gender, and the Law
LAW 7588	Reproductive and Sexual Rights and Health
LAW 7651	Human Rights in the United States
LAW 7679	Race and the Law

Required Non-Law Courses

Code	Title	Hours
Take at least two courses totaling at least 6 semester hours from the following list:		6
ECON 5292	Gender and Development Economics	
SOCL 7225	Gender and Social Movements	
SOCL 7265	Sociology of Gender	
SOCL 7273	Gender and Social Policy	
SOCL 7287	Social Movements in Health	
WMNS 5240	Feminist Resistance	
WMNS 6100	Theorizing Gender and Sexuality	
WMNS 7100	Queer Theory: Sexualities, Genders, Politics	
WMNS 7615	Feminist Inquiry	
WMNS 7635	Understanding the Pornographic and the Obscene	

Additional Requirements

Co-op Requirement: Students must complete at least one co-op related to the certificate topic.

Writing Requirement: Students must complete a piece of substantial writing that meets the requirements of the JD upper-level rigorous writing requirement and that has a clear connection to the certificate topic.

For additional information on requirements associated with this certificate, please consult the JD program's Student Information Handbook.

Program Credit/GPA Requirements

12 total credit hours required, including at least 6 credit hours of LAW courses and at least 6 credit hours of non-LAW courses.

Students must receive a passing grade in all courses and satisfactorily complete all other requirements.

Accelerated Degrees

The School of Law offers a PlusJD pathway that allows students to accelerate the attainment of the JD degree by applying School of Law coursework completed as an undergraduate toward both the undergraduate and JD degrees. In most circumstances, all undergraduate degree requirements must be completed before the student begins their first-year JD coursework. Degrees are earned sequentially, with the bachelor's degree attainment followed by coursework to complete the JD. Interested students should consult their advisor during their freshman or sophomore years. See the PlusJD program (https://www.northeastern.edu/law/admission/jd/apply/plusjd/) for additional information.

Dual Degrees

- Law, JD / Accounting and Business Administration, MSAMBA (p. 97)
- Law, JD / Business Administration, MBA (p. 359)
- Law, JD / Creative Practice Leadership, MS (p. 66)
- Law, JD / Criminology and Criminal Justice, MS (p. 360)
- Law, JD / Criminology and Justice Policy, PhD (p. 360)
- Law, JD / Public Health, MPH (p. 360)
- Law, JD / Public Policy, MPP (p. 361)
- Law, LLM / Business Administration, MBA (p. 361)

Law, JD / Accounting and Business Administration, MSAMBA

The Northeastern University School of Law and the D'Amore-McKim School of Business offer a dual-degree pathway between the Juris Doctor and Master of Science in Accounting and Business Administration programs (https://www.northeastern.edu/graduate/program/jd-msa-mba-in-professional-accounting-14265/). Our robust program positions students without a previous accounting background to operate effectively in specialized fields such as taxation law, corporate finance, or mergers and acquisitions. Successful students will gain not only advanced legal expertise but the fundamental, yet future-forward accounting and business knowledge students need to succeed.

Our dual-degree program is a full-time, four-year course of study that includes multiple experience-driven learning opportunities, allowing students to gain valuable work experience in both legal and public accounting before they graduate. Students may have the opportunity to make a real impact during two co-ops in legal departments, law firms, government agencies, judges' chambers, or other legal settings. They'll also have the chance to perform independent work during the busy tax season as part of their corporate residency at a top accounting firm. Students will ordinarily complete two years of the law curriculum, followed by 15 months of the combined accounting and business administration curriculum, before returning to finish their studies in the law school.

Students pursuing the dual degree will be able to enroll in 12 semester hours from the accounting and business administration curriculum that will also count toward the law curriculum. The corporate residency at an accounting firm may fulfill the requirement for the third co-op required for the law curriculum. Students are encouraged to consult with their law advisor as they plan their course schedule.

All JD students, including FlexJD students, are ordinarily eligible to apply into dual degree pathways.

Law, JD / Business Administration, MBA

As new technologies disrupt industries and the availability and sophisticated use of data is shifting the business landscape, businesses need leaders equipped to guide corporate-level strategy. A partnership between the School of Law and the D'Amore-McKim School of Business, our JD/MBA (https://law.northeastern.edu/academics/programs/jd/dual-degrees/business-administration/) dual-degree program is a powerful combination that positions candidates to operate with equal facility in the increasingly interdependent legal and business spheres.

Our JD/MBA program is a full-time, four-year course of study that includes three semester-long co-op work experiences arranged through the law school co-op office. Starting in the fall term, you'll complete three years of law school, taking a break after either year one or year two to complete one year of business school.

Students will select two concentrations to complete their MBA coursework. Business concentrations include analytics, brand management, business management for healthcare, corporate finance, corporate innovation, entrepreneurship, international business, investments, leading people and organizations, marketing, marketing analytics, operations and supply chain management, and sustainability and business.

Students may also choose to develop a complementary skill set in a different industry area. Students may select one MBA concentration with courses offered through one of Northeastern University's other professional colleges, including Khoury College of Computer Sciences; College of Arts, Media and Design; College of Science; and College of Social Sciences and Humanities.

Students pursuing the two degrees concurrently will be able to count 9 semester hours from the JD curriculum toward the interdisciplinary and elective requirements of the MBA degree and up to 12 semester hours from the MBA curriculum toward the JD degree. Students should work with their MBA advisor in selecting JD courses that will fulfill MBA requirements and with their law advisor in selecting MBA courses that will fulfill JD requirements.

All JD students, including FlexJD students, are ordinarily eligible to apply into dual degree pathways.

Law, JD / Creative Practice Leadership, MS

Students seeking to put their legal skills to work in music, the arts, or other creative industries can choose to combine their JD degree with a Master of Science in Creative Practice Leadership. By combining courses such as copyright law or entertainment law with a co-op in a creative industry, students can gain the legal knowledge and expertise that will make them effective legal advocates for their clients. Through their coursework in creative practice leadership, students will explore new approaches to transformational leadership in the fields of critical creative practice, cultural entrepreneurship, and innovation in the arts and entertainment industries. Students who pursue the JD alongside the Master of Science in Creative Practice Leadership can take up to 16 credits of courses that count toward both degrees, accelerating their educational path; students should consult their advisors in the School of Law and the College of Arts, Media and Design for more information.

All JD students, including FlexJD students, are ordinarily eligible to apply into dual degree pathways.

Law, JD / Criminology and Criminal Justice, MS

The JD/MS program will expand the knowledge base and career options of students. The disciplines of criminal justice and law share common interests in identifying opportunities to create the conditions for justice, social equality, and societal well-being. The dual degree is designed to provide students with a comprehensive interdisciplinary understanding of what influences criminal justice problems and the social, political, legal, economic context in which they are found. Solving these problems requires interdisciplinary knowledge and an analytical and practical skill set that includes interprofessional problem solving.

Up to 16 credits of coursework in the dual-degree program can be counted toward both the JD degree and the MS degree. Of these 16 credits, no more than 12 credits of non–law courses can count toward the JD degree.

Students will take law courses during semesters spent in the School of Law. Students will take criminology courses during semesters spent in in the School of Criminology and Criminal Justice. Please consult the School of Law for more information about JD requirements. Additionally, please consult SCCJ for more information about MS requirements.

All JD students, including FlexJD students, are ordinarily eligible to apply into dual degree pathways.

Law, JD / Criminology and Justice Policy, PhD

The JD/PhD program will expand the knowledge base and career options of students. The disciplines of criminology and justice policy and law share common interests in identifying opportunities to create conditions for justice, equality, and societal well-being. The dual degree will provide students with a comprehensive interdisciplinary understanding of what influences criminal justice problems and the sociopolitical, legal, and economic context in which they are found. Solving problems requires interdisciplinary knowledge and an analytical and practical skill set that includes interprofessional problem solving.

Up to 16 credits of coursework in the dual-degree program can be counted toward both the JD degree and the PhD degree. Of these 16 credits, no more than 12 credits of non–law courses can count toward the JD degree.

Students will take law courses during semesters spent in the law school. Students will take criminology courses during semesters spent in SCCJ. Please consult the School of Law (https://www.northeastern.edu/law/) for more information about JD requirements. Additionally, please consult SCCJ (https://cssh.northeastern.edu/sccj/) for more information about PhD requirements.

All JD students, including FlexJD students, are ordinarily eligible to apply into dual degree pathways.

Law, JD / Public Health, MPH

Northeastern University's School of Law and Bouvé College of Health Sciences offer a JD/MPH dual degree. Given the worldwide trend toward urbanization, the Master of Public Health (MPH) recognizes the growing need for professionals trained to respond to unique public health challenges and opportunities facing urban populations. The MPH program brings together interdisciplinary faculty (from the School of Law, D'Amore-McKim School of Business, College of Social Sciences and Humanities, Khoury College of Computer Sciences, and the Bouvé College of Health Sciences) with expertise in collaborating with diverse urban populations to offer students an opportunity to obtain practice-based knowledge, skills, and experience needed to address public health problems.

Up to 9 credit hours of coursework in the JD program may count toward the MPH, while up to 12 credit hours of coursework in the MPH program may count toward the JD. See JD/MPH program page (http://www.northeastern.edu/law/academics/jd/dual-degrees/jdmph-bouve.html) for more information.

All JD students, including FlexJD students, are ordinarily eligible to apply into dual degree pathways.

Law, JD / Public Policy, MPP

The JD/Master of Public Policy (MPP) is designed to equip graduates with a unique blend of skills for navigating a complex and rapidly changing policy landscape. The program builds on students' legal training with a compelling blend of skills in applied public policy analysis, policy design, and strategic policy formation. Students also gain career-relevant experience through internships, small group capstone projects, and other interactions with professionals in the field. All are part of a learning process designed to enable the Northeastern law and public policy graduates to navigate, and to redefine, diverse policy areas.

Ideally, students would apply to Northeastern's JD and MPP programs simultaneously. Those who apply and are admitted to both programs take MPP classes after completing their first year in the School of Law. Applicants may also be considered after they have enrolled in the JD program; interested JD students should consult the School of Law's Office of Academic and Student Affairs and the School of Public Policy and Urban Affairs graduate program director for more information.

Students enrolled in this dual-degree program will be able to count 8 JD credit hours toward their MPP degree and 12 MPP credit hours toward their JD degree. Students should consult advisors in each program if they have questions about which courses may be shared between degrees.

All JD students, including FlexJD students, are ordinarily eligible to apply into dual degree pathways.

Law, LLM / Business Administration, MBA

Law, LLM / MBA

In the global economy, lawyers increasingly need to harness both business and legal skills to serve their clients' needs. Through a partnership between the School of Law and the D'Amore-McKim School of Business, the LLM (Master of Laws)/MBA dual-degree program is designed to prepare students to assume leadership positions in which they will navigate complex legal issues, answering their clients' calls for legal expertise and engaging as partners to develop new models for businesses, nonprofit organizations, and governments worldwide.

The LLM/MBA program is a full-time, two-year course of study. Students will begin their studies fall semester in the business school, take law courses the following summer and fall, and finish with business courses.

Students will select two business concentrations to complete their MBA coursework. Business concentrations include analytics, brand management, business management for healthcare, corporate finance, corporate innovation, entrepreneurship, international business, investments, leading people and organizations, marketing, marketing analytics, operations and supply chain management, and sustainability and business.

Students may also choose to develop a complementary skill set in a different industry area. Students who pursue an MBA x concentration take courses from one of Northeastern University's other professional colleges, including Khoury College of Computer Sciences; the College of Arts, Media and Design; the College of Science; and the College of Social Sciences and Humanities.

By pursuing the two degrees concurrently, LLM/MBA students may be able to count up to 12 semester hours of coursework toward both degrees. Students should speak to their advisors in the MBA and LLM programs for more information.

Law, LLM—Experiential / MBA

In the global economy, lawyers increasingly need to harness both business and legal skills to serve their clients' needs. Through a partnership between the School of Law and the D'Amore-McKim School of Business, the LLM (Master of Laws)/MBA dual-degree program is designed to prepare students to assume leadership positions in which they will navigate complex legal issues, answering their clients' calls for legal expertise and engaging as partners to develop new models for businesses, nonprofit organizations, and governments worldwide.

The LLM/MBA program is a full-time, two-year course of study that includes one semester of co-op work experience at the intersection of law and business arranged through the law school. Students will begin their studies fall semester in the business school, take law courses the following summer and fall, complete their co-op, and finish with business courses the second summer.

Students will select two business concentrations to complete their MBA coursework. Business concentrations include analytics, brand management, business management for healthcare, corporate finance, corporate innovation, entrepreneurship, international business, investments, leading people and organizations, marketing, marketing analytics, operations and supply chain management, and sustainability and business.

Students may also choose to develop a complementary skill set in a different industry area. Students who pursue an MBA x concentration take courses from one of Northeastern University's other professional colleges, including Khoury College of Computer Sciences; the College of Arts, Media and Design; the College of Science; and the College of Social Sciences and Humanities.

By pursuing the two degrees concurrently, LLM/MBA students may be able to count up to 12 semester hours of coursework toward both degrees. Students should speak to their advisors in the MBA and LLM programs for more information.

College of Professional Studies

Website (https://cps.northeastern.edu)

David Fields, PhD, Interim Dean of the College of Professional Studies

Joseph Griffin, DMin, PMP ®, Interim Senior Associate Dean for Professional Programs and Graduate School of Education

Mike Jackson, PhD, Associate Dean of Academic and Faculty Affairs

877.668.7727
617.373.2400

Academic Policies and Procedures

Academic Progression Standards

Academic Progress/Standing

To be in good standing, a graduate student must continuously maintain a minimum cumulative grade-point average (GPA) of 3.000 on a 4.000 scale and must also make continuous satisfactory academic progress (SAP). To make SAP, a student must earn at least 66 percent of his or her cumulative attempted credits. Nonmatriculated students are required to be in good academic standing to be allowed to register for any subsequent classes.

Students are responsible for reviewing their grades and academic standing at the end of each term through their myNortheastern account. If there are any discrepancies, students should immediately contact the instructor(s) directly. Students who want to appeal a grade have 30 calendar days from the date the grade is posted to do so.

Academic Probation and Dismissal

Notation of academic probation appears on a student's internal record but not on his or her permanent transcript.

With exception as specified by the program, a graduate (nondoctoral) student is placed on academic probation if his or her cumulative GPA is below 3.000 and/or if he or she does not earn at least 66 percent of his or her cumulative attempted credits. The student is strongly encouraged to consult with his or her academic and career advisor to develop an individualized success plan (ISP) to improve his or her academic standing. Otherwise, a registration hold may be placed on the student's account.

A student whose cumulative GPA remains below 3.000, and/or does not earn at least 66 percent of his or her cumulative attempted credits in the term of enrollment subsequent to the one after he or she was placed on academic probation, will be academically dismissed. A student who has been academically dismissed from the college is automatically dismissed from his or her program of study.

Dismissal Notification

A student will be notified about his or her dismissal within one week following the end of the term and has the right to appeal the dismissal decision to the college's Academic Standing Committee if he or she can provide documented evidence supporting an appeal. The notification of dismissal will include the appeal deadline.

Students appealing a dismissal decision may not be eligible to enroll in classes the term following their dismissal to allow time for the appeal process.

Students are responsible for reviewing their grades and academic standing at the end of each term through their myNortheastern account.

Academic Resources

Interactive Academic Integrity Checklist (IAIC)

The Interactive Academic Integrity Checklist (https://www.northeastern.edu/oepd/demo/CPS_AIRS/Citation%20and%20Academic%20Integrity%20Checklist/story_html5.html) (IAIC) is a tool students can use before they turn in every assignment to ensure that they have not accidentally committed any of the most common violations of the Academic Integrity Policy. Additionally, the IAIC contains links to examples of APA- and MLA-style formatting.

Global Student Success

10 Belvedere
617.373.2455
gss@neu.edu (gss@northeastern.edu)
Website (https://international.northeastern.edu/gss/)

Global Student Success is committed to supporting the success of international students at Northeastern University through cross-cultural, linguistic, and academic support services. We also partner with faculty, staff, and administrators to integrate global dimensions and cross-cultural understanding into the Northeastern experience.

International Tutoring Center

Basement of Snell Library
617.373.2455
gss@neu.edu (gss@northeastern.edu)
Website (https://international.northeastern.edu/gss/)

Tutors provide high-quality ESL writing instruction and tutoring for international students who need assistance with papers, assignments, TOEFL writing, and research projects. Students can meet one-on-one with an ESL tutor for 50-minute appointments. This is a free service for Northeastern international students.

Tutoring Services

Website (https://cps.northeastern.edu/academic-resources/tutoring-services/)

Tutoring can benefit skilled professionals and beginning students alike. Whether you're struggling with organic chemistry, working on a long paper, or putting the finishing touches on a presentation, NU offers many opportunities for you to enhance your academic work and professional skills through free one-on-one academic support on and off campus.

Accommodations for Students with Disabilities

617.373.2675
617.373.7800 (fax)
Website (http://www.northeastern.edu/drc/)

Northeastern University and the Disability Resource Center (DRC) are committed to providing disability services that enable students who

qualify under Section 504 of the Rehabilitation Act and the Americans with Disabilities Act Amendments Act (ADAAA) to participate fully in the activities of the university. To receive accommodations through the DRC, students must provide appropriate documentation that demonstrates a current substantially limiting disability. Accommodations are provided based on an evaluation of the information provided by students and their clinicians, on a case-by-case basis. These services are available for, but not limited to, students with the following diagnoses:

- Learning disabilities and/or AD(H)D
- Autism spectrum disorders
- Chronic or degenerative disorders
- Hearing loss
- Mobility impairments
- Psychiatric disorders
- Traumatic or acquired brain injury
- Vision impairments

Students should provide documentation to the DRC at their earliest convenience to allow for sufficient time for review. After the documentation has been reviewed, a disability specialist will contact the student regarding appropriate next steps. Visit the DRC website (http://www.northeastern.edu/drc/) for additional information or contact staff at 617.373.2675.

Active-Duty Military Personnel

As a member of the Service Member Opportunity Colleges, the College of Professional Studies' academic residency requirement is different for active-duty service members. Active-duty service members are required to complete 30 percent of the graduate certificate/degree program at the College of Professional Studies.

Attendance Requirements

Class participation is essential to success no matter the course format or its delivery; therefore, attendance is mandatory. Individual instructors may have additional, course-specific, attendance policies. It is the student's responsibility to ascertain what each instructor requires. Failure to meet attendance requirements may force a student to drop the applicable courses. Students should not make conflicting commitments until the class schedules for each semester are final. Permission to make up work may be granted by instructors for reasonable cause. Requests must be made immediately upon a student's return to class. Laboratory work can be made up only during the hours of regularly scheduled instruction.

Absence Because of University-Sponsored Activities

Participation in university-sponsored activities, where the students are representing their university, college, or department, may cause absences from class that qualify as excused absences. Excused absences, with appropriate prior arrangement, are not subject to penalty, and missed work may be satisfied through agreement between the student and the instructor. University-sponsored activities that may justify excused absences include athletic competition, performing arts events, and research or other presentations.

Students must discuss absence(s) with instructors at least two weeks in advance of the university-sponsored activity, or as soon as possible if the activity is at the beginning of the term or is the result of an unforeseen circumstance. Instructors may require a written statement from the administrator in charge of the activity. Instructors are expected to make reasonable accommodations for these class absences, including administration of makeup assignments and exams whenever possible. It is expected that students seeking an excused absence will develop a plan and timetable to make up the missed coursework with their instructor(s). Note, however, that the requirements of some courses or programs may preclude such accommodations.

Absence Because of Religious Beliefs

Any student who is unable, because of his or her religious beliefs, to attend classes or to participate in any examination, study, or work requirement should be provided with an opportunity to make up such examination, study, or work requirement that he or she may have missed because of such absence on any particular day, provided that such makeup examination or work does not create an unreasonable burden upon the university. Students should make appropriate arrangements with the instructor in advance of the absence, preferably at least two weeks before the religious observance.

Absence Because of Jury Duty

Members of the university community are expected to fulfill their obligations to serve on a jury if called upon. A student selected for jury duty should inform his or her instructors. They will provide a reasonable substitute or compensatory opportunities for any required work missed. A student with such an absence will not be penalized in any way.

Absence Because of Military Deployment

See "Leave of Absence Due to Military Deployment (http://catalog.northeastern.edu/undergraduate/academic-policies-procedures/leaves-of-absence-withdrawal/#military)."

Other Absences

Unforeseen events or circumstances, including illness, may cause a student to be absent from class. Students must notify their instructors and academic advisor, as appropriate, as soon as possible to apprise them of the circumstances leading to their absence, as well as how much time will be missed. Students must work with their instructors to develop a plan, with a timetable, to make up missed coursework. Students cannot be required to provide medical documentation. (Faculty and students should note that the University Health and Counseling Services does not provide sick notes or medical excuses except for long-term illness.) Instructors are expected to make reasonable accommodations for warranted class absences, including administration of makeup assignments and exams, whenever possible.

Extended Absences

A student who is absent from school for an extended period of time must inform his or her academic advisor by letter, email, or telephone. The expected length of the absence may determine whether the student should apply for a medical or emergency leave of absence (http://catalog.northeastern.edu/undergraduate/academic-policies-procedures/leaves-of-absence-withdrawal/#medical). It is strongly recommended that the student contact his or her academic advisor to discuss potential next steps, which could include incomplete grades; withdrawal from classes; or, in the event of an extended absence due to a chronic medical condition or disability, consultation with the Disability Resource Center to explore potential accommodation.

Nonattendance

Nonattendance does not constitute official course dropping or withdrawal, which means the student is fully responsible for the academic and financial consequences. Like all grades for courses attempted and/or completed, a grade earned due to nonattendance

impacts a student's academic progression, an international student's visa eligibility, and a federal financial aid recipient's aid eligibility and award.

Attendance Verification

"I Am Here" (IAH) Process

After course registration, students are required to verify their intent to enroll in College of Professional Studies class(es) through their myNortheastern account during the first week of each class start. This verification process is called "I Am Here" (IAH). Students who fail to complete this process on time will be dropped from the class(es), which may impact their financial aid or international student visa eligibility.

Students are responsible for ensuring completion of the IAH process, which requires that they do not log out of the system early. Students who do not receive a "Successful Completion" message have not reached the end of the procedure and must start again. Sometimes it may take 24 hours before students can restart the procedure.

A student who registers for a course and completes the IAH process but does not officially drop the course by the deadline, regardless of his or her level of participation or attendance/nonattendance, is responsible for paying 100 percent of the tuition charges and applicable fees and the final earned grade. A student in this situation may earn an F grade that will be part of his or her permanent academic record.

Students registering for the first time after the start of classes will be considered "Here" for the semester.

Students who experience difficulty with the process or have questions should email the Office of the Registrar (registrar@northeastern.edu).

Completing Degree Requirements

Graduate and Doctoral Degree Programs

To earn a graduate or doctoral degree, students must complete all courses as prescribed in the curriculum; the required number of credits as per the curriculum; applicable thesis or dissertation; the residency requirement; and maintain a minimum cumulative grade-point average (GPA) of 3.000 or as outlined by the specific program.

Graduate Certificate Programs

To earn a graduate certificate, students must complete all courses as prescribed in the curriculum; the required number of credits as per the curriculum; the residency requirement; and maintain a minimum cumulative GPA of 3.000 or as outlined by the specific program.

Time Limit on Courses

Graduate course credits earned in the academic program or accepted by transfer are valid for a maximum of seven years.

Time Limit on Program Completion

- Graduate certificate students have up to three full years from the time of the first term of enrollment to complete the program.
- Master's degree students have up to seven full years from the time of the first term of enrollment to complete the program.
- Doctoral degree students, with the exception of the Transitional Doctor of Physical Therapy, have up to seven full years from the time of the first term of enrollment to complete the program.
- Transitional Doctor of Physical Therapy students who begin their program in the fall 2014 term or thereafter have up to four full years from the time of the first term of enrollment to complete the program.

Note: The College of Professional Studies makes adjustments to its academic program offerings and curricula to stay current and to be able to offer students the most relevant courses and knowledge in the field. Examples of such changes include adding new programs, adding/adjusting course requirements, adding/adjusting courses, and adding/adjusting curriculum requirements.

When there is a change to a curriculum or program requirement, students already matriculated and actively enrolled in the program may continue to follow the program requirements at the time of matriculation or to follow the new curriculum/program requirements, unless it is otherwise specified by the academic program at the time of the announcement of said changes.

Cooperative Education

Website (http://www.northeastern.edu/coop/)

Cooperative education (co-op) is the cornerstone of Northeastern University's experiential learning approach, in which on-campus study is enhanced by real-world experience through full-time employment at locations all over the world. Through co-op, students alternate periods of academic courses with periods of employment in positions related to their academic or career interests. This combination provides an integrated learning experience that enhances both in-class studies and career development.

General Requirements

- Be a full-time student to participate in co-op.
- Complete all pre–co-op requirements as established by the college of the student.
- Make satisfactory progress toward degree completion, including grade-point average requirements, as defined by the university, the colleges, and the major program curricula.
- Have accurate information about the co-op placement in the university's official co-op placement system, including specific start and end dates and meeting the minimum hour and day requirements.
- Not participate in co-op in the final term unless it is specified in the curriculum requirements of the program in the catalog.
- Resolve any previous disciplinary or academic probation issues, or have the cooperative education coordinator approve a plan to resolve these issues prior to applying for co-op jobs.
- Have any self-developed co-op approved by the cooperative education coordinator before accepting the position.
- Comply with any preemployment checks required by the employer, such as drug testing, credit checks, physical examinations, security clearance, and criminal record checks.
- Participate in Title IX training, as required.
- Complete any additional requirements (https://careers.northeastern.edu/students/student-co-op/global-co-op/) if participating in a global co-op.
- Work with the cooperative education coordinator if an Unsatisfactory (U) grade has been received for a past co-op to reestablish eligibility in accordance with the policies and requirements of the college.

TRANSFER AND INTERNATIONAL STUDENTS:

- Transfer students from other universities must have met the same requirements in their major's co-op program as nontransfers and must have completed at least one semester of classes before starting co-op.
- International students must attend one academic year, or its equivalent, and obtain proper authorization from the Office of Global Services before engaging in co-op.

Academic Requirements

1. **Be full-time while on co-op. Full-time status for co-op is defined as either:**
   a. one full-time co-op job; 32-40 hours per week, or
   b. two simultaneous half-time co-op jobs; 16-31.99 hours each, or
   c. one half-time co-op job; 16-31.99 hours with graduate students taking 3 or more academic credits or undergraduate students taking 6 or more academic credits.
      i. Undergraduate students on co-op in a Summer 1 or Summer 2 term may be registered for one half-time co-op without acquiring a second job or taking an accompanying class.
2. **Meet the minimum length requirements for an academic term:**
   a. Semester full-term: minimum of 11 weeks or 55 workdays
   b. Quarter full-term: minimum of 9 weeks or 45 workdays
   c. Summer 1 or Summer 2 term: minimum of 5 weeks or 25 workdays
3. **Receive a grade of Satisfactory or Unsatisfactory for the co-op experience.**

Registration for Co-op

Students are registered for co-op based on a complete job placement in the university's official co-op placement system with accurate start and end dates and meet the minimum hour and day requirements. Registration into the co-op experience class occurs one month before the term. Students need to be placed for co-op by the end of the add period, or they should be registered for classes if still searching for a job by this deadline. All co-op placements need to be approved by a co-op coordinator and entered into an official co-op placement system by the last day to drop without a W.

Co-op Financial Planning

- No tuition is charged while a student is on co-op only (students will pay room and board if they stay in university housing).
- If a student takes a credit-bearing class while on co-op, tuition will be charged at the per-credit rate.
- Students who wish to register for more than 4 credits while on full-time co-op must complete the Petition Registration form (https://registrar.northeastern.edu/wp-content/uploads/sites/9/form-pet-reg.pdf).
- Financial aid will be distributed to match the student's tuition bill and other allowable expenses.
- Students on co-op are required to maintain the same health insurance coverage (either through a private provider or through the university program) as they would while attending classes.

Further Information

For more detailed information about co-op policies and procedures, see the *Cooperative Education Student Handbook* on the Cooperative Education website (https://www.northeastern.edu/coop/).

Degrees, Majors, and Concentrations

Change of Major/Program of Study

A graduate (nondoctoral) student matriculated in a certificate/degree program who would like to enroll in a different graduate program, after consulting with their career and academic advisor, must apply to the intended program by submitting the Change of Major form.

Previously awarded transfer credit awards are subject to change as a result of a program change. Students on financial aid or an international student visa are responsible for understanding the impact that results from a program change.

Doctoral students must consult with their program director or designee.

Concentrations

Only university-approved concentrations are noted on students' official academic records. If a student pursues a customized specialization, no concentration will be noted on his or her official academic transcript. Students who wish to pursue a customized specialization must seek prior approval from the academic program director.

Full-Time Status

A graduate (nondoctoral) student is considered a full-time student if he or she is enrolled in 9 quarter hours of graduate credit for the quarter. An exception is made for students matriculated in master's degree programs that only require 4-credit courses, in which case full-time student status is attained with enrollment in 8 quarter hours of graduate credit for the quarter.

A doctoral student's full-time status is determined by the structure of the program.

Note that full-time status may be defined differently for federal loan purposes. International students have other considerations/requirements to maintain their visa eligibility.

Course Load

Federal financial aid recipients must be enrolled in and successfully complete a minimum number of credits each term to maintain eligibility. For more information, contact your financial aid counselor.

Course Overload

A maximum course load (different from full-time status) for a graduate (nondoctoral) student is 16 credits taken across a 12-week term, with no more than 8 credits per 6-week session.

To be eligible for a course overload (greater than 16 credits per 12-week term or greater than 8 credits per 6-week session), a graduate (nondoctoral) student must:

- Have a record of successful study with 12 or more credits a term at Northeastern University
- Have a minimum cumulative grade-point average (GPA) of 3.500
- Provide a rationale to support the request

Students need to complete the appropriate form and return it to their career and academic advisor. Course overload is approved per term.

Each doctoral program has its own enrollment and course load requirements. Doctoral students who wish to seek a course overload must consult with the program director or designee.

International Student Enrollment Requirements

IMPORTANCE OF MAINTAINING F-1 STATUS

International students studying at Northeastern University are responsible for maintaining compliance with U.S. federal regulations. Failure to maintain full-time enrollment, in accordance with these regulations, can result in consequences. Regular consultation with college academic advisors, as well as Office of Global Services (OGS) international student advisors, is required before taking any action that may impact immigration status and educational endeavors in the United States.

ACHIEVING FULL-TIME ENROLLMENT STATUS

Full-time enrollment status must be maintained by F-1 students throughout the academic year. To achieve full-time status, graduate students must be enrolled in 8–9 credits throughout each academic term. Students can consult with their college academic advisor prior to each term to develop a course schedule to maintain full-time status. F-1 students are expected to study on-ground and cannot enroll in an online course without first speaking to a college academic advisor to confirm eligibility. If approved, F-1 students who need to withdraw/drop from a course must withdraw/drop from the additional online course first and not from any of the on-ground core courses in order to maintain full-time status.

COLLEGE OF PROFESSIONAL STUDIES (CPS) ACADEMIC TERM

In CPS, each academic term in fall, winter, and spring is defined as a quarter term consisting of 12 weeks. Some courses are scheduled for the entire 12 weeks, while others are scheduled for either the first 6 weeks or the last 6 weeks (parts of a term). A full summer term consists of 8 weeks. Some courses are scheduled for the entire 8 weeks of a term, while others are scheduled for parts of a term.

FINAL TERM

F-1 students are required to maintain full-time enrollment status, except in the final academic term of degree completion. If the course requirements for degree completion are less than 8-9 credits, they must be completed on-ground throughout the entire final term.

ELIGIBILITY FOR SUMMER TERM OFF

All students, regardless of the term in which they begin studies, (e.g., CPS winter or spring quarter terms) are eligible to take the summer term off as their standard vacation term, as long as they confirm enrollment in the following fall term and they are not starting or ending their program of study in that same summer term.

Directed Study

Directed studies are offered when a course is required for a student's program of study but said course is not available in a given academic term and there is immediacy for a student to complete said course. Academic deans/directors will make the decision if there is a compelling need to run a course as a directed study.

Independent Study

Independent study is an opportunity for a degree student to work independently under the supervision of an instructor to undertake special research, literature review, or experimental study projects in areas related to his or her program of study that he or she cannot accomplish as part of a standard course in the curriculum. A degree student may take up to two independent studies. The work to be done for an independent study is usually crafted by the student, with faculty input. Independent studies are entirely optional and not needed to graduate. A completed Request for Independent Study form, signed by both the student and the faculty member, must be submitted to the academic program for review and approval.

Global Partnership Programs

Students enrolled in a College of Professional Studies' global partnership or a dual-degree program are required to abide by the policies and procedures of both institutions or as specified in their program.

Dual-degree candidates must apply to graduate at each institution by following each institution's policies and procedures.

Graduate Campus

Students enrolled in a Northeastern University graduate (regional) campus are also required to abide by the policies and procedures specific to that campus.

Graduation Requirements

Graduation Procedures

Only students who complete the graduation application process by specified deadlines will be considered for graduation and included in the graduation ceremony program. All qualified students must submit a graduation application in order to receive their diploma, regardless of whether they plan to attend the graduation ceremony.

Note important definitions: "Degree conferral date" and "graduation ceremony date" do not mean the same thing. Degree conferral date refers to the date of the university's official recognition of degree completion. For the purposes of the graduation application, that is accessed via the Student Hub. The "expected graduation date" (EGD) is the same as the degree conferral date. Northeastern University confers degrees four times each academic year: winter, spring, summer, and fall. The graduation ceremony date is the date that the college hosts the annual graduation ceremony.

Doctoral candidates must be mindful of additional deadlines to complete their dissertation/thesis in time to be eligible for degree conferral and participation in a doctoral hooding and a graduation ceremony.

Each fall, the Office of the Registrar sends an email notification to students who may be eligible to graduate that academic year about applying to graduate. This email notification informs and instructs students to complete the "Apply to Graduate" process, accessed via the Student Hub. Students are prompted to verify and provide critical information, e.g., spelling of the student's name on the diploma, intent to participate in the graduation ceremony, and mailing address.

An accurate EGD is required to gain access to the graduation application. The EGD is also used by clearinghouses to determine loan deferment schedules. If your EGD is not correct, contact your designated learner services specialist.

For more information, visit the College of Professional Studies Graduation webpage (https://cps.northeastern.edu/academic-resources/graduation/).

Diploma

The following rules apply to the diploma.

- Information that will be printed on diplomas:
  - Major for only nonspecified degrees (Master of Arts, Master of Science).

- Changes made to a student's name after the diploma has been printed may be subject to a $50 fee and take more than one month to reprint.
- Changes made to a student's degree information and name submitted after the program deadline will not be noted in the graduation ceremony program. If a diploma was previously printed, it will need to be reprinted and can take more than one month.

Master's Degree Admission Requirements

Note that all master's degrees offered through the College of Professional Studies (CPS) have the following admission requirements:

- Online application
- Statement of purpose (500–1,000 words)
- Professional resumé
- Official undergraduate transcript(s) noting conferral of a bachelor's degree
- Two letters of recommendation
- English-language proficiency proof (for non-native English-language speakers)
- TOEFL, IELTS, or TOEIC scores

Some programs have additional requirements.

The college reserves the right to rescind an offer of acceptance if the student is no longer considered in good academic or disciplinary standing between the time of acceptance and matriculation.

New Student Orientation (On-Ground and Online)

New students taking courses on-ground receive an invitation to the on-ground orientation. The purpose of New Student Orientation is to provide information and tools for each student's success from the point of program entry to degree completion. All new students are expected to attend the on-ground orientation. If students cannot attend the on-ground orientation, they should thoroughly review the New Admitted Students (http://www.orientation.cps.northeastern.edu) site.

Personal Information

Change of Name

Report all name changes to the Office of the Registrar immediately. Official documentation of the name change is required.

Change of Address

Report all address changes via the myNortheastern web portal (https://my.northeastern.edu/) or in person at the Office of the Registrar or Office of Student Accounts. Both the permanent home address and the local address are required. International students must report any changes of address or phone number via the myNortheastern web portal (https://my.northeastern.edu/) within 10 days in order to ensure compliance with Student and Exchange Visitor Information System (SEVIS) requirements.

Personal Professional Enrichment (PPE)

Students interested in taking graduate-level (nondoctoral) courses for personal or professional enrichment (PPE) need to complete an online application (http://www.cps.neu.edu/admissions/graduate/) as PPE students. Once approved, students will be able to register through their myNortheastern account.

- Students on PPE status are expected to satisfy applicable course prerequisites before enrolling in a course.
- Students taking courses while on PPE status may elect to apply to a graduate certificate or degree program by completing the formal application process (http://www.cps.neu.edu/admissions/graduate/). Up to two qualifying courses (or 8 credits) completed while on PPE status may be applied to the intended program of study. To be eligible, the minimum earned grade for the course(s) must be B.
- Students taking courses under PPE status are not eligible for financial aid.

PPE status is not an option for students seeking an F-1 visa.

Readmission to Program

A new admission application is required of students whose studies are interrupted voluntarily for more than three years.

Students are expected to meet the requirements of the program curriculum current at the time of the approved readmission. If the program into which the student is seeking readmission is no longer offered, the student may apply to another program and must meet the admissions requirements for that program. Contact the Office of Admissions (http://www.cps.neu.edu/admissions/) for assistance and to complete the admission application.

If readmitted, transfer credits that a student was previously awarded will be reevaluated following the transfer credit award rules current at the time of readmission. It is at the discretion of the academic program to determine applicability of courses previously completed.

Reentry to Program

Application for reentry into any academic program is required of students whose studies are interrupted voluntarily for a period of one to three years. Students who are dismissed academically must wait at least one academic term before applying for reinstatement.

Students are expected to meet the requirements of the program curriculum current at the time of the approved reentry. If a student does not enroll in the term in which he or she was approved for reentry, he or she must follow the curriculum requirements for the term in which he or she resumes coursework with approval. If a student waits for more than one year to resume his or her studies after being approved for reentry, he or she will have to apply for reentry again.

If the program into which the student is seeking reentry is no longer offered, the student may choose to enroll in another program if he or she meets the admissions requirements for that program. Contact the Office of Academic Advising (https://cps.northeastern.edu/academic-resources/advising/) for assistance and to complete the appropriate form.

Registration and Taking Courses

Course Registration

For course registration information, visit the College of Professional Studies webpage (http://www.cps.neu.edu/class-registration/).

Course registration procedures are as follows:

- Newly accepted and returning students add or drop courses through their myNortheastern account any time during the registration period.
- Certificate- and degree-seeking students whose studies have been interrupted voluntarily for one to three years or more need to first apply for reentry through the Office of Academic Advising before registering for course(s).
- Global program students should consult with their program to determine if they need to register on their own or if the program will register them.

All students need to be mindful of the college's course add/drop policies and deadlines to register as early as possible with the intent to secure a spot in the preferred course and to avoid being charged in full for missing the course drop/withdrawal deadline.

Auditing a Course

Graduate (nondoctoral) students are permitted to audit graduate (nondoctoral) courses, but they must complete the usual registration process and pay regular tuition fees. There is no reduction in fees for auditing.

An auditor may participate in class discussions, complete papers and projects, and take tests and examinations for informal evaluation. Regardless of the amount or quality of work completed, however, no academic credit will be granted at any time for audited courses. In addition, audited courses may not be used in the determination of enrollment status for financial aid purposes and do not count toward program completion.

The student's decision to audit a course must be communicated in writing to the Office of the University Registrar before the fourth class meeting for 12-week courses. For 4-, 6-, and 8-week courses, requests must be received by the second class meeting. No exception to this procedure may be approved without the authorization of the college's academic standing committee.

If approved, the student should inform the instructor of his or her status as auditor of the course.

Course Selection and Planning

Students should refer to their degree audits for program curriculum information, to select courses, and to monitor their progress toward degree completion. Students should access their degree audits through their myNortheastern account or request an audit from their academic and career advisor. Degree audits are unofficial records of academic progress. Students are encouraged to consult with their academic and career advisor about their academic planning.

Course Prerequisites

Course prerequisites are courses that are required to have been completed prior to enrolling in another course. Before registering for a course through their myNortheastern account, students, regardless of matriculation status, should consult the academic catalog to determine whether they have satisfied the course prerequisites.

Course Corequisites

Course corequisites are courses that are required to be taken concurrently. Before registering for a course through their myNortheastern account, students, regardless of matriculation status, should read the course description to determine if there is a corequisite requirement and register for both courses.

Repeating a Course

If a student wishes to improve his or her cumulative grade-point average (GPA) by repeating a course, he or she may do so . Only the grade earned in the last attempt is used to compute the GPA while all grades remain part of the student's permanent academic record. A student is required to pay the normal tuition charges for all repeated courses. A student may not repeat more than two courses or 8 quarter hours of credit, whichever is greater, to satisfy the requirements of the degree.

Financial aid recipients must be mindful that repeating a course could impact their aid eligibility. Students with questions about this possible impact should contact their financial aid counselor.

Course Waiver

A course waiver may be awarded to a student who has completed the equivalent course at an accredited institution other than the College of Professional Studies in the past five years. The waiver will exempt the student from completing the required course. The student will complete another course, as approved by the program, to satisfy the number of credits required for the program.

Doctoral students must consult with their academic program to determine if course waivers are permitted.

Duration of Courses

Each full fall, winter, and spring term runs for 12 weeks. Each full summer term runs for 8 weeks.

Course durations are as follows:

- During the fall, winter, and spring terms, courses are scheduled for either 6 or 12 weeks.
- During the summer term, courses are scheduled for 4, 6, or 8 weeks.

Course Add/Drop Policy

Refer to the academic calendar (http://www.northeastern.edu/registrar/calendars.html) for specific dates. Students should consult with their academic and career advisor before adding or dropping classes.

Students may add a 4-week or 6-week course within the first week of the course. For 8- and 12-week courses, students may add a course within the first 2 weeks of the course. Students who add a class during the add/drop period are responsible for all assignments missed prior to enrolling. Enrolled students are responsible to attend classes during the add/drop period, and absences will be held accountable to the instructor's attendance policy.

Students who drop a course before the add/drop deadline will not be charged for the course and will not have a W (withdrawal) on their transcript. Thereafter, students are responsible for 100 percent of the tuition charges and applicable fees and the earned grade will be on the students' permanent academic record. All such dates are specified in the academic calendar.

Students must add/drop courses using their myNortheastern account.

A reduction in a student's course load could affect a student's international student visa status or financial aid eligibility.

Students who experience difficulty adding or dropping a course should promptly email (registrar@northeastern.edu) the Office of the University Registrar. If it is determined that there is an issue with the student's

myNortheastern account or access, he or she needs to contact the Service Desk at 617.373.4357 (HELP); help@northeastern.edu.

Students with holds (e.g., financial, judicial) may have restricted access to add, drop, or withdraw from a course. In such instances, students are responsible for resolving the hold immediately and to meet the established course registration deadlines.

Course Withdrawal Policy

Refer to the academic calendar (http://www.northeastern.edu/registrar/calendars.html) for specific dates.

Students who withdraw from a course after the add/drop deadline and before the last day to withdraw will receive a W grade and will be responsible for 100 percent of the tuition charges and applicable fees. The W grade does not affect the calculation of the GPA but it does impact a student's academic progression, which may result in the student being placed on academic probation or dismissal.

Students must withdraw from courses using their myNortheastern account.

A reduction in a student's course load could affect a student's international student visa status or financial aid eligibility.

Students who experience difficulty withdrawing from a course should promptly contact the Service Desk at 617.373.4357 (HELP); help@northeastern.edu.

Students who fail to withdraw from a course by the deadline, regardless of their level of class participation or attendance, are financially and academically responsible. A student's lack of participation/attendance will likely result in a final grade of F.

All students are encouraged to consult with their career and academic advisor prior to withdrawing from a course. Withdrawals may impact a student's time to degree completion.

Reinstatement after Academic Dismissal

A student who is academically dismissed from the college is not eligible to register again for courses at this college until he or she is approved for reinstatement. A student may apply for reinstatement after a minimum of one academic term if he or she can provide documented evidence supporting the application (e.g., completed two graduate courses with a grade of B or higher at another accredited college or relevant professional development opportunities during the one-term absence). The application must be made in writing by submitting the appropriate form and providing supporting documentation to the Office of Academic Advising (https://cps.northeastern.edu/academic-resources/advising/).

If reinstatement to the college is approved, a student is expected to meet the most current requirements for program admissions and curriculum.

A student approved for reinstatement but who does not meet the admissions requirements for the intended program of study, or if the intended program of study is no longer available, may apply to another program.

Students reinstated must achieve good academic standing in the first term of reinstatement.

Seeking More than One Certificate or Degree

A graduate (nondoctoral) student can be enrolled in only one graduate program at a time.

Graduate (nondoctoral) students seeking more than one certificate or degree after having completed a program should note that graduate credits earned toward:

1. A degree at any institution may not be used to satisfy the requirements of another graduate program.
2. A degree earned at the College of Professional Studies may be used to satisfy the requirements of a graduate certificate with a cap of 50 percent of the required credits of a graduate certificate, if the contents are determined to be applicable per the program director and if the credits were earned within seven years of pursuit of the certificate.
    a. If the same course is required in the degree and certificate programs and the student has exceeded the maximum number of credits that can be applied in the certificate program, he or she may request a course substitution to be permitted to take another course instead of repeating the course.
3. With specified exception, a certificate earned at the College of Professional Studies may be used to satisfy the requirements of a graduate degree, if the contents are determined to be applicable per the program director and if the credits were earned within seven years of pursuit of the degree.
4. A certificate earned at the College of Professional Studies may be used to satisfy the requirements of a second certificate with a cap of one course of no more than 4 credits, if the contents are determined to be applicable per the program director and if the credits were earned within seven years of pursuit of the certificate.
    a. If the same course is required in both certificate programs and the student has exceeded the maximum number of credits that can be applied in the second certificate program, he or she will request a course waiver to be permitted to take another course instead of repeating the course. See Course Waiver (p. 367) section.
5. A certificate earned at another accredited institution may be accepted as transfer credits to satisfy the requirements of a graduate degree with a cap of four 3-credit courses or three 4-credit courses (no more than 12 credits), if the contents are determined to be applicable per the program director and if the credits were earned within seven years of pursuit of the degree.

A graduate (nondoctoral) degree student who wishes to pursue a graduate certificate concurrently may seek admission in the certificate program by the end of his or her first term of matriculation in the degree program. Courses that satisfy requirements for both the degree and certificate will count for each.

- When the certificate is identical to a concentration in a degree program, only the certificate credential will be earned. The student's transcript will not indicate completion of a concentration.

Special Student Status

Graduate applicants to the College of Professional Studies may be eligible to take up to 16 graduate (nondoctoral) QH toward their program while completing the formal application process by seeking special student status (http://www.cps.neu.edu/admissions/graduate/special-students.php).

- Students taking courses under special student status are expected to satisfy applicable course prerequisites before enrolling in a course.
- Students taking courses under special student status are not eligible for financial aid.
- Special student status does not guarantee acceptance.
- The maximum number of courses students may take under special student status is two. After completing two courses, students will be blocked from further course registration until they have been officially accepted into a program.

The following programs are not available for special student status: Master of Arts in Teaching (MAT); Master of Education, Special Education Concentration; Master of Science in Applied Nutrition; Doctor of Education; Doctor of Law and Policy.

Special student status is not an option for students seeking an F-1 visa.

Student Evaluation of Courses (EvaluationKIT)

Students play a critical role in the university's commitment to quality teaching and academic excellence when they participate in the evaluation of courses through EvaluationKIT, an online survey students complete anonymously at the completion of a course. Students are expected to participate in EvaluationKIT with constructive feedback that is relevant to teaching and course content.

Students may access EvaluationKIT summary results from previous terms via their myNortheastern web portal (http://my.northeastern.edu/). Courses with three or fewer students enrolled are not surveyed.

Transfer Credit Policies

All graduate transfer credit awards are made on a case-by-case basis. Transfer credit awards are made for eligible courses successfully completed at regionally and programmatically accredited institutions. The Council for Higher Education Accreditation provides information about the organizations responsible for these two forms of accreditation. Official transcripts from all institutions should be sent directly to the College of Professional Studies Office of Admissions at the time of application.

Students seeking transfer credits earned at institutions outside the United States should submit an official English evaluation completed by an approved credential evaluator. Course descriptions and/or syllabi also should be translated into English and submitted to the College of Professional Studies Office of Admissions.

A maximum of 12 quarter hours or four 3-credit courses or three 4-credit courses obtained at another institution may be accepted as transfer toward the degree, provided the credits consist of work taken at the graduate level for graduate credit, carry minimum grades of B (or 3.000 on a 4.000 scale), have been earned at an accredited institution or equivalent, and have not been used toward any baccalaureate or advanced degree or certificate of advanced graduate study at another institution.

Transfer credits must be no more than five academic years old at the time the student is admitted to graduate study. Courses older than five years will be accepted only in rare circumstances.

Prior Learning Assessment (PLA)

Students may be eligible for PLA credit if they have accrued a foundation of knowledge and skills equivalent to the content of courses offered by the College of Professional Studies.

Awarded credits are incorporated into a student's degree plan as transfer credits and are subject to the university's residency requirement. PLA credit is limited to a maximum of 12 quarter hours for graduate students. Acceptable credits for PLA review are credits from certificates, training, and a portfolio review of prior work experience. As part of consideration for PLA credits, faculty will evaluate and map learning outcomes and achievement in alignment with NECHE accreditation requirements.

Potential PLA credits should be considered and discussed as part of a student's transfer credits at the time of enrollment. Interested students should contact their career and academic advisor for more information.

Graduate Certificate Transfer Credit Policies

- A maximum of 4 quarter hours of transfer credit

Master's Degree Transfer Credit Policies

- A maximum of 12 quarter hours of transfer credit

Doctoral Degree Transfer Credit Policies

- A maximum of 9 quarter hours of transfer credit for Doctor of Education students
- A maximum of 8 quarter hours of transfer credit for Transitional Doctor of Physical Therapy students
- No transfer credit is awarded for students in the Doctor of Law and Policy program

Doctoral Degree Programs

Guided by industry leading faculty, our innovative **doctoral programs** combine cutting-edge coursework with professionally relevant research projects. These programs will provide you with the opportunity to earn the policy, research, and administrative foundation necessary to advance to the top of your career.

Programs

Doctor of Education (EDD)

- Education (p. 370)

Doctor of Law and Policy (DLP)

- Law and Policy (p. 373)

Transitional Doctor of Physical Therapy (DPT)

- Transitional Doctor of Physical Therapy (p. 374)

Education, EDD

The Doctor of Education (EdD) empowers students to bring about solutions to complex problems of practice in their local context, while leveraging a global network to magnify students' boundless experiential learning to build a more socially just world. The Dissertation in Practice, the culminating component of the degree, is designed to prepare leaders who can construct and apply knowledge to transform their organizations and communities through laboratories of practice where students implement change and then measure and analyze the impact to improve their professional practice. This knowledge is the start of students' potential for meaningful change work. Students magnify their ability to

generate socially just change by leveraging Northeastern University's global network of students, alumni, employers, and entrepreneurs.

ADMISSION REQUIREMENTS

Note that all Doctor of Education degrees offered through the College of Professional Studies have the following admission requirements:

- Online application
- Academic transcripts (undergraduate **and** graduate)
- Admissions statement (1,000–1,200 words)
- Minimum of three years of professional work experience in a related field
- Professional resumé
- Faculty recommendation
- Two professional recommendations
- English-language proficiency proof (for non-native English-language speakers)

CURRICULUM, TEACHING, LEARNING, AND LEADERSHIP CONCENTRATION

The Doctor of Education with Concentration in Curriculum, Teaching, Learning, and Leadership helps educational leaders develop the competencies, dispositions, and values required to pursue educational reform, based on a commitment to social justice. Students explore the relationship between effective educational leadership and the ways that curriculum and teaching can enhance learning opportunities for students across their life span.

This EdD concentration focuses on preparing transformational leaders who recognize the importance of providing quality educational experiences for all learners.

Key learning objectives include how to:

- Assess how issues of social justice play out in contemporary educational settings
- Analyze education systems to gain an understanding of the evolution of micro- and macrolevel policies and legislation
- Examine international curriculum and instruction research and practices
- Investigate the development and interaction of leadership roles within organizations
- Explore the theoretical and historical dimensions of curriculum, teaching, and learning in varied educational settings

HIGHER EDUCATION ADMINISTRATION CONCENTRATION

The Higher Education Administration concentration provides an opportunity for experienced higher education professionals to examine new and deepen previous understanding of practices within all sectors of postsecondary education. Sectors examined include community colleges, four-year colleges, for-profit institutions, and research universities. The increased globalization of higher education is addressed throughout the program. The concentration courses allow experienced higher education professionals to advance their professional practice by developing and deepening their understanding of the roles of colleges and universities in our society. Specifically, this concentration provides the opportunity to:

1. Be well-grounded in areas essential to understanding and articulating the educational roles of colleges and universities that include:
   - Cultural, ethical, and societal issues that affect higher education
   - History of higher education worldwide
   - Organization, governance, leadership, and administrative theories and practices
   - Higher education finance, law, and planning
2. Develop skills and knowledge for establishing and sustaining initiatives in higher education.
3. Address the challenge of ensuring educational equity through an evaluation of the roles, functions, and interrelationships among a college's or university's major constituents, including students, faculty, staff, and alumni.
4. Conduct research at the worksite that contributes to the resolution of an urgent and complex problem of practice.

INNOVATIVE TEACHING AND LEARNING

The Innovative Teaching and Learning concentration focuses on transforming education through innovation, justice, and policy by providing engaging opportunities for current and aspiring teaching and learning specialists working in a variety of educational spaces. In a global, ever-changing educational environment, cultivating strong teaching and learning specialists is critical to building strong, safe, and equitable learning spaces. The concentration focuses on teaching and learning both inside and outside the bounds of P–20 schools. Through a focus on developing and leading innovative curriculum and professional development, the coursework and programmatic experiences are experiential—offers opportunity for learning and growth in connection with partners in the field; modular—develops specialized professional knowledges; and justice-oriented—enables an understanding of change processes that deconstruct systemic injustice at all educational levels. Specifically, the Innovative Teaching and Learning concentration provides the opportunity to:

- Develop the ability to improve teaching and learning through innovation
- Design classroom, curriculum, and professional development that lead to greater achievement and equity
- Design systems to address race, class, and gender inequities in education
- Leverage partnerships with business and community to expand networks and experiences

INTEGRATIVE STUDIES CONCENTRATION

The Integrative Studies Concentration provides an opportunity for students to design a program of study that includes the program-required foundation and research courses, concentration courses from any EdD concentration, and electives from the Doctor of Education or Doctor of Law and Policy programs.

ORGANIZATIONAL LEADERSHIP STUDIES CONCENTRATION

The Doctor of Education with Concentration in Organizational Leadership Studies positions experienced leaders to assume greater responsibilities within their organizations. Designed for leaders working in educational, government, healthcare, military, not-for-profit, for-profit, and management consulting organizations, this concentration combines theory, research, and practice to develop individuals who can effectively manage and lead change in today's fast-paced, global environment.

The interdisciplinary curriculum offers a strong foundation in leadership, culture, learning, change, communications, systems, and strategy. Students have an opportunity to conduct and apply doctoral research to develop real-world answers to the leadership challenges facing 21st-century organizations.

Throughout the course of the program, students have an opportunity to:

- Review contemporary leadership theory and models emphasizing recent conceptualizations such as adaptive, relational, distributed, complexity, and global leadership to refine their personal leadership knowledge, skills, and abilities
- Explore classical and modern theories of organization and design a forward-thinking organization creating all components, including vision, mission, strategy, structure, and processes
- Use both seminal and current theoretical approaches of organizational communication to investigate the dynamic interplay between communication processes and human organizing
- Examine seminal and modern group dynamics research to assess group processes and to stimulate group development inside their organizations
- Investigate topical consulting strategies and organizational assessment tools and conduct an organizational diagnosis to gain a comprehensive understanding of the models, variables, and perspectives used to understand complex organizational processes
- Integrate organizational power theory, research, and practical diagnostic tools to systematically identify and evaluate the political processes and behaviors at play inside their organizations

This program seeks to produce graduates who have the capacity to contribute new knowledge to leadership scholarship and become positive forces of change.

TRANSFORMATIVE SCHOOL LEADERSHIP

The Transformative School Leadership concentration provides innovative opportunities for experienced education professionals who are current and aspiring leaders of early childhood centers, public or private schools, or school districts. In a global, ever-changing educational environment, cultivating strong educational leaders is critical to building strong, safe, and equitable learning spaces. In preparing to meet complex and nuanced educational challenges, school leaders need to be knowledgeable and innovative, capable of facilitating the generation and advancement of new ideas and strategic initiatives, and equipped to shape the needs of education in K–12, higher education, organizational contexts, and beyond. Through deeper engagement with these components, the Transformative School Leadership concentration prepares students to lead and transform educational spaces P–12. The coursework and programmatic experiences are experiential—offers opportunity for learning and growth in connection with partners in the field; modular—develops specialized professional knowledges; and justice-oriented—enables an understanding of change processes that deconstruct systemic injustice at all educational levels. Specifically, this concentration provides the opportunity to:

- Develop the ability to shape a vision of academic success for all students
- Develop leadership capacity in others
- Manage people, data, and processes to develop innovative skills and knowledge
- Design systems to address race, class, and gender inequities in education
- Leverage partnerships with business and community to expand networks and experiences

WORKPLACE LEARNING

The Workplace Learning concentration embraces the value of equity through instruction grounded in the concept of enabling people of all backgrounds, networking across the globe, to achieve their potential and the belief that social issues matter in workplace learning and development. This doctoral concentration in Workplace Learning helps learning professionals gain a deeper understanding of, recognize, and influence real-life social inequalities marginalized populations face in the workplace. The concentration courses allow experienced learning professionals to advance their professional practice by developing and deepening their understanding of workplace learning, organizational dynamics, learning strategy, and ethics. Specifically, this concentration provides the opportunity to:

- Articulate the issues facing workplace learning
- Develop skills and knowledge for establishing and sustaining initiatives and partnerships in workplace learning
- Conduct research in the workplace that contributes to the resolution of an urgent and complex problem of practice

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Note: A minimum of 51 quarter hours must be taken at the College of Professional Studies.

Required Foundation Courses

Code	Title	Hours
EDU 7207	Introduction to Action Research and Social Change	3
EDU 7218	Leadership for Social Justice	3
EDU 7219	Collaborative Leadership	3

Required Research Courses

Code	Title	Hours
EDU 7225	Fundamentals of Research	3
EDU 7226	Research Design	3
EDU 7294	Advanced Research Design	3
EDU 7295	Dissertation in Practice Seminar	3

Concentrations

Complete one of the following concentrations:

- Curriculum, Teaching, Learning, and Leadership
- Higher Education Administration
- Innovative Teaching and Learning
- Integrative Studies
- Organizational Leadership Studies
- Transformative School Leadership (p. 373)
- Workplace Learning (p. 373)

Dissertation in Practice

Code	Title	Hours
EDU 8750	Proposal, Action Step, and Evaluation	6
EDU 8760	Action Research Results and Dissemination	6

Residency Requirement: Each student is required to attend two residency events. Dates and other event information are released annually. Seattle and Charlotte students will satisfy residency requirements through regional campus hybrid coursework.

Elective List

Complete five courses from the EDU 7000 level. Below is a list of courses regularly offered as electives within the Doctor of Education program.

Code	Title	Hours
EDU 7227	The Power of Experiential Learning	
EDU 7228	Bringing Experiential Learning, Assessment, and Reflection to Life	
EDU 7229	The Experiential Learning Leader	
EDU 7230	Current and Emerging Practice in STEM Education	
EDU 7245	Urban Education	
EDU 7251	Student Engagement in Higher Education	
EDU 7256	Financial Decision Making in Higher Education	
EDU 7260	Comparative International/Global Higher Education	
EDU 7261	International Student Markets	
EDU 7266	Contemporary Issues in Community Colleges	
EDU 7251	Student Engagement in Higher Education	
EDU 7274	Doctoral Seminar in Organizational Leadership and Communication	
EDU 7279	Organizational Consulting	
EDU 7314	Collaboration and Networks in Educational Leadership	
EDU 7317	Collaboration and Networks in Teaching and Learning	
EDU 7510	Data-Driven Decision Making	
EDU 7511	Digital Workplace Learning	

Doctor of Education Advanced Graduate Credit (https://cps.northeastern.edu/admissions-aid/graduate-admissions/graduate-transfer-credit/doctor-of-education-advanced-graduate-credit/)

Program Credit/GPA Requirements

60 total quarter hours required
Minimum 3.000 GPA required

CURRICULUM, TEACHING, LEARNING, AND LEADERSHIP

Code	Title	Hours
EDU 7213	Education Entrepreneurship	3
EDU 7217	Educational Systems: The Dynamics of Policy, Power, and Practice	3
EDU 7242	Situated Leadership	3
EDU 7244	Curriculum Theory and Practice Over Time: Implications for Educational Leadership	3

HIGHER EDUCATION ADMINISTRATION

Code	Title	Hours
EDU 7204	Global and Historical Perspectives on Higher Education	3
EDU 7250	Organizational Systems and Institutional Governance	3
EDU 7253	The Legal Environment of Higher Education	3
EDU 7258	Strategic Management in Higher Education	3

INNOVATIVE TEACHING AND LEARNING

Code	Title	Hours
EDU 7217	Educational Systems: The Dynamics of Policy, Power, and Practice	3
EDU 7311	Designing Educational Systems for Justice and Equity	3
EDU 7315	Landscape of Teaching and Learning	3
EDU 7316	Designing Transformative Curriculum and Professional Development	3

INTEGRATIVE STUDIES

Code	Title	Hours
Required Courses		
Complete EDU courses from any other program concentration.		12
Elective Courses		
Complete EDU 7000 courses from the program elective list and any LWP 7000-level course.		15

ORGANIZATIONAL LEADERSHIP STUDIES

Code	Title	Hours
EDU 7272	Organizational Culture and Change	3
EDU 7275	Contemporary Leadership Perspectives	3
EDU 7276	Communication: Teams, Organizations, and Global Networks	3
EDU 7277	Organizational Learning, Innovation, and Systems Thinking	3

TRANSFORMATIVE SCHOOL LEADERSHIP

Code	Title	Hours
EDU 7217	Educational Systems: The Dynamics of Policy, Power, and Practice	3
EDU 7311	Designing Educational Systems for Justice and Equity	3
EDU 7312	Landscape of Educational Leadership	3
EDU 7313	Leading and Managing Change	3

WORKPLACE LEARNING

Code	Title	Hours
EDU 7501	Designing Workplace Learning	3
EDU 7502	The Dynamics of Workplace Learning	3
EDU 7503	Leading the Learning Strategy	3
EDU 7504	Ethics and Organizational Learning	3

Law and Policy, DLP

Public servants, executives, and managers operate in an increasingly complex global environment. A doctoral education seeks to provide the policy, analytic, and research skills necessary to advance one's career.

Developed jointly by the College of Professional Studies and Northeastern's Public Policy program, the Doctor of Law and Policy program (DLP) is designed for experienced professionals who are interested in the origins, development, implementation, and analysis of legal and public policy decisions in government and related institutions. The program prepares students to advance their careers within a variety of fields while focusing their thesis research on a precise law and policy topic.

Students undertake the DLP in order to understand the ways in which public and related institutions formulate and execute policy. Students have the opportunity to develop the ability to interpret and assess the research of others, to acquire skills as researchers, and to communicate their knowledge to a wide range of audiences. Those who successfully complete the degree are equipped to bring their skills and knowledge to senior policy and management positions in government, nonprofit agencies, research organizations, consulting firms, and corporations.

The DLP program is structured so course work and the doctoral thesis can be completed in two years. Classes meet one weekend per month in Boston, and the learning continues online throughout the rest of the month.

Northeastern University also offers a traditional PhD in Public Policy. To learn more, visit the Public Policy program website (https://cssh.northeastern.edu/policyschool/program/phd-in-public-policy/).

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
LWP 6118	Historical Foundations of American Law	3
LWP 6119	Current Law and Policy Debates: Our Nation's Capital and Beyond	3
LWP 6120	Law and Legal Reasoning 1	3
LWP 6401	Law and Policy Concepts 1: The Policymaking Process	3
LWP 6424	Research Methods	3
LWP 6121	Law and Legal Reasoning 2	3
LWP 6402	Law and Policy Concepts 2: Strategizing for Public Policy	3
LWP 6423	Qualitative Methods	3
LWP 6122	Law and Legal Reasoning 3	3
LWP 6403	Law and Policy Concepts 3: Policy Case Studies	3
LWP 6420	Quantitative Methods	3
LWP 6123	Law and Legal Reasoning 4	3
LWP 6410	Economics for Policy Analysis	3
LWP 6404	Evaluation Research	3
LWP 6431	Political and Moral Ethics and Dilemmas	3
LWP 6500	Doctoral Research Design 1	3
LWP 6450	Public Policy Theory and Practice 1	3
LWP 6501	Doctoral Research Design 2	3
LWP 6451	Public Policy Theory and Practice 2	3
LWP 6502	Doctoral Research Design 3	3
LWP 6452	Public Policy Theory and Practice 3	3
LWP 6503	Doctoral Research Design 4	6

Program Credit/GPA Requirements

69 total quarter hours required
Minimum 3.000 GPA required

Transitional Doctor of Physical Therapy, DPT

Designed for practicing physical therapists, the Transitional Doctor of Physical Therapy (tDPT) is an innovative, 100 percent online program. Integrating art and science, as well as professional and experiential learning, this curriculum provides the necessary coursework to earn a terminal doctoral degree in physical therapy. Students who have earned a bachelor's degree in physical therapy will enter the program as Direct Entry students and will be required to take a core of six courses plus two electives (33 quarter hours). Students who have previously earned a master's degree in physical therapy will be required to take five core courses and one elective (24 quarter hours). All students will culminate their tDPT curriculum with the capstone course, Comprehensive Case Analysis (PTH 6900). Students have an opportunity to prepare a comprehensive and publishable case report or other scholarly work in partial fulfillment of the requirement for a tDPT degree.

Upon entrance to the Transitional Doctor of Physical Therapy program, students will select either the educational or clinical track to follow. Selecting the educational track will enable the student to focus their coursework within the educational realm. Selecting the clinical track will allow the student to focus on current clinical practice in their elective(s) as well as completing a capstone project within their clinical domain.

One of the two elective requirements may be waived in certain circumstances, i.e., if the physical therapist holds an ABPTS or similar certifications. In certain circumstances, other elective options may be considered with program director approval. Students work with their advisor and the program director for their individual course plan of study.

Direct Entry Program Requirements (BS)

Note: 33 quarter hours are required for students entering with a Bachelor of Science in Physical Therapy.

Required Courses for All Students

Code	Title	Hours
PTH 6110	Diagnostic Imaging	4
PTH 6101	Medical Screening and Nutrition for Physical Therapists	5
PTH 6130	Pharmacology	3
PTH 6900	Comprehensive Case Analysis	4
PTH 6140	Motor Control	4
PTH 6200	Research Methods and Statistical Analysis	5

Upon entrance to the Transitional Doctor of Physical Therapy program, students will select either the educational or clinical track.

Educational Track

Code	Title	Hours
PTH 6430	Educational Strategies for Effective Healthcare Delivery	4
PTH 6235	Administrative and Management Keys for Contemporary Physical Therapist Practice	4

Clinical Track

Code	Title	Hours
Complete two of the following:		8
PTH 6480	Evidence-Based Exercise for the Older Adult	
PTH 6563	Evidence-Based Examination and Outcomes for Lumbar Spine and Sacroiliac Joint	
PTH 6564	Evidence-Based Examination and Outcomes for Lower Extremity: Hip, Knee, Foot, and Ankle	

Program Credit/GPA Requirements

33 total quarter hours required
Minimum 3.000 GPA required

Advanced Entry Program Requirements (MS)

Note: 24 quarter hours are required for students entering with a Master of Science in Physical Therapy.

Core Requirements

Code	Title	Hours
Required Core		
PTH 6110	Diagnostic Imaging	4
PTH 6101	Medical Screening and Nutrition for Physical Therapists	5
PTH 6130	Pharmacology	3
PTH 6900	Comprehensive Case Analysis	4
PTH 6140	Motor Control	4

Upon entrance to the Transitional Doctor of Physical Therapy program, students will select either the educational track or clinical track.

Educational Track

Code	Title	Hours
PTH 6430	Educational Strategies for Effective Healthcare Delivery	4

Clinical Track

Code	Title	Hours
Complete one of the following:		4
PTH 6480	Evidence-Based Exercise for the Older Adult	
PTH 6563	Evidence-Based Examination and Outcomes for Lumbar Spine and Sacroiliac Joint	
PTH 6564	Evidence-Based Examination and Outcomes for Lower Extremity: Hip, Knee, Foot, and Ankle	

Program Credit/GPA Requirements

24 total quarter hours required
Minimum 3.000 GPA required

Master's Degree Programs

Representing in-demand fields such as education, technology, project management, and regulatory affairs, our **master's degree programs** are grounded in theory and applied in practice. Programs may be taken part-time or full-time, online, or on campus, providing you maximum flexibility and convenience for your busy schedule.

Programs

Master of Arts (MA)

- Homeland Security (p. 375)
- Strategic Intelligence and Analysis (p. 376)

Master of Arts in Teaching (MAT)

- Teaching, Elementary Licensure (p. 378)
- Teaching, Secondary Licensure (p. 379)

Master of Education (MEd)

- Education (p. 380)
- Higher Education Administration (p. 380)

Master of Professional Studies (MPS)

- Analytics (p. 381)
- Applied Machine Intelligence (p. 382)
- Digital Media (p. 383)
- Digital Media—Connect (p. 385)
- Geospatial Services (p. 386)
- Informatics (p. 387)
- Learning Experience Design and Technology (p. 389)

Master of Science (MS)

- Applied Nutrition (p. 389)
- Commerce and Economic Development (p. 391)
- Corporate and Organizational Communication (p. 392)
- Global Studies and International Relations (p. 396)
- Human Resources Management (p. 394)
- Leadership (p. 397)
- Nonprofit Management (p. 399)
- Organizational Leadership (p. 401)
- Project Management (p. 402)
- Regulatory Affairs (p. 404)

Master of Sports Leadership (MSLD)

- Sports Leadership (p. 406)

Homeland Security, MA

The Master of Arts in Homeland Security is intended to prepare the next generation of emergency managers and homeland security professionals for leadership roles in the public and private sectors. The degree offers a comprehensive program of studies covering core elements of homeland security and emergency management at the graduate level, including management skills, intelligence gathering and analysis, risk management, emergency planning and management, legal issues, technological issues, and social psychology. The master's in homeland security program is designed to develop high-level operational expertise through the application of the above content to the implementation of emergency response protocols as executed in the United States.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
CMN 6050	Crisis Communication	3
HLS 6000	Introduction to Homeland Security	3
HLS 6010	Contemporary Threats to Homeland Security	3
HLS 6020	Technology for Homeland Security	3
HLS 6030	Intelligence for Homeland Security	3
HLS 6040	Critical Infrastructure and Protection	3
HLS 6050	Multidisciplinary Approaches to Homeland Security	3

Capstone/Thesis

Code	Title	Hours
Complete one of the following capstone options.		1-8
Option 1		
HLS 6983	Topics in Homeland Security	
Option 2		
GST 6109	Basic Field Research Methods	
HLS 7990	Thesis	

The remaining quarter hours may be completed by: 1) a combination of completing a concentration and additional electives or 2) selecting any courses listed in the concentrations and elective list below.

Concentrations

CONCENTRATION IN EMERGENCY MANAGEMENT

Code	Title	Hours
HLS 6060	Strategic Planning and Budgeting	3
HLS 6070	Emergency Management and Geographic Information Systems	3
HLS 6080	Continuity of Operations and Planning	3
HLS 6150	Essentials of Emergency Management	3
HLS 6155	Critical Infrastructure, Security, and Emergency Management	3
HLS 6160	Advanced Emergency Management	3

CONCENTRATION IN GEOSPATIAL SERVICES

Code	Title	Hours
GIS 5103	Foundations of Geographic Information Science	4
GIS 6394	Crisis Mapping for Humanitarian Action	3
HLS 6060	Strategic Planning and Budgeting	3
HLS 6070	Emergency Management and Geographic Information Systems	3
HLS 6080	Continuity of Operations and Planning	3

CONCENTRATION IN ORGANIZATION AND INFRASTRUCTURE CONTINUITY

Code	Title	Hours
CJS 6430	Risk Management	3
GIS 5103	Foundations of Geographic Information Science	4
HLS 6090	Organization and Structural Continuity Planning	3
ITC 6315	Information Security Risk Management	3
ITC 6310	Information Security Governance	3

CONCENTRATION IN PORT SECURITY

Code	Title	Hours
Complete the following:		
HLS 6100	Maritime Port Security 1 (recommended taken conconcurrently with HLS 6120)	4
HLS 6120	Aviation Security 1 (recommended taken conconcurrently with HLS 6100)	4
Complete 8 quarter hours from the following subject areas: HLS, SIA		8

Electives

Code	Title	Hours
CJS 5978	Independent Study	
CJS 6105	Domestic and International Terrorism	
CJS 6125	National Security—Law and Policy	
CJS 6430	Risk Management	
CMN 6060	Negotiation, Mediation, and Facilitation	
EDU 6184	Interdisciplinary Foundations	
GST 6109	Basic Field Research Methods	
GST 6300	Security and Terrorism	
GST 6501	Regional Studies: East Asia	
GST 6502	Regional Studies: Middle East and North Africa	
GST 6503	Regional Studies: Sub-Saharan Africa	
GST 6504	Regional Studies: Europe and Eurasia	
GST 6505	Regional Studies: Southwest and Central Asia	
GST 6506	Regional Studies: Latin America	
HLS 6035	Advanced Intelligence Applications for Homeland Security	
INT 6943	Integrative Experiential Learning	
SIA 6010	Intelligence Operations Management	
SIA 6020	Globalization and Intelligence Issues	
SIA 6030	Intelligence Analysis and Policy Relationship	
SIA 6040	Interagency Collaboration	
SIA 6050	All-Source Intelligence	
SIA 6060	Human Intelligence Operations	
SIA 6070	Analysis for Counterterrorism	
SIA 6090	Intelligence Collection	

Program Credit/GPA Requirements

45 total quarter hours required
Minimum 3.000 GPA required

Strategic Intelligence and Analysis, MA

The Master of Arts in Strategic Intelligence and Analysis is designed for students who seek careers in the intelligence field, as well as professionals whose agencies or clientele are charged with the acquisition and interpretation of intelligence. The degree features courses in fundamental intelligence disciplines, such as analysis and epistemology, intelligence collection, and others. Every analyst in the intelligence community is expected to be proficient in six core competencies. The competencies enumerated by the Director of National Intelligence (DNI) are as follows:

- Engagement and collaboration
- Critical thinking
- Personal leadership and integrity
- Accountability for results
- Technical expertise
- Communication

The program focuses on summarizing psychological theories relevant to critical thinking and analytical techniques; demonstrating knowledge, through examination procedures, of the major theories and research findings in intelligence analysis; becoming familiar with analytical literature through independent reading; and applying analytical techniques and theories to problem sets. The Master of Arts in Strategic Intelligence and Analysis is designed to prepare the next generation of intelligence analysts for leadership roles in the public and private sectors.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
CJS 6125	National Security—Law and Policy	3
SIA 6000	Psychology of Intelligence Analysis	4
SIA 6010	Intelligence Operations Management	4
SIA 6020	Globalization and Intelligence Issues	4
SIA 6030	Intelligence Analysis and Policy Relationship	4

Capstone

Code	Title	Hours
Complete one of the following capstone options:		1-8
Option 1		
SIA 6983	Topics in Strategic Intelligence and Analysis	
Option 2		
GST 6109	Basic Field Research Methods	
SIA 7990	Thesis	

The remaining quarter hours may be completed by a combination of completing a concentration and additional electives or selecting any courses listed in the concentrations and elective list.

Concentrations

ANALYSIS FOR HOMELAND SECURITY

Code	Title	Hours
GST 6300	Security and Terrorism	4
HLS 6030	Intelligence for Homeland Security	3
HLS 6020	Technology for Homeland Security	3
HLS 6010	Contemporary Threats to Homeland Security	3
HLS 6050	Multidisciplinary Approaches to Homeland Security	3

INTELLIGENCE COMMUNITY OPERATIONS AND ANALYSIS

Code	Title	Hours
SIA 6040	Interagency Collaboration	4
SIA 6050	All-Source Intelligence	4
SIA 6060	Human Intelligence Operations	4
SIA 6070	Analysis for Counterterrorism	4

REMOTE SENSING

Code	Title	Hours
Required Courses		
RMS 5105	Fundamentals of Remote Sensing	3
RMS 6110	Introduction to Machine Learning for Image Data	3
Electives		
Complete four of the following:		12
GIS 6330	Building Geospatial Systems at Scale	
GIS 6345	Geospatial Programming	
RMS 6240	Introduction to Radar and LiDAR Remote Sensing	
RMS 6280	Automated Feature Extraction for the Geospatial Professional	
RMS 6290	Spectroscopic Image Analysis	
RMS 6293	Allied Technologies in Remote Sensing	
RMS 6983	Topics	

Electives

Code	Title	Hours
CJS 6430	Risk Management	
EDU 6184	Interdisciplinary Foundations	
GST 6109	Basic Field Research Methods	
GST 6300	Security and Terrorism	
GST 6501	Regional Studies: East Asia	
GST 6502	Regional Studies: Middle East and North Africa	
GST 6503	Regional Studies: Sub-Saharan Africa	
GST 6504	Regional Studies: Europe and Eurasia	
GST 6505	Regional Studies: Southwest and Central Asia	
GST 6506	Regional Studies: Latin America	
HLS 6000	Introduction to Homeland Security	
HLS 6010	Contemporary Threats to Homeland Security	
HLS 6020	Technology for Homeland Security	
HLS 6040	Critical Infrastructure and Protection	
HLS 6080	Continuity of Operations and Planning	
HLS 6100	Maritime Port Security 1	
HLS 6120	Aviation Security 1	
ITC 6300	Foundations of Information Security	
SIA 6080	Culture and Psychology	
SIA 6090	Intelligence Collection	
SIA 6100	Leadership for Intelligence Professionals	

Program Credit/GPA Requirements

45 total quarter hours required
Minimum 3.000 GPA required

Teaching, Elementary Licensure, MAT

Designed for aspiring teachers and career changers, the Master of Arts in Teaching in Elementary Education (MAT)[1] offers an appreciation for and an understanding of the diverse educational needs, social concerns, and cultural values of today's elementary and secondary schools. This graduate degree in teaching seeks to enhance your foundational skills, broaden your perspectives, and strengthen your ability to inspire and educate. The master's degree, which includes a full term of student teaching, seeks to produce graduates well positioned to make a meaningful impact in their school, in their community, and in the lives of their students.

[1] The MAT (grades 1–6) has been approved at the initial licensure level by the Massachusetts Department of Elementary and Secondary Education.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
EDU 6104	Child and Adolescent Development, Learning, and Teaching	4
EDU 6107	Inclusion, Equity, and Diversity	4
EDU 6101	Critical Issues in Education: Past and Present	2
EDU 6102	Reflection, Community Engagement, and Agency in Education	2
EDU 6086	Foundations of Literacy Development and Instruction	4
EDU 6154	Inquiry in the Sciences and Humanities	4
EDU 6155	Inquiry in Mathematics	4
EDU 6185	English-Language Learners in the General Education Classroom	4
EDU 6051	Culture, Equity, Power, and Influence	4
EDU 6183	Collaborative Strategies for Effective Classroom Management	3
EDU 6866	Teaching Practicum and Seminar	6

Elective Courses

Code	Title	Hours
Complete 4 quarter hours from the following:		4
EDU 6184	Interdisciplinary Foundations	
EDU 6300	Introduction to Language and Linguistics	
EDU 6425	Special Education: Role of Special Educators in an Inclusive School	
EDU 6426	Developmental Language, Literacy, and Writing: Assessment and Instruction	
EDU 6429	Variations in Child and Adolescent Development	
EDU 6437	Assessment in Education	
EDU 6438	Teachers as Curriculum Leaders	
EDU 6465	Critical and Creative Thinking	
EDU 6516	Sheltered English Instruction and Assessment	
EDU 6520	Learning and the Brain: Translating Research into Practice	
EDU 6528	Adaptive Learning/Behavior Management Strategies: Consultation and Collaboration	
EDU 6569	Differentiated Instruction and Assessment in Mathematics	

Program Credit/GPA Requirements

45 total quarter hours required
Minimum 3.000 GPA required

LOOKING TO DEEPEN YOUR KNOWLEDGE AND EXPERTISE?

The MAT+ offers qualifying students the opportunity to complete a MAT with further study in a selected area of expertise. Currently, students can take additional coursework to earn either an additional license in special education (teacher of students of moderate disabilities, PreK–8 or 5–12).

MAT+ IN SPECIAL EDUCATION

The MAT+ provides qualifying students with the opportunity to complete a Master of Arts in Teaching (MAT) with further study in a selected area of expertise. Currently, students can take additional coursework to earn either an additional license in special education (teacher of students of moderate disabilities, PreK-8 or 5-12) or an additional license in ESL (teacher of English as a Second Language, PreK-8 or 5-12). Teacher candidates may also plan a program of study that allows for triple licensure in consultation with the program director.

The special education course requirements are:

Code	Title	Hours
EDU 6425	Special Education: Role of Special Educators in an Inclusive School	4
EDU 6426	Developmental Language, Literacy, and Writing: Assessment and Instruction	4
EDU 6528	Adaptive Learning/Behavior Management Strategies: Consultation and Collaboration	4
EDU 6569	Differentiated Instruction and Assessment in Mathematics	4
EDU 6874	Practicum, Portfolio, and Panel Review	4

MAT+ IN ENGLISH AS A SECOND LANGUAGE (ESL)

This Commonwealth of Massachusetts-approved MAT+ program consists of five courses, some of which may be taken as electives in the MAT program.

The English as a Second Language course requirements are:

Code	Title	Hours
EDU 6300	Introduction to Language and Linguistics	4
EDU 6516	Sheltered English Instruction and Assessment	4
EDU 6517	Foundations of Teaching English as a Second Language: Research and Practice	4
EDU 6310	Literacy Development and the Academic Domains	4
EDU 6874	Practicum, Portfolio, and Panel Review	4

Teaching, Secondary Licensure, MAT

Designed for aspiring teachers and career changers, the Master of Arts in Secondary Education (MAT)[1] offers an appreciation for and an understanding of the diverse educational needs, social concerns, and cultural values of today's secondary schools.

This MAT in secondary education seeks to enhance your foundational skills, broaden your perspectives, and strengthen your ability to inspire and educate. This master's degree, which includes a full term of student teaching, seeks to produce graduates well positioned to make a meaningful impact in their school, in their community, and in the lives of their students.

- Gain political, social, and historical perspectives on education
- Explore the richly complex environments of schools and communities
- Develop a working understanding of teaching and learning in diverse settings
- Investigate how humans learn, acquire knowledge, and make sense of their experiences
- Examine theories of teaching and explore how best to teach for understanding and learning achievement
- Research methods and materials, pedagogies, and assessment strategies that foster integrated learning

[1] The Master of Arts in Secondary Education (grades 8–12) has been approved at the initial licensure level by the Massachusetts Department of Elementary and Secondary Education.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
EDU 6104	Child and Adolescent Development, Learning, and Teaching	4
EDU 6107	Inclusion, Equity, and Diversity	4
EDU 6101	Critical Issues in Education: Past and Present	2
EDU 6102	Reflection, Community Engagement, and Agency in Education	2
EDU 6064	Curriculum and Assessment	4
EDU 6162	Language, Culture, and Literacy in Middle and High Schools	4
EDU 6185	English-Language Learners in the General Education Classroom	4
EDU 6051	Culture, Equity, Power, and Influence	4
EDU 6183	Collaborative Strategies for Effective Classroom Management	3
EDU 6866	Teaching Practicum and Seminar	6
Complete one of the following courses:		4
EDU 6122	Teaching the Language Arts	
EDU 6124	Teaching History and the Social Sciences	
EDU 6127	Teaching Science	
EDU 6129	Teaching Mathematics	

Elective Courses

Code	Title	Hours
Complete 4 quarter hours from the following:		4
EDU 6184	Interdisciplinary Foundations	
EDU 6300	Introduction to Language and Linguistics	
EDU 6425	Special Education: Role of Special Educators in an Inclusive School	
EDU 6426	Developmental Language, Literacy, and Writing: Assessment and Instruction	
EDU 6429	Variations in Child and Adolescent Development	
EDU 6437	Assessment in Education	
EDU 6438	Teachers as Curriculum Leaders	
EDU 6465	Critical and Creative Thinking	
EDU 6516	Sheltered English Instruction and Assessment	
EDU 6520	Learning and the Brain: Translating Research into Practice	
EDU 6528	Adaptive Learning/Behavior Management Strategies: Consultation and Collaboration	
EDU 6569	Differentiated Instruction and Assessment in Mathematics	

Program Credit/GPA Requirements

45 total quarter hours required
Minimum 3.000 GPA required

LOOKING TO DEEPEN YOUR KNOWLEDGE AND EXPERTISE?

The MAT+ offers qualifying students the opportunity to complete a MAT with further study in a selected area of expertise. Currently, students can take additional coursework to earn either an additional license in special education (teacher of students of moderate disabilities, PreK–8 or 5–12) or an additional license in ESL (teacher of English as a Second Language, PreK-8 or 5-12).

MAT+ IN SPECIAL EDUCATION

The MAT+ provides qualifying students with the opportunity to complete a Master of Arts in Teaching (MAT) with further study in a selected area of expertise. Currently, students can take additional coursework to earn either an additional license in special education (teacher of students of moderate disabilities, PreK-8 or 5-12) or an additional license in ESL (teacher of English as a Second Language, PreK-8 or 5-12). Teacher candidates may also plan a program of study that allows for triple licensure in consultation with the program director.

The special education course requirements are:

Code	Title	Hours
EDU 6425	Special Education: Role of Special Educators in an Inclusive School	4
EDU 6426	Developmental Language, Literacy, and Writing: Assessment and Instruction	4
EDU 6528	Adaptive Learning/Behavior Management Strategies: Consultation and Collaboration	4
EDU 6569	Differentiated Instruction and Assessment in Mathematics	4
EDU 6874	Practicum, Portfolio, and Panel Review	4

MAT+ IN ENGLISH AS A SECOND LANGUAGE (ESL)

This Commonwealth of Massachusetts-approved MAT+ program consists of five courses, some of which may be taken as electives in the MAT program.

The English as a Second Language course requirements are:

Code	Title	Hours
EDU 6300	Introduction to Language and Linguistics	4
EDU 6516	Sheltered English Instruction and Assessment	4
EDU 6517	Foundations of Teaching English as a Second Language: Research and Practice	4
EDU 6310	Literacy Development and the Academic Domains	4
EDU 6874	Practicum, Portfolio, and Panel Review	4

Education, MEd

Learning and Instruction Concentration

The learning and instruction concentration in the MEd program is designed for teachers and leaders in K–12 focused schools and community organizations that want to lead change and expand equity in their classrooms, schools, or educational communities. Graduate students examine the impact of local, national, and global changes on educational policy and practice. They deepen their ability to effectively engage diverse students in meaningful learning through coursework focused on curriculum and assessment, teaching and learning, and experiential education.

Special Education Concentration

Demand for graduate-level-prepared special education practitioners is on the rise, driven by heightened degree requirements and a shortage of licensed, qualified teachers. In response, the CPS is pleased to offer the Master of Education with Concentration in Special Education. Designed for educators who are licensed at the initial or professional level in another discipline, this innovative master's degree program seeks to prepare you to meet the special needs of students across a variety of school environments.

This program meets the Massachusetts Department of Elementary and Secondary Education standards and competencies for an additional licensure as a Teacher of Students with Moderate Disabilities, PreK–8 and 5–12.

In this advanced program, you have an opportunity to explore specific topics on modifying curriculum, designing curriculum-based assessments, managing severe behaviors, developing individualized education programs (IEPs), leveraging community resources, and improving literacy. As a result, you have an opportunity to enhance your ability to meet the needs of a diverse student population and to achieve the competencies required for this specialized license.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
EDU 6050	Education as an Advanced Field of Study	5
EDU 6051	Culture, Equity, Power, and Influence	4

Concentration

Complete one of the following concentrations:

- Learning and Instruction
- Special Education

Program Credit/GPA Requirements

45 total quarter hours required
Minimum 3.000 GPA required

LEARNING AND INSTRUCTION

Code	Title	Hours
Required Courses		
EDU 6330	Digital Media Literacy	4
EDU 6328	Policy and Leadership	4
EDU 6437	Assessment in Education	4
Complete one of the following:		4
EDU 6465	Critical and Creative Thinking	
EDU 6319	How People Learn	
Capstone		
EDU 6225	Capstone (to be taken last)	4
Electives		
Complete 12 quarter hours at the EDU 6000 level.		12

SPECIAL EDUCATION

Code	Title	Hours
Required Courses		
EDU 6425	Special Education: Role of Special Educators in an Inclusive School	4
EDU 6426	Developmental Language, Literacy, and Writing: Assessment and Instruction	4
EDU 6438	Teachers as Curriculum Leaders	4
EDU 6528	Adaptive Learning/Behavior Management Strategies: Consultation and Collaboration	4
EDU 6569	Differentiated Instruction and Assessment in Mathematics	4
EDU 6874	Practicum, Portfolio, and Panel Review	4
Electives		
Complete 12 quarter hours at the EDU 6000 level.		12

Higher Education Administration, MEd

Institutions of higher education around the world are facing considerable pressures that range from changing demographics to financial strain amid disruptions unimaginable 20 years ago. Administrators must develop foundational skills to create conditions that allow their students and institutions to thrive in a constantly changing world. The Master of Education in Higher Education Administration prepares practitioners for the unique and difficult challenges facing the next generation of higher education professionals. This program allows students the flexibility to

build upon their skills in a customized manner with a focus on practical skills and course designs firmly grounded in experiential learning.

The Master of Education in Higher Education Administration degree program seeks to prepare student with the knowledge to understand the structure, governance, and operation of various higher education organizations. Within the context of classes, students have an opportunity to develop solutions to real world problems. This innovative master's degree program explores complex industry issues such as student demographics, financial concerns, legal and policy requirements, technology, and competitive forces.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

General Requirements

Code	Title	Hours
EDU 6051	Culture, Equity, Power, and Influence	4
EDU 6204	The Foundations of Higher Education	5

Required Courses

Code	Title	Hours
EDU 6205	The Demographics of the New College Student	4
EDU 6217	The History of Colleges and Universities	4
EDU 6218	Money Matters: Financial Management in Higher Education	4
EDU 6219	Higher Education Law and Policy	4
EDU 6234	Program Evaluation, Assessment, and Accreditation in Higher Education	4

Capstone

Code	Title	Hours
EDU 6222	Contemporary Issues Capstone	4

Electives

Code	Title	Hours
Complete 12 quarter hours at the EDU 6000 level or choose from the following courses:		12
CMN 6050	Crisis Communication	
CMN 6065	Implementation and Management of Social Media Channels and Online Communities	
CMN 6045	Leveraging Digital Technologies: Strategy, Assessment, and Governance	
LDR 6100	Developing Your Leadership Capability	
LDR 6110	Leading Teams Strategically in a Global Environment	
NPM 6110	Legal and Governance Issues in Nonprofit Organizations	
NPM 6120	Financial Management for Nonprofit Organizations	
NPM 6130	Fundraising and Development for Nonprofit Organizations	
NPM 6140	Grant and Report Writing	

Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

Analytics, MPS

With the proliferation of data across all sectors of the global economy, there is an immediate need for individuals to be knowledgeable in how to harness this data for continuous analysis and study. This spectrum spans from commercial to nonprofit, from higher education to government, and is constantly expanding with new sectors as data mining becomes the standard for knowledge gathering in the digital age.

The Master of Science in Analytics helps to meet the demand from employers with a graduate program that provides students with an end-to-end analytics education through a core curriculum with integrated experiential learning opportunities. The program is designed to prepare students with a deep understanding of the mechanics of working with data (i.e., its collection, modeling, and structuring), along with the capacity to identify and communicate data-driven insights that ultimately influence decisions.

Not only will students graduate with a portfolio of work samples that demonstrate their range and depth of skill, they will be part of a larger network of analytics professionals who will serve them now and in the future.

- Build portfolios of real-world projects demonstrating competency with key technologies, visualization and communication techniques, and the ability to translate information into recommended actions.
- Gain a core analytical skill set upon which to layer more specialized technical skill sets or industry-specific applications.
- Develop a relationship to industry leaders and peers so that you may leverage your Northeastern education long after your formal education ends.
- Choose from a host of flexible programming options—all of which share an industry-defined core curriculum and a required, credit-bearing experiential requirement.
- Anticipate and contribute to the future direction of data analytics.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
Note: ITC 6000 is for students without prior educational or professional experience with data and database structures. Students who do not complete ITC 6000 must complete a third elective course to reach 45 quarter hours.		
ALY 6000	Introduction to Analytics	3
ALY 6010	Probability Theory and Introductory Statistics	3
ALY 6015	Intermediate Analytics	3
ALY 6050	Introduction to Enterprise Analytics	3
ALY 6070	Communication and Visualization for Data Analytics	3
ITC 6000	Database Management Systems	3

Experiential Learning Course

Code	Title	Hours
ALY 6080	Integrated Experiential Learning	3

Experiential Capstone Course

Code	Title	Hours
ALY 6980	Capstone	3

The remaining quarter hours of the program may be completed by a combination of completing a concentration and additional electives or selecting any courses listed in the concentrations and elective list.

Concentrations

- Applied Machine Intelligence (p. 382)
- Evidence-Based Management (p. 382)
- Statistical Modeling (p. 382)

Electives

Code	Title	Hours
ALY 6020	Predictive Analytics	
ALY 6030	Data Warehousing and SQL	
ALY 6040	Data Mining Applications	
ALY 6050	Introduction to Enterprise Analytics	
ALY 6060	Decision Support and Business Intelligence	
ALY 6110	Data Management and Big Data	
ALY 6120	Leadership in Analytics	
ALY 6130	Risk Management for Analytics	
ALY 6140	Analytics Systems Technology	
ALY 6150	Healthcare/Pharmaceutical Data and Applications	
ALY 6160	Business Intelligence in Healthcare/ Pharmaceutical	
ALY 6983	Topics	
CMN 6005	Foundations of Professional Communication	
COP 6940	Personal and Career Development	
EAI 6000	Fundamentals of Artificial Intelligence	
EAI 6010	Applications of Artificial Intelligence	
EAI 6020	AI System Technologies	
EDU 6184	Interdisciplinary Foundations	
GIS 5102	Fundamentals of GIS Analysis	
GIS 5201	Advanced Spatial Analysis	
ITC 6000	Database Management Systems	
ITC 6020	Information Systems Design and Development	
ITC 6045	Information Technology Policy, Ethics, and Social Responsibility	
ITC 6310	Information Security Governance	
LDR 6110	Leading Teams Strategically in a Global Environment	
LDR 6135	Ethical Leadership	
PJM 6015	Project Risk Management	
PJM 6125	Project Evaluation and Assessment	
PJM 6180	Project Stakeholder Management	

Program Credit/GPA Requirements

45 total quarter hours required
Minimum 3.000 GPA required

APPLIED MACHINE INTELLIGENCE

Code	Title	Hours
EAI 6000	Fundamentals of Artificial Intelligence	3
EAI 6010	Applications of Artificial Intelligence	3
EAI 6020	AI System Technologies	3
ALY 6040	Data Mining Applications	3
ALY 6110	Data Management and Big Data	3

EVIDENCE-BASED MANAGEMENT

Code	Title	Hours
ALY 6040	Data Mining Applications	3
ALY 6060	Decision Support and Business Intelligence	3
PJM 6005	Project Scope Management	3
ALY 6120	Leadership in Analytics	3
ALY 6130	Risk Management for Analytics	3

STATISTICAL MODELING

Code	Title	Hours
ALY 6040	Data Mining Applications	3
ALY 6110	Data Management and Big Data	3
ALY 6020	Predictive Analytics	3
ALY 6140	Analytics Systems Technology	3
ALY 6030	Data Warehousing and SQL	3

Applied Machine Intelligence, MPS

Humankind is on the threshold of a new era—an age of artificial intelligence (AI) as revolutionary in its global impact as the Industrial Revolution. With the proliferation of machine learning and AI across all sectors of the global society, and fields such as financial services, healthcare, and robotics, GEOINT and cybersecurity are already changing as intelligent computers take on once-indispensably human tasks. There is an immediate need for individuals to be knowledgeable in how to manage, analyze, communicate, visualize, and lead in the area of AI by being data, technology, and human literate. The experiential AI curricula includes an introductory core, as well as an advanced core with an end-to-end AI education in the areas of finance, HR, business ventures, and healthcare/pharmaceuticals. The goal is to proactively and thoughtfully prepare students for the evolving technology and the challenges it presents. The curricula framework adopts a multidisciplinary approach to problem solving by combining computer science and analytical skills with functional government and industry expertise, creativity, and leadership with program offerings on-ground and online.

The degree program is distinguished from others by:

- Focusing on the specific but widespread field of AI that exists within a variety of industries and applications
- Northeastern faculty experts, who have extensive and proven experience in computer science, analytics, geospatial science, information technology, etc.
- Courses that focus on providing critical skills in data management, data analysis, data visualization, problem solving, and advanced analytical tools, creating AI-driven decision making in fields like healthcare/pharmaceuticals, finance, HR, and business ventures

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
ALY 6110	Data Management and Big Data	3
EAI 6000	Fundamentals of Artificial Intelligence	3
EAI 6010	Applications of Artificial Intelligence	3
EAI 6020	AI System Technologies	3
EAI 6030	Usability and Human Interaction	3

Experiential Network and Capstone

Code	Title	Hours
EAI 6980	Integrated Experiential Capstone	3
INT 6940	Experiential Learning Projects for Professionals	1-4

The remaining quarter hours may be completed by a combination of completing a concentration and additional electives or selecting any courses listed in the concentrations and elective list.

Concentrations

- AI for Business Ventures (p. 383)
- AI for Finance (p. 383)
- AI for Healthcare (p. 383)
- AI for Human Resources (p. 383)

Electives

Code	Title	Hours
ALY 6140	Analytics Systems Technology	
CMN 6000	Introduction to Organizational Communication	
CED 6050	Commerce and Economic Development	
EDU 6184	Interdisciplinary Foundations	
GIS 5201	Advanced Spatial Analysis	
GIS 6360	Spatial Databases	
LDR 6135	Ethical Leadership	
PJM 6005	Project Scope Management	
PJM 6015	Project Risk Management	
PJM 6205	Leading and Managing Technical Projects	

Program Credit/GPA Requirements

45 total quarter hours required
Minimum 3.000 GPA required

Concentrations

AI FOR BUSINESS VENTURES

Code	Title	Hours
ALY 6040	Data Mining Applications	3
EAI 6080	Advanced Analytical Utilization	3
EAI 6120	AI Communication and Visualization	3
EDU 6558	Issues in Education	1-4
ITC 6015	Enterprise Information Architecture	3

AI FOR FINANCE

Code	Title	Hours
ALY 6040	Data Mining Applications	3
EAI 6050	Finance Information Processing	3
EAI 6080	Advanced Analytical Utilization	3
EAI 6120	AI Communication and Visualization	3
FIN 6101	Accounting Fundamentals for Financial Institutions	4

AI FOR HEALTHCARE

Code	Title	Hours
ALY 6040	Data Mining Applications	3
ALY 6150	Healthcare/Pharmaceutical Data and Applications	3
EAI 6060	Healthcare Information Processing	3
EAI 6080	Advanced Analytical Utilization	3
EAI 6120	AI Communication and Visualization	3

AI FOR HUMAN RESOURCES

Code	Title	Hours
ALY 6040	Data Mining Applications	3
EAI 6070	Human Resources Information Processing	3
EAI 6080	Advanced Analytical Utilization	3
EAI 6120	AI Communication and Visualization	3
HRM 6025	Workforce Analytics	3

Digital Media, MPS

Students in the Master of Professional Studies in Digital Media will build their skills and expertise while gaining experience using a variety of industry-standard and cutting-edge technologies and tools. Our curriculum is organized around three types of experiences: core courses, concentration electives, and a capstone that can be completed as an individual thesis or a team project.

Our core courses in media creation, interactive design, usability, design thinking, and narrative structure provide a baseline for producing content-rich experiences. A series of electives are offered in seven distinctive areas: 3D animation, game design, digital video, social media, digital media management, or one of two tracks in interactive design: visual design or usability and production. In the capstone experience, you'll work with the guidance of faculty to channel your passion into a project that provides tangible evidence of your abilities.

Whether you are a full- or part-time student, our cohort structure allows you to build meaningful working relationships with students from around the globe. Team-based assignments strengthen your project management and leadership skills and allow you to take part in the design and development of more complex media projects than you could by working alone. The team efforts will also prepare you for your future as a professional in digital media's collaboration-oriented culture.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Core Courses

Code	Title	Hours
DGM 6122	Foundations of Digital Storytelling	4
DGM 6145	Information Technology and Creative Practice	4
DGM 6521	Web Creation for Content Management Systems	2

Complete one of the following:		4
DGM 6140	Sound Design	
DGM 6168	Usability and Human Interaction	
Complete one of the following options:		8
Thesis Option		
DGM 6890	Thesis Proposal Development	
DGM 7990	Thesis	
Capstone Option		
DGM 7980	Capstone	
Technical course from the workshops list		

The remaining quarter hours may be completed by a combination of completing a concentration and additional electives/workshops or selecting any courses in the concentrations and elective lists. You must complete any prerequisite associated with DGM courses unless granted a course substitute under special circumstances. Consult with your academic advisor.

Concentrations

- 3D Animation (p. 384)
- Digital Media Management (p.)
- Digital Video (p.)
- Game Design (p.)
- Interactive Design (p.)
- Social Media (p.)

Electives

Code	Title	Hours
ALY 6110	Data Management and Big Data	
DGM 6125	Time-Based Media	
DGM 6322	Advanced Digital Storytelling	
DGM 6550	Search Engine Optimization: Strategy and Implementation	
EDU 6184	Interdisciplinary Foundations	
ITC 6410	Fundamentals of Human Behaviors for Interactive Systems	

Workshops

Optional digital media workshops are designed to provide valuable technical skills and tools for students in all graduate degree programs.

Code	Title	Hours
Students may complete one of the following:		
DGM 6506	Introduction to Digital Video	
DGM 6515	Introduction to After Effects	
DGM 6516	Virtual and Augmented Reality (VR/AR)	
DGM 6892	Capstone Project Preparation	
TCC 6410	Online Documentation	
TCC 6630	Introduction to XML	

Program Credit/GPA Requirements

45 total quarter hours required
Minimum 3.000 GPA required

3D ANIMATION

Code	Title	Hours
Required Courses		
DGM 6450	Animation Basics	4
DGM 6510	3D Modeling	4
DGM 6530	Character Animation	4
Elective Courses		
Choose from the following:		4-6
DGM 6515	Introduction to After Effects	
DGM 6540	Compositing	
DGM 6535	Rigging Principles and Techniques	

DIGITAL MEDIA MANAGEMENT

Code	Title	Hours
Required Courses		
DGM 6279	Project Management for Digital Media	4
DGM 6280	Managing for Digital Media	4
DGM 6285	Interactive Marketing Fundamentals	4
Elective Courses		
Complete one of the following:		4
DGM 6230	Digital Media Entrepreneurship	
DGM 6290	Social Media and Brand Strategy Implementation	

DIGITAL VIDEO

Code	Title	Hours
Required Courses		
DGM 6435	Digital Video Production	4
DGM 6440	Editing in the Digital Studio	4
DGM 6506	Introduction to Digital Video	2
DGM 6540	Compositing	4
Complete one of the following:		2
DGM 6515	Introduction to After Effects	
DGM 6516	Virtual and Augmented Reality (VR/AR)	
Elective Courses		
Complete one of the following:		4
DGM 6430	Screenwriting: Linear and Interactive	
DGM 6545	Documentary and Nonfiction Production	
DGM 6520	Lighting for the Camera	

GAME DESIGN

Code	Title	Hours
Required Courses		
DGM 6308	Intermediate Programming for Digital Media	4
DGM 6400	Game Design Fundamentals	4
DGM 6403	Game Engine Fundamentals	4
DGM 6405	Game Development	4
DGM 6410	Game Design Technology Lab	4

INTERACTIVE DESIGN

Code	Title	Hours
Required Courses		
DGM 6217	Typography for Interactivity	4
DGM 6317	Screen-Based Publication Design	4
DGM 6461	Interactive Information Design 1	4

Elective Courses		
Complete one of the following:		4
DGM 6463	Interactive Information Design 2	
DGM 6471	Designing Infographics	

SOCIAL MEDIA

Code	Title	Hours
Required Courses		
DGM 6285	Interactive Marketing Fundamentals	4
CMN 6045	Leveraging Digital Technologies: Strategy, Assessment, and Governance	3
DGM 6290	Social Media and Brand Strategy Implementation	4
Elective Courses		
Choose from the following:		5
CMN 6040	Consumer Behaviors in the Online Environment	
CMN 6065	Implementation and Management of Social Media Channels and Online Communities	
CMN 6075	Digital Marketing Analytics	
CMN 6096	Cultural Communications Lab	
DGM 6550	Search Engine Optimization: Strategy and Implementation	
DGM 6168	Usability and Human Interaction	
PBR 6001	Communications Technology Lab	

Digital Media, MPS—Connect

Students in the Master of Professional Studies in Digital Media will build their skills and expertise while gaining experience using a variety of industry-standard and cutting-edge technologies and tools. Our curriculum is organized around three types of experiences: core courses, concentration electives, and a capstone that can be completed as an individual thesis or a team project.

Our core courses in media creation, interactive design, usability, design thinking, and narrative structure provide a baseline for producing content-rich experiences. A series of electives are offered in six distinctive areas: 3D animation, game design, digital video, social media, digital media management, or interactive design. In the capstone experience, you'll work with the guidance of faculty to channel your passion into a project that provides tangible evidence of your abilities.

Whether you are a full- or part-time student, our cohort structure allows you to build meaningful working relationships with students from around the globe. Team-based assignments strengthen your project management and leadership skills and allow you to take part in the design and development of more complex media projects than you could by working alone. The team efforts will also prepare you for your future as a professional in digital media's collaboration-oriented culture.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Foundation Courses

Code	Title	Hours
DGM 6105	Visual Communications Foundation	4
DGM 6108	Programming Foundations for Digital Media	4
DGM 6109	Lab for DGM 6108	2
DGM 6501	Web Creation Boot Camp	2

Required Core Courses

Code	Title	Hours
DGM 6122	Foundations of Digital Storytelling	4
DGM 6145	Information Technology and Creative Practice	4
DGM 6521	Web Creation for Content Management Systems	2
Complete one of the following:		4
DGM 6140	Sound Design	
DGM 6168	Usability and Human Interaction	
Complete one of the following options:		8
Thesis Option		
DGM 6890	Thesis Proposal Development	
DGM 7990	Thesis	
Capstone Option		
Choose one course from the Workshops list.		2-4
DGM 7980	Capstone	6

The remaining quarter hours may be completed by selecting a combination of a concentration and additional electives/workshops or selecting any courses in the concentrations and elective lists. You must complete any prerequisites associated with DGM courses unless granted a waiver under special circumstances.

Concentrations

- 3D Animation (p. 386)
- Digital Media Management (p.)
- Digital Video (p.)
- Game Design (p.)
- Interactive Design (p.)
- Social Media (p.)

Electives

Code	Title	Hours
ALY 6110	Data Management and Big Data	
DGM 6125	Time-Based Media	
DGM 6322	Advanced Digital Storytelling	
DGM 6550	Search Engine Optimization: Strategy and Implementation	
EDU 6184	Interdisciplinary Foundations	
ITC 6410	Fundamentals of Human Behaviors for Interactive Systems	

Workshops

Digital media workshops are designed to provide valuable technical skills and tools for students in all graduate degree programs.

Code	Title	Hours
DGM 6506	Introduction to Digital Video	
DGM 6515	Introduction to After Effects	
DGM 6516	Virtual and Augmented Reality (VR/AR)	
DGM 6892	Capstone Project Preparation	
TCC 6410	Online Documentation	
TCC 6630	Introduction to XML	

Program Credit/GPA Requirements

56 total quarter hours required
Minimum 3.000 GPA required

3D ANIMATION

Code	Title	Hours
Required Courses		
DGM 6450	Animation Basics	4
DGM 6510	3D Modeling	4
DGM 6530	Character Animation	4
Elective Courses		
Choose from the following:		4-6
DGM 6515	Introduction to After Effects	
DGM 6540	Compositing	
DGM 6535	Rigging Principles and Techniques	

DIGITAL MEDIA MANAGEMENT

Code	Title	Hours
Required Courses		
DGM 6279	Project Management for Digital Media	4
DGM 6280	Managing for Digital Media	4
DGM 6285	Interactive Marketing Fundamentals	4
Elective Courses		
Choose from the following:		4
DGM 6230	Digital Media Entrepreneurship	
DGM 6290	Social Media and Brand Strategy Implementation	

DIGITAL VIDEO

Code	Title	Hours
Required Courses		
DGM 6506	Introduction to Digital Video	2
DGM 6435	Digital Video Production	4
DGM 6440	Editing in the Digital Studio	4
DGM 6540	Compositing	4
Complete one of the following:		2
DGM 6515	Introduction to After Effects	
DGM 6516	Virtual and Augmented Reality (VR/AR)	
Elective Courses		
Choose from the following:		4
DGM 6430	Screenwriting: Linear and Interactive	
DGM 6520	Lighting for the Camera	
DGM 6545	Documentary and Nonfiction Production	

GAME DESIGN

Code	Title	Hours
Required Courses		
DGM 6308	Intermediate Programming for Digital Media	4
DGM 6400	Game Design Fundamentals	4
DGM 6403	Game Engine Fundamentals	4
DGM 6405	Game Development	4
DGM 6410	Game Design Technology Lab	4

INTERACTIVE DESIGN

Code	Title	Hours
Required Courses		
DGM 6461	Interactive Information Design 1	4
DGM 6217	Typography for Interactivity	4
DGM 6317	Screen-Based Publication Design	4
Elective Courses		
Choose from the following:		4
DGM 6463	Interactive Information Design 2	
DGM 6471	Designing Infographics	

SOCIAL MEDIA

Code	Title	Hours
Required Courses		
CMN 6045	Leveraging Digital Technologies: Strategy, Assessment, and Governance	3
DGM 6285	Interactive Marketing Fundamentals	4
DGM 6290	Social Media and Brand Strategy Implementation	4
Elective Courses		
Choose from the following:		5
CMN 6040	Consumer Behaviors in the Online Environment	
CMN 6065	Implementation and Management of Social Media Channels and Online Communities	
CMN 6075	Digital Marketing Analytics	
CMN 6096	Cultural Communications Lab	
DGM 6168	Usability and Human Interaction	
DGM 6550	Search Engine Optimization: Strategy and Implementation	
PBR 6001	Communications Technology Lab	

Geospatial Services, MPS

The Northeastern University MPS in Geospatial Services program is designed for working professionals striving to maintain competitive, leading-edge capabilities at a time of rapidly growing utilization of geospatial data for diversity of government and business intelligence needs. Program strengths are highly correlated with geospatial workforce requirements as identified by geospatial enterprise leaders from government and industry. Our curriculum incorporates tools, technologies, and services required in three primary sectors:

- *Location-based geodata* (collect, manage, distribute spatial information and imagery)
- *Geo-applications and devices* (devices and software for creating, visualizing, and sharing geospatial information)

- *Geo-expert industries* (turn location-based information into insights for commercial and government organizations)

Available 100 percent online and built to Northeastern University's high academic standards, our program's experiential focus emphasizes the connections between learning and workplace needs.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
GIS 5103	Foundations of Geographic Information Science	4
GIS 5201	Advanced Spatial Analysis	3
GIS 6980	Capstone	4
RMS 5105	Fundamentals of Remote Sensing	3
Complete two of the following:		6-7
EAI 6000	Fundamentals of Artificial Intelligence	
ITC 6045	Information Technology Policy, Ethics, and Social Responsibility	
ITC 6300	Foundations of Information Security	
ITC 6460	Cloud Analytics	
PJM 5900	Foundations of Project Management	
PJM 6000	Project Management Practices	

The remaining quarter hours required for the program may be completed by a combination of completing a concentration and additional electives or selecting any courses listed in the concentrations and electives.

Concentrations

- Geographic Information System (p.)s (p. 387)
- Geospatial Analytics (p. 387)
- Remote Sensing (p. 387)

Electives

Code	Title	Hours
COP 6940	Personal and Career Development	3-4
EAI 6000	Fundamentals of Artificial Intelligence	3
EDU 6184	Interdisciplinary Foundations	2
INT 6940	Experiential Learning Projects for Professionals	1-4

Program Credit/GPA Requirements

45 total quarter hours required
Minimum 3.000 GPA required

GEOGRAPHIC INFORMATION SYSTEMS

Code	Title	Hours
Complete six of the following:		18
GIS 6320	Use and Applications of Free and Open-Source GIS Desktop Software	
GIS 6340	GIS Customization	
GIS 6330	Building Geospatial Systems at Scale	
GIS 6345	Geospatial Programming	
GIS 6350	Planning a GIS Implementation	
GIS 6360	Spatial Databases	
GIS 6370	Internet-Based GIS	
GIS 6385	GIS/Cartography	
GIS 6983	Topics	
ITC 6480	Amazon Web Service (AWS) Cloud Architecting	
RMS 6293	Allied Technologies in Remote Sensing	

GEOSPATIAL ANALYTICS

Code	Title	Hours
Complete the following:		18
ALY 6020	Predictive Analytics	
ALY 6040	Data Mining Applications	
ALY 6030	Data Warehousing and SQL	
ALY 6070	Communication and Visualization for Data Analytics	
ALY 6110	Data Management and Big Data	
ALY 6983	Topics	

REMOTE SENSING

Code	Title	Hours
RMS 6110	Introduction to Machine Learning for Image Data	3
Complete five of the following:		15-16
GIS 6330	Building Geospatial Systems at Scale	
GIS 6345	Geospatial Programming	
ITC 6480	Amazon Web Service (AWS) Cloud Architecting	
RMS 6240	Introduction to Radar and LiDAR Remote Sensing	
RMS 6280	Automated Feature Extraction for the Geospatial Professional	
RMS 6290	Spectroscopic Image Analysis	
RMS 6293	Allied Technologies in Remote Sensing	
RMS 6983	Topics	

Informatics, MPS

A rapidly evolving area, informatics is increasingly used to solve today's problems through IT innovations across many industries, including healthcare, business consulting, education, finance, and social media. This master's degree attracts students and working professionals with a diverse background to learn and improve IT technical and management skills, highlighted by our strengthened curriculum on information security management, as well as cloud computing application and management. Students also have the opportunity to acquire technical training in data analytics, user-centered design and web development, and managing technical projects.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
ITC 6400	Foundations of Informatics	3
ITC 6000	Database Management Systems	3
ITC 6010	Information Technology Strategy and Governance	3

ITC 6020	Information Systems Design and Development	3
ITC 6035	Information Technology Project Management	3
Capstone and Experiential Learning		
ITC 6040	Informatics Capstone	3
INT 6940	Experiential Learning Projects for Professionals	1-4

The remaining quarter hours may be completed by a combination of completing a concentration and additional electives or by selecting any courses listed in the concentrations and elective lists.

Concentration

Complete one of the following concentrations:

- Analytics (p. 388)
- Cloud Computing Application and Management (p. 388)
- Human-Centered Informatics (p. 388)
- Information Security Management (p. 388)
- Leading and Managing Technical Projects (p. 388)

ANALYTICS CONCENTRATION

Code	Title	Hours
ALY 6000	Introduction to Analytics	3
ALY 6010	Probability Theory and Introductory Statistics	3
ALY 6015	Intermediate Analytics	3
ALY 6070	Communication and Visualization for Data Analytics	3
Complete one of the following:		3
ALY 6020	Predictive Analytics	
ALY 6030	Data Warehousing and SQL	
ALY 6040	Data Mining Applications	
ALY 6110	Data Management and Big Data	

CLOUD COMPUTING APPLICATION AND MANAGEMENT CONCENTRATION

Code	Title	Hours
ITC 6015	Enterprise Information Architecture	3
ITC 6420	Introduction to Cloud Computing Applications and Management	3
ITC 6450	Advanced Cloud Computing Applications and Management	3
ITC 6460	Cloud Analytics	3
ITC 6520	Network Protection and Cloud Security	3
Complete one of the following:		3-4
ITC 6355	Web Application Design and Development	
ITC 6470	Enterprise Data Storage and Management Technologies	
ITC 6480	Amazon Web Service (AWS) Cloud Architecting	

HUMAN-CENTERED INFORMATICS CONCENTRATION

Code	Title	Hours
DGM 6168	Usability and Human Interaction	4
DGM 6268	Usable Design for Mobile Digital Media	4
DGM 6461	Interactive Information Design 1	4
ITC 6410	Fundamentals of Human Behaviors for Interactive Systems	3
Complete one of the following:		3-4
ALY 6070	Communication and Visualization for Data Analytics	
DGM 6463	Interactive Information Design 2	
ITC 6355	Web Application Design and Development	

INFORMATION SECURITY MANAGEMENT CONCENTRATION

Code	Title	Hours
ITC 6300	Foundations of Information Security	3
ITC 6305	IT Infrastructure (Systems, Networks, Telecom)	3
ITC 6315	Information Security Risk Management	3
ITC 6520	Network Protection and Cloud Security	3
ITC 6530	Security Analytics	3
Complete one of the following:		3
ITC 6325	CISA Preparation	
ITC 6330	CISSP Preparation	
ITC 6490	Ethical Hacking	

LEADING AND MANAGING TECHNICAL PROJECTS CONCENTRATION

Code	Title	Hours
PJM 6000	Project Management Practices	3
PJM 6205	Leading and Managing Technical Projects	3
PJM 6210	Communication Skills for Project Managers	3
PJM 6215	Leading Remote Project Teams	3
PJM 6810	Principles of Agile Project Management	3
PJM 6825	Agile Lean Product Development	3

Electives

Code	Title	Hours
ALY 6015	Intermediate Analytics	
ALY 6030	Data Warehousing and SQL	
ALY 6050	Introduction to Enterprise Analytics	
ALY 6060	Decision Support and Business Intelligence	
ALY 6110	Data Management and Big Data	
ALY 6120	Leadership in Analytics	
ALY 6130	Risk Management for Analytics	
DGM 6501	Web Creation Boot Camp	
DGM 6145	Information Technology and Creative Practice	
DGM 6521	Web Creation for Content Management Systems	
EDU 6184	Interdisciplinary Foundations	
GIS 5103	Foundations of Geographic Information Science	
GIS 6340	GIS Customization	
GIS 6360	Spatial Databases	
ITC 6030	Computer Systems and Networks	
ITC 6080	Network Security Concepts	
ITC 6082	Network Protection	
ITC 6345	Systems and Network Administration	

ITC 6045	Information Technology Policy, Ethics, and Social Responsibility
PJM 6000	Project Management Practices
PJM 6205	Leading and Managing Technical Projects
TCC 6110	Information Architecture

Program Credit/GPA Requirements

45 total quarter hours required
Minimum 3.000 GPA required

Learning Experience Design and Technology, MPS

The Master of Professional Studies in Learning Experience Design and Technology is a robust practice-based program. It builds expertise in learning designers, educators, trainers, technologists, and other professionals by grounding them in the art and science of learning and the effective use of learning design principles and technology. It provides both foundational and advanced design-related coursework that is experiential, taught by experts in the field, and incorporates skill-building opportunities that align with contemporary industry-based competencies.

During their course of study, students will have the opportunity to:

- Design learning environments that support learners in meeting academic, personal, professional, and/or organizational goals
- Put creative ideas into action using a variety of technologies and design and delivery modalities
- Develop a robust online portfolio of work to demonstrate their design skills

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Foundation Courses

Code	Title	Hours
EDU 6050	Education as an Advanced Field of Study	5
EDU 6051	Culture, Equity, Power, and Influence	4

Core Courses

Code	Title	Hours
EDU 6319	How People Learn	4
EDU 6334	Foundations of Learning Experience Design	4
EDU 6335	Advanced Practices in Learning Experience Design	4
EDU 6336	Data Literacy for Data-Driven Decision Making	4
EDU 6323	Technology as a Medium for Learning	4

Capstone

Code	Title	Hours
EDU 6225	Capstone	4

Electives

Code	Title	Hours
Electives may be satisfied by any EDU 6000-level course not already being used toward degree requirements. Suggested EDU 6000-level courses are listed below. Additionally, CPS graduate-level courses that may also be used to satisfy elective requirements are listed below:		12
EDU 6202	Faculty, Curriculum, and Academic Community	
EDU 6223	Change Agency	
EDU 6233	Survey Design	
EDU 6338	Learning Experience Design Studio	
EDU 6331	E-Learning Design as a Collaborative Profession	
EDU 6332	Open Learning	
EDU 6333	Social Media and Beyond	
EDU 6558	Issues in Education	
CMN 6025	Digital Era Skills: Platforms, Tools, and Techniques	
CMN 6080	Intercultural Communication	
CMN 6090	Organizational Culture, Climate, and Communication	
CMN 6095	Foundations of Developing Cultural Awareness	
DGM 6145	Information Technology and Creative Practice	
DGM 6279	Project Management for Digital Media	
DGM 6461	Interactive Information Design 1	
DGM 6501	Web Creation Boot Camp	
NPM 6140	Grant and Report Writing	
PJM 5900	Foundations of Project Management	
PJM 6000	Project Management Practices	
PJM 6205	Leading and Managing Technical Projects	
TCC 6120	Usability and User Experience	
TCC 6610	Prototyping	
TCC 6710	Content Strategy	

Program Credit/GPA Requirements

45 total quarter hours required
Minimum 3.000 GPA required

Applied Nutrition, MS

Increased attention on disease prevention through better dietary habits has heightened the demand for skilled nutrition professionals.

To meet the demands and need in the industry, this Master of Science in Applied Nutrition degree is designed to build upon your clinical knowledge and to allow you to concentrate in one of five specialty areas. This advanced program is open to individuals who hold undergraduate degrees in health science, dietetics, or a related area.

Led by real-world practitioners, including dietitians, an exercise scientist, and a clinical psychologist, this innovative nutrition degree seeks to provide you with a solid grounding in nutrition, metabolism, disease prevention, health promotion, and clinical behavior. Complementing the core nutrition courses is the college's renowned nutrition practicum that

allows you to work directly with registered dietitians, fitness specialists, as well as other health professionals.

Further differentiating this master's degree in nutrition is the option to choose from five degree concentrations: business and entrepreneurship in nutrition; integrative health and wellness; nutrition education; nutrition and fitness; and obesity and nutritional health. This degree program seeks to give you the knowledge and skills you need to succeed in the field of nutrition.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
NTR 6100	Advanced Nutrition and Metabolism	4
NTR 6110	Medical Nutrition Therapy	4
NTR 6112	Research Methods in Nutrition	4
NTR 6115	Health Promotion/Disease Prevention	4
NTR 6118	Clinical Health Behavior Change	4
NTR 6165	Food and Society	4
NTR 6866	Applied Research in Nutrition (Recommended as the last course taken)	1-4

The remaining required quarter hours for the program may be completed by a combination of completing a concentration and additional electives or selecting any courses listed in the concentrations and electives list.

Electives

Code	Title	Hours
EDU 6184	Interdisciplinary Foundations	
NTR 6101	Nutrition Program Planning	
NTR 6105	Foundations of Integrative Health	
NTR 6119	Pediatric Nutrition	
NTR 6120	Healthy Aging: Nutrition Strategies for Optimal Longevity	
NTR 6125	The Process of Health and Healing: Exploring Systems in the Body—Part 1	
NTR 6130	Healthcare and Nutrition Communication	
NTR 6135	The Process of Health and Healing: Exploring Systems in the Body—Part 2	
NTR 6148	Exercise Physiology	
NTR 6150	Sports Psychology	
NTR 6155	Nutrition Entrepreneurship	
NTR 6160	Survey of Integrative Practices and Interventions	
NTR 6200	Nutrition Education	
NTR 6201	Commercialization of Nutrition and Nutritional Information	
NTR 6202	The Financing of Nutrition and Wellness	
NTR 7130	Overweight and Obesity 1	
NTR 7132	Overweight and Obesity 2	
NTR 7135	Eating Disorders in Children and Adults	
NTR 7140	Wellness and Nutrition	
NTR 7147	Sports and Fitness Nutrition	
NTR 7880	Wellness in Practice	
PJM 5900	Foundations of Project Management	

Program Credit/GPA Requirements

45 total quarter hours required
Minimum 3.000 GPA required

Concentrations

BUSINESS AND ENTREPRENEURSHIP IN NUTRITION

Code	Title	Hours
NTR 6155	Nutrition Entrepreneurship	3
NTR 6130	Healthcare and Nutrition Communication	4
PJM 5900	Foundations of Project Management	4
NTR 6202	The Financing of Nutrition and Wellness	3
NTR 7880	Wellness in Practice	1-4

INTEGRATIVE HEALTH AND WELLNESS

Code	Title	Hours
Required Courses		
NTR 6105	Foundations of Integrative Health	4
NTR 6125	The Process of Health and Healing: Exploring Systems in the Body—Part 1	4
NTR 6135	The Process of Health and Healing: Exploring Systems in the Body—Part 2	4
NTR 6160	Survey of Integrative Practices and Interventions	4
Experiential Capstone		
NTR 7880	Wellness in Practice	2-4

NUTRITION EDUCATION

Code	Title	Hours
Required Courses		
NTR 6200	Nutrition Education	4
NTR 6130	Healthcare and Nutrition Communication	4
NTR 6201	Commercialization of Nutrition and Nutritional Information	3
NTR 7880	Wellness in Practice	1-4
Nutrition Education Elective		
Complete one of the following:		4
NTR 6119	Pediatric Nutrition	
NTR 6120	Healthy Aging: Nutrition Strategies for Optimal Longevity	
NTR 6101	Nutrition Program Planning	

NUTRITION AND FITNESS

Code	Title	Hours
Required Courses		
NTR 7147	Sports and Fitness Nutrition	3
NTR 6148	Exercise Physiology	3
NTR 6150	Sports Psychology	3
NTR 7880	Wellness in Practice	1-4
Nutrition and Fitness Elective		
Complete one of the following:		4

NTR 6120	Healthy Aging: Nutrition Strategies for Optimal Longevity
NTR 6101	Nutrition Program Planning

OBESITY AND NUTRITIONAL HEALTH

Code	Title	Hours
Required Courses		
NTR 7130	Overweight and Obesity 1	4
NTR 7132	Overweight and Obesity 2	4
NTR 6201	Commercialization of Nutrition and Nutritional Information	3
NTR 7880	Wellness in Practice	1-4
Obesity and Nutritional Health Elective		
Complete one of the following:		4
NTR 7140	Wellness and Nutrition	
NTR 7135	Eating Disorders in Children and Adults	

Commerce and Economic Development, MS

Globalization has created a borderless economy with a host of new opportunities and challenges for those engaged in commerce and economic development. While global markets offer exciting growth prospects, navigating the world stage requires in-depth knowledge of the financial, regulatory, and economic environments and institutions that affect the global economy and international trade. To meet the need for both insight and skills development, Northeastern University's College of Professional Studies—in collaboration with Northeastern University's College of Social Sciences and Humanities—offers the online Master of Science in Commerce and Economic Development.

This graduate-level program integrates economics, leadership, institutional organization, technology, and public policy into a unique and focused educational experience designed to help guide and advance a rewarding career in the private or public sectors.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
CED 6010	Applied Microeconomic Theory 1	3
CED 6020	Applied Macroeconomic Theory 1	3
CED 6030	Mathematical Methods for Economics 1	3
CED 6040	Applied Econometrics	3
CED 6050	Commerce and Economic Development	3

Capstone

Code	Title	Hours
The following course should be taken last:		
CED 6910	Capstone: Master's Project	4

The remaining quarter hours may be completed by a combination of completing a concentration and additional electives or by selecting any courses listed in the concentration and elective lists.

Concentrations

- Economic Analysis (p. 391)
- Economic Entrepreneurship (p. 391)
- Data Analytics (p. 391)
- Financial Economics (p. 391)

Electives

Code	Title	Hours
Complete courses from the 6000 level. Below is a list of courses regularly offered as electives within the program:		
ALY 6000	Introduction to Analytics	
ALY 6015	Intermediate Analytics	
ALY 6050	Introduction to Enterprise Analytics	
ALY 6070	Communication and Visualization for Data Analytics	
ALY 6110	Data Management and Big Data	
CED 6011	Applied Microeconomic Theory 2	
CED 6021	Applied Macroeconomic Theory 2	
CED 6031	Mathematical Methods for Economics 2	
CED 6041	Applied Econometrics II	
CED 6051	Open Economy Macroeconomic Analysis	
CED 6070	Economics of Human Capital	
CED 6090	Cultural Economic Development	
CED 6110	Law and Economics	
CED 6120	Environmental Economics	
CED 6130	Sustainable Economic Development	
CED 6140	Economics of E-Commerce	
CED 6210	Managerial Finance	
CED 6220	International Finance	
CED 6230	Quantitative Methods	
CED 6240	Financial Ethics	
CED 6250	Derivatives and Alternative Investments	
CMN 6080	Intercultural Communication	
CMN 6095	Foundations of Developing Cultural Awareness	
COP 6940	Personal and Career Development	
EDU 6184	Interdisciplinary Foundations	
FIN 6102	Asset and Liability Management	
FIN 6120	Building Financial Relationships	
FIN 6161	Investment Analysis	
GST 6102	Global Corporate Social Responsibility	
GST 6430	Leadership and Management	
LDR 6145	Developing Sustainable Global Leadership	

Program Credit/GPA Requirements

45 total quarter hours required
Minimum 3.000 GPA required

ECONOMIC ANALYSIS CONCENTRATION

Code	Title	Hours
CED 6011	Applied Microeconomic Theory 2	3
CED 6021	Applied Macroeconomic Theory 2	3
CED 6031	Mathematical Methods for Economics 2	3
CED 6041	Applied Econometrics II	3

CED 6051	Open Economy Macroeconomic Analysis	3

ECONOMIC ENTREPRENEURSHIP CONCENTRATION

Code	Title	Hours
ALY 6050	Introduction to Enterprise Analytics	3
CED 6070	Economics of Human Capital	3
CED 6140	Economics of E-Commerce	3
CMN 6095	Foundations of Developing Cultural Awareness	3
GST 6430	Leadership and Management	4

DATA ANALYTICS CONCENTRATION

Code	Title	Hours
ALY 6000	Introduction to Analytics	3
ALY 6015	Intermediate Analytics	3
ALY 6020	Predictive Analytics	3
ALY 6050	Introduction to Enterprise Analytics	3
or ALY 6070	Communication and Visualization for Data Analytics	
ALY 6110	Data Management and Big Data	3

FINANCIAL ECONOMICS CONCENTRATION

Code	Title	Hours
Complete five of the following:		15-18
CED 6210	Managerial Finance	
CED 6220	International Finance	
CED 6230	Quantitative Methods	
CED 6240	Financial Ethics	
CED 6250	Derivatives and Alternative Investments	
FIN 6102	Asset and Liability Management	
FIN 6120	Building Financial Relationships	
FIN 6161	Investment Analysis	

Corporate and Organizational Communication, MS

Across all industries and professions, strong written and oral communication skills are essential to success. Whether you are seeking to advance in a communications-related field or get ahead in your current organization, this program seeks to provide the practical knowledge and valuable perspectives you need to communicate across a variety of contexts and situations.

From negotiation and writing to crisis management and public speaking, the Master of Science in Corporate and Organizational Communication degree program examines topics that are critical to effective organizational communication. Incorporating best practices, case studies, and classroom learning, courses within this innovative master's degree in communication address complex communication challenges, seeking to provide you with a distinct advantage in today's competitive marketplace.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Note: Introduction to Organizational Communication (CMN 6000) is required for students who do not have any professional experience in communication. Students with professional communication experience begin the program with Strategic Communication Management (CMN 6010) and complete an additional elective to satisfy the program credit requirement.

Code	Title	Hours
CMN 6000 and INT 6000	Introduction to Organizational Communication and Writing Lab	4
CMN 6010	Strategic Communication Management	3
CMN 6020	Ethical Issues in Organizational Communication	3
CMN 6910	Organizational Communication Assessment	3
Complete two of the following:		6
CMN 6100	Communication Networks and Managing Information	
CMN 6080	Intercultural Communication	
CMN 6090	Organizational Culture, Climate, and Communication	

Capstone

Code	Title	Hours
CMN 6940	Projects for Professionals	4

The remaining quarter hours may be completed by a combination of completing a concentration and additional electives or selecting any courses in the concentrations and elective lists.

Concentrations

- Human Resource Management (p. 393)
- Public and Media Relations (p. 393)
- Leadership (p. 393)
- Project Management (p. 393)
- Social Media (p. 393)
- Cross-Cultural Communication (p. 394)

ELECTIVE COURSES

Note: Students who take Introduction to Organizational Communication (CMN 6000) are only required to take two courses in this section.

Code	Title	Hours
ALY 6010	Probability Theory and Introductory Statistics	
ALY 6070	Communication and Visualization for Data Analytics	
CMN 6005	Foundations of Professional Communication	
CMN 6025	Digital Era Skills: Platforms, Tools, and Techniques	
CMN 6050	Crisis Communication	
CMN 6060	Negotiation, Mediation, and Facilitation	
CMN 6085	Strategies for Cross-Cultural Facilitation and Negotiation	
CMN 6095	Foundations of Developing Cultural Awareness	
CMN 6096	Cultural Communications Lab	

CMN 6110	Group Dynamics and Interpersonal Conflict: Meeting Management
COP 6940	Personal and Career Development
EDU 6184	Interdisciplinary Foundations
INT 6900	International Field Study Experience
LDR 6101	Leadership Challenge Lab
PBR 6001	Communications Technology Lab

Program Credit/GPA Requirements

45 total quarter hours required
Minimum 3.000 GPA required

HUMAN RESOURCE MANAGEMENT

Code	Title	Hours
Required Courses		
HRM 6015	Introduction to Human Resources Management [1]	3
HRM 6025	Workforce Analytics	3
HRM 6042	Strategic Workforce Planning	3
Concentration Electives		
Choose from the following:		7
CMN 6096	Cultural Communications Lab	
HRM 6005	Creating a High-Performance Organization: Strategic Organizational and HRM Choices	
HRM 6010	Compensation and Benefits	
HRM 6020	Talent Acquisition and Onboarding	
HRM 6030	The Employment Contract	
HRM 6035	Digital Human Resources Platforms	
HRM 6047	Managing the Employee Life Cycle	
HRM 6050	Employee Engagement	
HRM 6060	Organizational Design	
HRM 6070	Global Human Resources Management	

[1] This course is required for students who do not have at least two years of professional experience in human resources. Students with two years or more of professional project experience complete an additional concentration elective.

PUBLIC AND MEDIA RELATIONS

Code	Title	Hours
Required Courses		
PBR 6100	Introduction to Public Relations	3
PBR 6135	Public Relations Strategy and Planning	3
PBR 6710	Public Relations Research: Understanding External Audiences	3
Concentration Electives		
Choose from the following:		7
CMN 6025	Digital Era Skills: Platforms, Tools, and Techniques	
CMN 6045	Leveraging Digital Technologies: Strategy, Assessment, and Governance	
CMN 6050	Crisis Communication	
CMN 6075	Digital Marketing Analytics	
DGM 6290	Social Media and Brand Strategy Implementation	
DGM 6550	Search Engine Optimization: Strategy and Implementation	
PBR 6001	Communications Technology Lab	
PBR 6125	Community Relations and Corporate Social Responsibility	
PBR 6130	Public Relations Content Development	
PBR 6140	Advanced Public Relations Content Development	

LEADERSHIP

Code	Title	Hours
Required Courses		
LDR 6100	Developing Your Leadership Capability	3
LDR 6110	Leading Teams Strategically in a Global Environment	3
LDR 6120	Developing Organizational Success through Leadership Development	3
LDR 6135	Ethical Leadership	3
Concentration Electives		
Choose from the following:		6
CMN 6095	Foundations of Developing Cultural Awareness	
HRM 6050	Employee Engagement	
LDR 6115	Developing Strategic and Authentic Leadership Communication	
LDR 6140	Leadership Strategy, Design, and Practice	
LDR 6145	Developing Sustainable Global Leadership	
LDR 6150	Innovation and Organizational Transformation	

PROJECT MANAGEMENT

Code	Title	Hours
Required Courses		
Note: Students with project management experience are not required to take PJM 5900 and complete an additional concentration elective.		
PJM 5900	Foundations of Project Management	4
PJM 6005	Project Scope Management	3
PJM 6015	Project Risk Management	3
PJM 6025	Project Scheduling and Cost Planning	3
Concentration Electives		
Choose from the following:		5
PJM 6125	Project Evaluation and Assessment	
PJM 6135	Project Quality Management	
PJM 6140	Managing Troubled Projects	
PJM 6210	Communication Skills for Project Managers	
PJM 6710	Introduction to Program and Portfolio Management	
PJM 6810	Principles of Agile Project Management	

SOCIAL MEDIA

Code	Title	Hours
Required Course		
CMN 6045	Leveraging Digital Technologies: Strategy, Assessment, and Governance	3

DGM 6285	Interactive Marketing Fundamentals	4
DGM 6290	Social Media and Brand Strategy Implementation	4
Concentration Electives		
Choose from the following:		5
CMN 6040	Consumer Behaviors in the Online Environment	
CMN 6065	Implementation and Management of Social Media Channels and Online Communities	
CMN 6075	Digital Marketing Analytics	
CMN 6096	Cultural Communications Lab	
DGM 6168	Usability and Human Interaction	
DGM 6550	Search Engine Optimization: Strategy and Implementation	
PBR 6001	Communications Technology Lab	

CROSS-CULTURAL COMMUNICATION

Code	Title	Hours
Required Courses		
CMN 6085	Strategies for Cross-Cultural Facilitation and Negotiation	3
CMN 6095	Foundations of Developing Cultural Awareness	3
Concentration Electives		
Choose from the following:		10
CMN 6096	Cultural Communications Lab	
GST 6100	Globalization and Global Politics and Economics	
GST 6101	Global Literacy, Culture, and Community	
HRM 6070	Global Human Resources Management	
INT 6900	International Field Study Experience	
ITC 6045	Information Technology Policy, Ethics, and Social Responsibility	
LDR 6145	Developing Sustainable Global Leadership	
PBR 6100	Introduction to Public Relations	

Human Resources Management, MS

The human resources management program in the College of Professional Studies is designed to prepare students to make the connection between an organization's strategy and its people and other key stakeholders. The program focuses on vital human resource competencies and analytical skills—with an emphasis on experiential learning—required for students to serve as strategic business partners in their organizations. Students also have the opportunity to tailor their studies to support their specific career objectives.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
Based on your experience, complete one of the two options below:		
Two or more years of human resources experience:		*6*
HRM 6025	Workforce Analytics	
HRM 6042	Strategic Workforce Planning	
Fewer than two years of experience:		*9*
HRM 6015	Introduction to Human Resources Management	
HRM 6025	Workforce Analytics	
HRM 6042	Strategic Workforce Planning	
Core Electives		
Complete four of the following:		12
HRM 6005	Creating a High-Performance Organization: Strategic Organizational and HRM Choices	
HRM 6010	Compensation and Benefits	
HRM 6020	Talent Acquisition and Onboarding	
HRM 6030	The Employment Contract	
HRM 6035	Digital Human Resources Platforms	
HRM 6047	Managing the Employee Life Cycle	
HRM 6050	Employee Engagement	
HRM 6060	Organizational Design	
HRM 6070	Global Human Resources Management	

The remaining quarter hours may be completed by: 1) combination of completing a concentrations and additional electives or 2) selecting any courses in the concentrations and elective lists.

Concentrations

Complete one of the following concentrations:

- Artificial Intelligence for Human Resources (p. 395)
- Digital Human Resources (p. 395)
- Global Talent Management (p. 395)
- Leadership (p. 395)
- Organizational Communication (p.)
- Project Management (p. 395)

Capstone

Code	Title	Hours
HRM 6940	Projects for Professionals	4

Electives

Code	Title	Hours
ALY 6010	Probability Theory and Introductory Statistics	
ALY 6070	Communication and Visualization for Data Analytics	
CMN 6025	Digital Era Skills: Platforms, Tools, and Techniques	
CMN 6050	Crisis Communication	
CMN 6060	Negotiation, Mediation, and Facilitation	
CMN 6096	Cultural Communications Lab	
CMN 6110	Group Dynamics and Interpersonal Conflict: Meeting Management	
COP 6940	Personal and Career Development	
LDR 6101	Leadership Challenge Lab	

Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

ARTIFICIAL INTELLIGENCE FOR HUMAN RESOURCES

Code	Title	Hours
Required Courses		
EAI 6070	Human Resources Information Processing	3
EAI 6080	Advanced Analytical Utilization	3
EAI 6120	AI Communication and Visualization	3
Electives		
Complete two of the following:		6
ALY 6010	Probability Theory and Introductory Statistics	
ALY 6040	Data Mining Applications	
ALY 6060	Decision Support and Business Intelligence	
ALY 6110	Data Management and Big Data	

DIGITAL HUMAN RESOURCES

Code	Title	Hours
Required Course		
HRM 6035	Digital Human Resources Platforms	3
Electives		
Choose from the following:		13
ALY 6000	Introduction to Analytics	
ALY 6010	Probability Theory and Introductory Statistics	
ALY 6060	Decision Support and Business Intelligence	
ALY 6070	Communication and Visualization for Data Analytics	
ALY 6110	Data Management and Big Data	
CMN 6045	Leveraging Digital Technologies: Strategy, Assessment, and Governance	
CMN 6065	Implementation and Management of Social Media Channels and Online Communities	
CMN 6096	Cultural Communications Lab	
PBR 6001	Communications Technology Lab	

GLOBAL TALENT MANAGEMENT

Code	Title	Hours
Required Course		
HRM 6070	Global Human Resources Management	3
Electives		
Choose from the following:		12
CMN 6085	Strategies for Cross-Cultural Facilitation and Negotiation	
CMN 6095	Foundations of Developing Cultural Awareness	
CMN 6096	Cultural Communications Lab	
GST 6101	Global Literacy, Culture, and Community	
HRM 6072	Global and Comparative Employment/ Employee Relations	
HRM 6074	Global Talent Acquisition and Mobility	
HRM 6076	International Compensation	
LDR 6145	Developing Sustainable Global Leadership	

LEADERSHIP

Code	Title	Hours
Required Courses		
LDR 6100	Developing Your Leadership Capability	3
LDR 6110	Leading Teams Strategically in a Global Environment	3
LDR 6120	Developing Organizational Success through Leadership Development	3
LDR 6135	Ethical Leadership	3
Electives		
Complete two of the following:		6
LDR 6115	Developing Strategic and Authentic Leadership Communication	
LDR 6140	Leadership Strategy, Design, and Practice	
LDR 6145	Developing Sustainable Global Leadership	
LDR 6150	Innovation and Organizational Transformation	
CMN 6095	Foundations of Developing Cultural Awareness	
HRM 6050	Employee Engagement	

ORGANIZATIONAL COMMUNICATION

Code	Title	Hours
Required Courses		
CMN 6010	Strategic Communication Management	3
CMN 6020	Ethical Issues in Organizational Communication	3
CMN 6910	Organizational Communication Assessment	3
Electives		
Choose from the following:		7
CMN 6080	Intercultural Communication	
CMN 6090	Organizational Culture, Climate, and Communication	
CMN 6096	Cultural Communications Lab	
CMN 6100	Communication Networks and Managing Information	
PBR 6001	Communications Technology Lab	

PROJECT MANAGEMENT

Code	Title	Hours
Required Courses		
PJM 5900	Foundations of Project Management [1]	4
PJM 6005	Project Scope Management	3
PJM 6015	Project Risk Management	3
PJM 6025	Project Scheduling and Cost Planning	3
Electives		
Choose from the following:		5-9
PJM 6125	Project Evaluation and Assessment	
PJM 6135	Project Quality Management	
PJM 6140	Managing Troubled Projects	

PJM 6210	Communication Skills for Project Managers
PJM 6710	Introduction to Program and Portfolio Management
PJM 6810	Principles of Agile Project Management

[1] This course is required for students who do not have at least two years of professional experience working on projects. This course is only intended for those who are not familiar with professional project work. Students with two years or more of professional project experience complete an additional concentration elective in lieu of Foundations of Project Management (PJM 5900).

Global Studies and International Relations, MS

Globalization has created a world of new opportunities for those savvy enough to recognize them and acquire the new skill sets needed for success in international government, consulting, business and industry, nonprofit, and educational sectors.

This program is designed to prepare students for internationally focused positions that range from traditional practitioners of diplomacy; to development workers; to executives employed in the dynamic world of international consultancy, trade, and industry. With courses enriched by classmates from every continent, students are active learners in a collaborative, cross-cultural setting from their very first course.

The core curriculum ensures all students have a solid grounding in foundational courses such as international politics, economics, security, and diplomacy. Students then select from a broad-based menu of concentrations, allowing them to develop specialties. The program culminates in a capstone experience in which students elect to write a thesis, engage in a case study, or undertake short-term travel to conduct intensive field research.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
GST 6100	Globalization and Global Politics and Economics	4
GST 6101	Global Literacy, Culture, and Community	4
GST 6109	Basic Field Research Methods	4
GST 6320	Peace and Conflict	4

Regional Studies Courses

Code	Title	Hours
Complete one of the following:		4
GST 6501	Regional Studies: East Asia	
GST 6502	Regional Studies: Middle East and North Africa	
GST 6503	Regional Studies: Sub-Saharan Africa	
GST 6504	Regional Studies: Europe and Eurasia	
GST 6505	Regional Studies: Southwest and Central Asia	
GST 6506	Regional Studies: Latin America	

Capstone

Code	Title	Hours
Complete one of the following:		4
GST 6920	Case Study in Global Studies	
GST 7990	Thesis	
INT 6900	International Field Study Experience	

The remaining required quarter hours for the program may be completed by a combination of completing a concentration and additional electives or selecting any courses listed in the electives list. *Note:* A minimum of 18–20 quarter hours must be completed within global studies electives.

Concentrations

- Global Health and Development (p.)
- Conflict Resolution (p.)
- Diplomacy (p. 397)
- International Economics and Consulting (p.)

Electives

Code	Title	Hours
Choose from the following:		
Global Studies Electives		
GST 6102	Global Corporate Social Responsibility	
GST 6105	Foundations of Global Studies and International Relations	
GST 6200	The Funders	
GST 6210	The Developers	
GST 6220	Globalization of Emerging Economies	
GST 6300	Security and Terrorism	
GST 6310	Immigration and Labor	
GST 6324	Divided Societies in the Modern World	
GST 6326	International Conflict and Cooperation	
GST 6327	Conflict and Postconflict Development	
GST 6340	The Economics of Development	
GST 6350	Global Economics of Food and Agriculture	
GST 6360	Nuclear Nonproliferation	
GST 6410	Global Education in the Internet Age	
GST 6425	Comparative Higher Education Systems Across Regions	
GST 6430	Leadership and Management	
GST 6525	International Organizations: Law and Diplomacy	
GST 6550	U.S. Foreign Policy	
GST 6540	Politics of the European Union	
GST 6560	Multilateral Diplomacy	
GST 6580	Opportunities in International Consulting	
GST 6590	Public Diplomacy	
GST 6600	The Practice of Diplomacy	
GST 6610	Sustainable Development	
GST 6700	Global Health Perspectives, Politics, and Experiences in International Development	
GST 6710	Critical Issues and Challenges in the Practice of Global Health	

GST 6740	Human Rights
GST 6810	International Higher Education
GST 6820	Managing Study Abroad
GST 6830	Managing International Students
GST 6840	The Business of International Education
GST 6850	Immigration and Legal Issues in International Higher Education
GST 6965	Professional Practice in Global Education
GST 7983	Topics
Other Electives	
ALY 6000	Introduction to Analytics
ALY 6010	Probability Theory and Introductory Statistics
CED 6120	Environmental Economics
CED 6130	Sustainable Economic Development
CMN 6060	Negotiation, Mediation, and Facilitation
CMN 6085	Strategies for Cross-Cultural Facilitation and Negotiation
COP 6940	Personal and Career Development
EDU 6184	Interdisciplinary Foundations
LDR 6145	Developing Sustainable Global Leadership
NPM 6140	Grant and Report Writing
PJM 5900	Foundations of Project Management

Program Credit/GPA Requirements

46 total quarter hours required
Minimum 3.000 GPA required

GLOBAL HEALTH AND DEVELOPMENT

Code	Title	Hours
Complete five of the following (one of the courses can be from another global studies concentration, a regional studies course, or a special topics course if you choose):		20
GST 6210	The Developers	
GST 6340	The Economics of Development	
GST 6350	Global Economics of Food and Agriculture	
GST 6610	Sustainable Development	
GST 6700	Global Health Perspectives, Politics, and Experiences in International Development	
GST 6710	Critical Issues and Challenges in the Practice of Global Health	

CONFLICT RESOLUTION

Code	Title	Hours
Complete five of the following (one of the courses can be from another global studies concentration, a regional studies course, or a special topics course if you choose):		20
GST 6324	Divided Societies in the Modern World	
GST 6326	International Conflict and Cooperation	
GST 6327	Conflict and Postconflict Development	
GST 6300	Security and Terrorism	
GST 6360	Nuclear Nonproliferation	
GST 6740	Human Rights	

DIPLOMACY

Code	Title	Hours
Complete five of the following (one of the courses can be from another global studies concentration, a regional studies course, or a special topics course if you choose):		20
GST 6600	The Practice of Diplomacy	
GST 6540	Politics of the European Union	
GST 6550	U.S. Foreign Policy	
GST 6560	Multilateral Diplomacy	
GST 6590	Public Diplomacy	
GST 6740	Human Rights	

INTERNATIONAL ECONOMICS AND CONSULTING

Code	Title	Hours
Complete five of the following (one of the courses can be from another global studies concentration, a regional studies course, or a special topics course if you choose):		20
GST 6102	Global Corporate Social Responsibility	
GST 6200	The Funders	
GST 6220	Globalization of Emerging Economies	
GST 6310	Immigration and Labor	
GST 6340	The Economics of Development	
GST 6430	Leadership and Management	
GST 6580	Opportunities in International Consulting	

Leadership, MS

As today's workforce continues to diversify, leadership tasks and responsibilities have become more complex. The Master of Science in Leadership seeks to prepare you to meet these evolving challenges by helping you cultivate a personal leadership philosophy. Leveraging students' interdisciplinary backgrounds, this master's degree in leadership combines real-world lessons with an action-learning approach that is designed to build and strengthen your leadership capabilities.

In September of 2009, the Master of Science in Leadership with a Concentration in Project Management received accreditation by the Project Management Institute's Global Accreditation Center (GAC), the world's leading association for project management professionals. Accreditation is achieved by meeting the GAC's rigorous standards, which include an assessment of program objectives and outcomes, a review of on-site and online resources, evaluations of faculty and students, and proof of continuous improvements in the area of project management.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
LDR 6100	Developing Your Leadership Capability	3
LDR 6101	Leadership Challenge Lab	1
LDR 6110	Leading Teams Strategically in a Global Environment	3

LDR 6120	Developing Organizational Success through Leadership Development	3
LDR 6135	Ethical Leadership	3
LDR 6140	Leadership Strategy, Design, and Practice	3
LDR 6145	Developing Sustainable Global Leadership	3
LDR 6150	Innovation and Organizational Transformation	3
LDR 7980	The Capstone: Demonstrating Leadership in Action	4

Concentration

Complete one of the following seven concentrations:

- Health Management (p. 398)
- Human Resources Management (p. 398)
- Leading and Managing Technical Projects (p. 398)
- Nonprofit Management (p. 398)
- Organizational Communication (p. 398)
- Project Management (p. 398)
- Sport and Social Change (p. 399)

Electives

Code	Title	Hours
EDU 6184	Interdisciplinary Foundations	
Complete at least one of the following:		4
CMN 6000	Introduction to Organizational Communication	
LDR 6115	Developing Strategic and Authentic Leadership Communication	
Complete at least one of the following:		4
CMN 6095	Foundations of Developing Cultural Awareness	
COP 6940	Personal and Career Development	
INT 6000	Writing Lab	
INT 6900	International Field Study Experience	

Program Credit/GPA Requirements

45 total quarter hours required
Minimum 3.000 GPA required

HEALTH MANAGEMENT

Code	Title	Hours
HMG 6110	Organization, Administration, Financing, and History of Healthcare	3
HMG 6130	Healthcare Strategic Management	3
HMG 6140	Principles of Population-Based Management	3
HMG 6160	Healthcare Information Systems Management	3
HMG 6170	Health Law, Politics, and Policy	3

HUMAN RESOURCES MANAGEMENT

Code	Title	Hours
Required Courses		
HRM 6015	Introduction to Human Resources Management	3
HRM 6025	Workforce Analytics	3
Electives		
Complete three of the following. (Students waived out of HRM 6015, complete four of the following).		9
HRM 6005	Creating a High-Performance Organization: Strategic Organizational and HRM Choices	
HRM 6010	Compensation and Benefits	
HRM 6020	Talent Acquisition and Onboarding	
HRM 6030	The Employment Contract	
HRM 6042	Strategic Workforce Planning	
HRM 6047	Managing the Employee Life Cycle	
HRM 6050	Employee Engagement	
HRM 6060	Organizational Design	
HRM 6070	Global Human Resources Management	

LEADING AND MANAGING TECHNICAL PROJECTS

Code	Title	Hours
PJM 6000	Project Management Practices	3
PJM 6205	Leading and Managing Technical Projects	3
PJM 6210	Communication Skills for Project Managers	3
PJM 6215	Leading Remote Project Teams	3
PJM 6810	Principles of Agile Project Management	3

NONPROFIT MANAGEMENT

Code	Title	Hours
NPM 6110	Legal and Governance Issues in Nonprofit Organizations	3
NPM 6120	Financial Management for Nonprofit Organizations	3
NPM 6125	Promoting Nonprofit Organizations	3
NPM 6130	Fundraising and Development for Nonprofit Organizations	3
NPM 6140	Grant and Report Writing	3

ORGANIZATIONAL COMMUNICATION

Code	Title	Hours
CMN 6000 and INT 6000	Introduction to Organizational Communication and Writing Lab	4
CMN 6020	Ethical Issues in Organizational Communication	3
CMN 6050	Crisis Communication	3
CMN 6090	Organizational Culture, Climate, and Communication	3
CMN 6110	Group Dynamics and Interpersonal Conflict: Meeting Management	3

PROJECT MANAGEMENT

Code	Title	Hours
Required Courses		
Note: Students with project management experience are not required to take PJM 5900:		
PJM 5900	Foundations of Project Management	4
PJM 6000	Project Management Practices	3
PJM 6025	Project Scheduling and Cost Planning	3

PJM 6015	Project Risk Management	3
Electives		
Complete one of the following. (Note: Students who are not required to take PJM 5900 complete two of the following).		3
PJM 6125	Project Evaluation and Assessment	
PJM 6135	Project Quality Management	
PJM 6140	Managing Troubled Projects	
PJM 6710	Introduction to Program and Portfolio Management	

SPORT AND SOCIAL CHANGE

Code	Title	Hours
LDR 6410	Leadership and Organization in Sport	3
GST 6102	Global Corporate Social Responsibility	4
HSV 6120	Social Inequality, Social Change, and Community Building	3
LDR 6360		3
LDR 6427	Gender and Diversity in Sport	3

Nonprofit Management, MS

Facing the threat of privatization and for-profit competition, nonprofit organizations are challenged to find leaders who not only possess keen business and managerial skills but can also effect change at a community or social level. Being successful in this dynamic and rewarding field requires strong leadership, managerial and interpersonal skills, as well as in-depth knowledge of fundraising, marketing, program development, and governance issues.

Integrating theoretical approaches with practical applications, the **Master of Science in Nonprofit Management** seeks to prepare you for a leadership position in a not-for-profit university, hospital, charity, foundation, or religious organization. Upon completion of this nonprofit degree, you emerge well equipped to embark on a career in nonprofit management—prepared, and inspired, to make a meaningful impact.

The mission of the Master of Science in Nonprofit Management at the College of Professional Studies is to offer courses that further develop the students' knowledge, skills, talent, and abilities. Faculty in the program support students' development goals through action-oriented courses that link theoretical learning to practical application. Nonprofit management courses aim to prepare students to be mission-driven executive leaders, managers, employees, and board members in public and private nonprofit organizations.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
NPM 6100	Strategic Management for the Nonprofit Sector	3
NPM 6110	Legal and Governance Issues in Nonprofit Organizations	3
NPM 6120	Financial Management for Nonprofit Organizations	3
NPM 6125	Promoting Nonprofit Organizations	3
NPM 6130	Fundraising and Development for Nonprofit Organizations	3
NPM 6140	Grant and Report Writing	3
NPM 6150	Human Resources Management in Nonprofit Organizations	3
NPM 6980	Capstone	3

The remaining required quarter hours for the program may be completed by a combination of completing a concentration and additional electives or selecting any courses listed in the elective list.

Concentration

- Fundraising (p. 400)
- Leadership and Communication (p. 400)
- Project Management
- Social Media Analytics (p. 400)
- Social Innovation

Electives

Code	Title	Hours
Complete courses from the 6000 level. Below is a list of courses regularly offered as electives within the program.		
Nonprofit Management Electives		
NPM 6210	Social Value Investing and Effective Partnerships	
NPM 6220	Donor Research and Management	
NPM 6230	Measuring Social Impact	
NPM 6240	Managing the Annual Fund	
NPM 6310	Social and Sustainable Entrepreneurship	
NPM 6320	New Ventures in Social Entrepreneurship	
Other Electives		
ALY 6000	Introduction to Analytics	
ALY 6010	Probability Theory and Introductory Statistics	
ALY 6070	Communication and Visualization for Data Analytics	
ALY 6110	Data Management and Big Data	
CMN 6025	Digital Era Skills: Platforms, Tools, and Techniques	
CMN 6035	Legal, Policy, and Ethical Issues in the Digital Era	
CMN 6045	Leveraging Digital Technologies: Strategy, Assessment, and Governance	
CMN 6050	Crisis Communication	
CMN 6060	Negotiation, Mediation, and Facilitation	
CMN 6065	Implementation and Management of Social Media Channels and Online Communities	
CMN 6080	Intercultural Communication	
CMN 6090	Organizational Culture, Climate, and Communication	
CMN 6100	Communication Networks and Managing Information	
COP 6940	Personal and Career Development	
DGM 6285	Interactive Marketing Fundamentals	
DGM 6290	Social Media and Brand Strategy Implementation	

EDU 6184	Interdisciplinary Foundations
GST 6610	Sustainable Development
INT 6943	Integrative Experiential Learning
LDR 6110	Leading Teams Strategically in a Global Environment
LDR 6120	Developing Organizational Success through Leadership Development
LDR 6135	Ethical Leadership
LDR 6140	Leadership Strategy, Design, and Practice
LDR 6150	Innovation and Organizational Transformation
PJM 5900	Foundations of Project Management
PJM 6000	Project Management Practices
PJM 6005	Project Scope Management
PJM 6015	Project Risk Management
PJM 6025	Project Scheduling and Cost Planning
PJM 6135	Project Quality Management

Program Credit/GPA Requirements

45 total quarter hours required
Minimum 3.000 GPA required

Concentrations

FUNDRAISING

Code	Title	Hours
Required Courses		
NPM 6210	Social Value Investing and Effective Partnerships	3
NPM 6220	Donor Research and Management	3
NPM 6230	Measuring Social Impact	3
Electives		
Complete a minimum of 6 quarter hours from the following:		6
ALY 6000	Introduction to Analytics	
ALY 6010 and ALY 6070	Probability Theory and Introductory Statistics and Communication and Visualization for Data Analytics	
DGM 6285	Interactive Marketing Fundamentals	
DGM 6290	Social Media and Brand Strategy Implementation	
NPM 6240	Managing the Annual Fund	

LEADERSHIP AND COMMUNICATION

Code	Title	Hours
Required Courses		
CMN 6090	Organizational Culture, Climate, and Communication	3
LDR 6150	Innovation and Organizational Transformation	3
Electives		
Complete a minimum of 9 quarter hours from the following:		9
CMN 6000 and INT 6000	Introduction to Organizational Communication and Writing Lab	
CMN 6060	Negotiation, Mediation, and Facilitation	
CMN 6080	Intercultural Communication	
CMN 6100	Communication Networks and Managing Information	
LDR 6120	Developing Organizational Success through Leadership Development	
LDR 6135	Ethical Leadership	
LDR 6140	Leadership Strategy, Design, and Practice	
LDR 6150	Innovation and Organizational Transformation	
LDR 6110	Leading Teams Strategically in a Global Environment	
LDR 6140	Leadership Strategy, Design, and Practice	

PROJECT MANAGEMENT

Code	Title	Hours
Required Courses		
Complete the courses that are required based on the number of years of project management experience you have completed.		6-7
Two-plus years project management experience:		
PJM 6000	Project Management Practices	
PJM 6015	Project Risk Management	
Fewer than two years project management experience:		
PJM 5900	Foundations of Project Management [1]	
PJM 6000	Project Management Practices	
PJM 6015	Project Risk Management	
Electives		
Complete a minimum of 5 quarter hours from the following: [2]		5
PJM 6005 and PJM 6125	Project Scope Management and Project Evaluation and Assessment	
or PJM 6140	Managing Troubled Projects	
PJM 6025	Project Scheduling and Cost Planning	
PJM 6135	Project Quality Management	

SOCIAL MEDIA ANALYTICS

Code	Title	Hours
Required Courses		
CMN 6045	Leveraging Digital Technologies: Strategy, Assessment, and Governance	3
CMN 6065	Implementation and Management of Social Media Channels and Online Communities	3
DGM 6285	Interactive Marketing Fundamentals	4
Electives		
Complete a minimum of 5 quarter hours from the following:		5
ALY 6000	Introduction to Analytics	
ALY 6110 and ALY 6070	Data Management and Big Data and Communication and Visualization for Data Analytics	
ALY 6010	Probability Theory and Introductory Statistics	
DGM 6290	Social Media and Brand Strategy Implementation	

SOCIAL INNOVATION

Code	Title	Hours
Required Courses		
GST 6610	Sustainable Development	4
NPM 6230	Measuring Social Impact	3
NPM 6310	Social and Sustainable Entrepreneurship	3
NPM 6320	New Ventures in Social Entrepreneurship	3
Electives		
Complete a minimum of 3 quarter hours from the following:		3
ALY 6000	Introduction to Analytics	
ALY 6010 and ALY 6070	Probability Theory and Introductory Statistics and Communication and Visualization for Data Analytics	
DGM 6285	Interactive Marketing Fundamentals	
DGM 6290	Social Media and Brand Strategy Implementation	
LDR 6120	Developing Organizational Success through Leadership Development	
PJM 5900 and PJM 6000	Foundations of Project Management and Project Management Practices [1]	

[1] This course is required for students who do not have **at least two years** of professional experience working on projects. This course is only intended for those who are not familiar with professional project work. Students with two years or more of professional project experience should not take Foundations of Project Management (PJM 5900).

[2] Students who take Foundations of Project Management (PJM 5900) are not required to take a course in this section.

Organizational Leadership, MS

As today's workforce continues to be faced by new challenges, leadership tasks and responsibilities have become more important as well as more complex. The Master of Science in Organizational Leadership uses a practical, experiential learning approach to help students examine and develop their individual leadership styles while building skills that inspire and drive productive activity in all kinds of professional environments. Graduates are well able to perform at a higher level regardless of their position within the organization, demonstrate readiness for promotion, start their own business or consulting practice, take on global strategic and management challenges, and drive organizational change and innovation.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
LDR 6100	Developing Your Leadership Capability	3
LDR 6110	Leading Teams Strategically in a Global Environment	3
LDR 6115	Developing Strategic and Authentic Leadership Communication	3
LDR 6120	Developing Organizational Success through Leadership Development	3
LDR 6135	Ethical Leadership	3
LDR 7980	The Capstone: Demonstrating Leadership in Action	4

The remaining 26 of 45 quarter hours may be completed by a combination of completing a concentration and additional electives or selecting any courses listed in the concentrations and elective list.

Concentrations

- Coaching
- Health Management (p. 402)
- Human Resources Management (p. 402)
- Leading and Managing Technical Projects (p. 402)
- Organizational Communication (p. 402)
- Project Management (p. 402)

Electives

Code	Title	Hours
Complete courses from the 6000 level. Below is a list of courses regularly offered as electives within the Organizational Leadership program.		
CMN 6060	Negotiation, Mediation, and Facilitation	3
CMN 6095	Foundations of Developing Cultural Awareness	3
CMN 6096	Cultural Communications Lab	1
EDU 6184	Interdisciplinary Foundations	2
HRM 6042	Strategic Workforce Planning	3
HRM 6050	Employee Engagement	3
HRM 6070	Global Human Resources Management	3
HRM 6074	Global Talent Acquisition and Mobility	3
INT 6900	International Field Study Experience	3,4
LDR 6101	Leadership Challenge Lab	1
LDR 6140	Leadership Strategy, Design, and Practice	3
LDR 6145	Developing Sustainable Global Leadership	3
LDR 6150	Innovation and Organizational Transformation	3
LDR 6190	Leadership: Coaching for Purpose and Performance	3
LDR 6983	Topics	1-4

Program Credit/GPA Requirements

45 total quarter hours required
Minimum 3.000 GPA required

COACHING

Code	Title	Hours
CMN 6060	Negotiation, Mediation, and Facilitation	3
CMN 6095	Foundations of Developing Cultural Awareness	3
HRM 6042	Strategic Workforce Planning	3
HRM 6050	Employee Engagement	3
LDR 6190	Leadership: Coaching for Purpose and Performance	3

HEALTH MANAGEMENT

Code	Title	Hours
HMG 6110	Organization, Administration, Financing, and History of Healthcare	3
HMG 6130	Healthcare Strategic Management	3
HMG 6140	Principles of Population-Based Management	3
HMG 6160	Healthcare Information Systems Management	3
HMG 6170	Health Law, Politics, and Policy	3

HUMAN RESOURCES MANAGEMENT

Code	Title	Hours
Required Courses		
HRM 6015	Introduction to Human Resources Management	3
HRM 6025	Workforce Analytics	3
Complete three of the following (students waived out of HRM 6015, complete four of the following):		9-12
HRM 6005	Creating a High-Performance Organization: Strategic Organizational and HRM Choices	
HRM 6010	Compensation and Benefits	
HRM 6020	Talent Acquisition and Onboarding	
HRM 6030	The Employment Contract	
HRM 6042	Strategic Workforce Planning	
HRM 6047	Managing the Employee Life Cycle	
HRM 6050	Employee Engagement	
HRM 6060	Organizational Design	
HRM 6070	Global Human Resources Management	

LEADING AND MANAGING TECHNICAL PROJECTS

Code	Title	Hours
PJM 6000	Project Management Practices	3
PJM 6205	Leading and Managing Technical Projects	3
PJM 6210	Communication Skills for Project Managers	3
PJM 6215	Leading Remote Project Teams	3
PJM 6810	Principles of Agile Project Management	3

ORGANIZATIONAL COMMUNICATION

Code	Title	Hours
CMN 6000	Introduction to Organizational Communication	3
CMN 6020	Ethical Issues in Organizational Communication	3
CMN 6050	Crisis Communication	3
CMN 6090	Organizational Culture, Climate, and Communication	3
CMN 6110	Group Dynamics and Interpersonal Conflict: Meeting Management	3
INT 6000	Writing Lab	1

PROJECT MANAGEMENT

Code	Title	Hours
Required Courses		
Note: Students with project management experience are not required to take PJM5900:		
PJM 5900	Foundations of Project Management	4
PJM 6000	Project Management Practices	3
PJM 6015	Project Risk Management	3
PJM 6025	Project Scheduling and Cost Planning	3
Complete one of the following (note: students who are not required to take PJM 5900, complete two of the following):		3-6
PJM 6125	Project Evaluation and Assessment	
PJM 6135	Project Quality Management	
PJM 6140	Managing Troubled Projects	
PJM 6710	Introduction to Program and Portfolio Management	

Project Management, MS

Companies succeed or fail based on their ability to bring quality products and services to market in a timely manner. Without skilled project managers in place, companies are challenged to deliver projects on time, on budget, and according to specifications. From inception to completion, project managers are responsible for every step in the process: project definition, cost and risk estimation, schedule planning and monitoring, budget management, negotiation and conflict resolution, project leadership, and project presentation and evaluation.

The Master of Science in Project Management is designed to provide you with the practical skills and theoretical concepts you need to lead complex projects. Featuring real-world case studies, this project management degree presents techniques and tools for managing long- and short-term projects successfully and cost-effectively. Augmenting the core project management courses are concentrations that seek to provide you with content-specific expertise that enables you to deepen your knowledge in your field of interest.

In September of 2009, the Master of Science in Project Management received accreditation by the Project Management Institute's Global Accreditation Center (GAC), the world's leading association for project management professionals. Accreditation is achieved by meeting the GAC's rigorous standards, which include an assessment of program objectives and outcomes, a review of on-site and online resources, evaluations of faculty and students, and proof of continuous improvements in the area of project management.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
Note: PJM 5900 is for students with less than three years of experience directing or leading project tasks and is recommended for students who do not have a basic working knowledge of Microsoft Project software. Students who do not complete PJM5900 may take any project management elective to satisfy the required credits.		
PJM 5900	Foundations of Project Management	4
PJM 6005	Project Scope Management	3

PJM 6015	Project Risk Management	3
PJM 6025	Project Scheduling and Cost Planning	3
PJM 6135	Project Quality Management	3
The following course should be taken last:		
PJM 6910	Capstone	3

The remaining required quarter hours for the program may be completed by: 1) a combination of completing a concentration, project management electives, and 6000-level elective or 2) a combination of project management electives, and selecting any courses listed in the concentrations and elective lists.

Project Management Electives

Code	Title	Hours
PJM 6075	Project Finance	
PJM 6125	Project Evaluation and Assessment	
PJM 6140	Managing Troubled Projects	
PJM 6145	Global Project Management	
PJM 6175	Project Resource Management	
PJM 6180	Project Stakeholder Management	
PJM 6205	Leading and Managing Technical Projects	
PJM 6210	Communication Skills for Project Managers	
PJM 6215	Leading Remote Project Teams	
PJM 6710	Introduction to Program and Portfolio Management	
PJM 6983	Topics	

Elective List

Code	Title	Hours
Complete courses from the 6000 level. Below is a list of courses regularly offered as electives within the Project Management Program.		
CMN 6000	Introduction to Organizational Communication	
CMN 6005	Foundations of Professional Communication	
CMN 6060	Negotiation, Mediation, and Facilitation	
CMN 6090	Organizational Culture, Climate, and Communication	
CMN 6095	Foundations of Developing Cultural Awareness	
CMN 6110	Group Dynamics and Interpersonal Conflict: Meeting Management	
COP 6940	Personal and Career Development	
EDU 6184	Interdisciplinary Foundations	
INT 6940	Experiential Learning Projects for Professionals	
INT 6943	Integrative Experiential Learning	

Concentrations

- Agile Project Management (p. 403)
- Analytics (p. 403)
- Construction Management (p. 403)
- Leadership (p. 403)
- Leading and Managing Technical Projects (p.)
- Organizational Communication (p.)
- Project Business Analysis (p.)

Program Credit/GPA Requirements

45 total quarter hours required
Minimum 3.000 GPA required

CONCENTRATION IN AGILE PROJECT MANAGEMENT

Code	Title	Hours
Students in this concentration are only required to complete one project management required elective.		
PJM 6205	Leading and Managing Technical Projects	3
PJM 6810	Principles of Agile Project Management	3
PJM 6815	Advanced Agile Project Management	3
PJM 6820	Agile Implementation and Governance	3
PJM 6825	Agile Lean Product Development	3

CONCENTRATION IN ANALYTICS

Code	Title	Hours
ALY 6000	Introduction to Analytics	3
ALY 6010	Probability Theory and Introductory Statistics	3
ALY 6015	Intermediate Analytics	3
ALY 6070	Communication and Visualization for Data Analytics	3
Choose from one of the following:		3
ALY 6020	Predictive Analytics	
ALY 6030	Data Warehousing and SQL	
ALY 6040	Data Mining Applications	
ALY 6110	Data Management and Big Data	

CONCENTRATION IN CONSTRUCTION MANAGEMENT

Code	Title	Hours
CMG 6400	Introduction to Construction Management	4
CMG 6402	Alternative Project Delivery Methods and Project Controls	4
CMG 6403	Safety, Project Risk, and Quality Management	4
CMG 6405	Construction Law	4

CONCENTRATION IN LEADERSHIP

Code	Title	Hours
Required Courses		
LDR 6100	Developing Your Leadership Capability	3
LDR 6110	Leading Teams Strategically in a Global Environment	3
LDR 6120	Developing Organizational Success through Leadership Development	3
LDR 6150	Innovation and Organizational Transformation	3
Elective		
Complete one of the following:		3
LDR 6135	Ethical Leadership	
LDR 6140	Leadership Strategy, Design, and Practice	

CONCENTRATION IN LEADING AND MANAGING TECHNICAL PROJECTS

Code	Title	Hours
PJM 6205	Leading and Managing Technical Projects	3
PJM 6210	Communication Skills for Project Managers	3
PJM 6215	Leading Remote Project Teams	3
PJM 6810	Principles of Agile Project Management	3
PJM 6825	Agile Lean Product Development	3

CONCENTRATION IN ORGANIZATIONAL COMMUNICATION

Code	Title	Hours
Required Course		
CMN 6000 and INT 6000	Introduction to Organizational Communication and Writing Lab	4
Electives		
Complete four of the following:		12
CMN 6020	Ethical Issues in Organizational Communication	
CMN 6050	Crisis Communication	
CMN 6060	Negotiation, Mediation, and Facilitation	
CMN 6080	Intercultural Communication	
CMN 6090	Organizational Culture, Climate, and Communication	
CMN 6110	Group Dynamics and Interpersonal Conflict: Meeting Management	

CONCENTRATION IN PROJECT BUSINESS ANALYSIS

Code	Title	Hours
ALY 6000	Introduction to Analytics	3
PJM 6610	Foundations of Project Business Analysis	3
PJM 6620	Project Business Analysis: Needs Assessment	3
PJM 6630	Project Business Analysis: Requirements Planning and Analysis	3
PJM 6640	Leadership Strategies for the Business Analyst	3

Regulatory Affairs, MS

The rapid advancement of technology within healthcare and other sectors has driven the evolution of a complex global regulatory landscape and concurrently created the need for professionals with the skills necessary to facilitate the commercialization of products used therein. In response to this demand, Northeastern University's College of Professional Studies offers the Master of Science in Regulatory Affairs degree.

This unique graduate degree is designed to both broaden and deepen the student's understanding of current global compliance requirements and their practical application in the design, development, approval, and postmarketing of products utilized within regulated industries. Courses within this degree program provide students with the opportunity to integrate scientific and technical knowledge and engineering and regulatory perspectives within the larger context of global product commercialization. From research and discovery through the postmarket phase of product utilization, the Master of Science in Regulatory Affairs degree examines the processes required for stakeholders to maintain compliance to product standards and regulations throughout the global marketplace.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
BTC 6210	Human Experimentation: Methodological Issues Fundamentals	4
RGA 6002	Introduction to Regulatory Compliance and Practice	2
RGA 6203	Pharmaceutical and Medical Device Law: Topics and Cases	5
or RGA 6204	Legal Issues in International Food, Drug, and Medical Device Regulation	
RGA 6212	Introduction to Safety Sciences	4
RGA 6463	Regulatory Strategy for Product Development and Life-Cycle Management	4

Capstone

Code	Title	Hours
RGA 6300	Practical Applications in Global Regulatory Affairs	4

The remaining quarter hours may be completed by selecting a combination of a concentration and additional electives or selecting any courses listed in the concentrations and elective lists.

Concentrations

- Biopharmaceutical Regulatory Affairs (p. 405)
- Clinical Research Regulatory Affairs (p. 405)
- Medical Device Regulatory Affairs (p. 405)
- Nonclinical Biomedical Product Regulation (p. 405)
- Quality Assurance and Compliance (p.)

Program Credit/GPA Requirements

45 total quarter hours required
Minimum 3.000 GPA required

Elective Courses

Code	Title	Hours
General Electives		
COP 6940	Personal and Career Development	
EDU 6184	Interdisciplinary Foundations	
INT 6943	Integrative Experiential Learning	
RGA 6205	Emerging Trends and Issues in the Medical Device Industry	
RGA 6210	Strategic Planning and Project Management for Regulatory Affairs	
RGA 6215	Project Management in Early Drug Discovery and Development	
RGA 6217	Biomedical Product Development: From Biotech to Boardroom to Market	
RGA 6219	Advanced Topics in Advertising and Promotion of Drugs and Medical Devices	

RGA 6255	Global Convergence of Regulatory Science and Reimbursement/Market Access
RGA 6461	Cybersecurity and Regulation of Digital Health Technologies by the FDA
Regulatory Affairs of Food	
GST 6350	Global Economics of Food and Agriculture
GST 6610	Sustainable Development
GST 6102	Global Corporate Social Responsibility
RFA 6220	Food Safety and Surveillance: Concepts and Applications
International Regulatory Affairs	
RGA 6221	European Union Compliance Process and Regulatory Affairs
RGA 6222	European Medical Device Regulations
RGA 6223	Introduction to Australian, Asian, and Latin American Regulatory Affairs
RGA 6224	Regulation of Biomedical Product Commercialization by Health Canada
RGA 6228	Managing International Clinical Trials
RGA 6228	Managing International Clinical Trials
RGA 6243	Medical Device Product Development in Canada
RGA 6244	Therapeutic Product Development in Canada
RGA 6247	Medicines Regulatory Harmonization in Africa
RGA 6249	Chinese Food and Drug Administration Regulation of Biomedical Product Commercialization

Concentrations

BIOPHARMACEUTICAL REGULATORY AFFAIRS

Code	Title	Hours
RGA 6000	Introduction to Food and Drug Administration (FDA) Pharmaceutical Regulation	2
RGA 6101	Therapeutic Product Development: A Regulatory Overview	4
RGA 6207	Global Impact of Electronic Common Technical Document (eCTD) Submissions	4
RGA 6380	Advanced Regulatory Writing: New Drug Applications	4
Complete one of the following:		4
RGA 6217	Biomedical Product Development: From Biotech to Boardroom to Market	
RGA 6235	Emerging Product Categories in the Regulation of Drugs and Biologics	

CLINICAL RESEARCH REGULATORY AFFAIRS

Code	Title	Hours
BTC 6211	Validation and Auditing of Clinical Trial Information	4
BTC 6213	Clinical Trial Design Optimization and Problem Solving	4
RGA 6101	Therapeutic Product Development: A Regulatory Overview	4
or RGA 6202	Medical Device Development: A Regulatory Overview	
Complete one of the following:		4
RGA 6217	Biomedical Product Development: From Biotech to Boardroom to Market	
RGA 6228	Managing International Clinical Trials	

MEDICAL DEVICE REGULATORY AFFAIRS

Code	Title	Hours
RGA 6001	Introduction to Food and Drug Administration (FDA) Medical Device Regulation	2
RGA 6202	Medical Device Development: A Regulatory Overview	4
RGA 6233	Application of Quality System Regulation in Medical Device Design and Manufacturing	4
Choose from the following:		6
RGA 6205	Emerging Trends and Issues in the Medical Device Industry	
RGA 6222	European Medical Device Regulations	
RGA 6243	Medical Device Product Development in Canada	
RGA 6275	Product Development and Process Validation	
RGA 6370	Advanced Regulatory Writing: Medical Device Submissions	

NONCLINICAL BIOMEDICAL PRODUCT REGULATION

Code	Title	Hours
RGA 6207	Global Impact of Electronic Common Technical Document (eCTD) Submissions	4
RGA 6233	Application of Quality System Regulation in Medical Device Design and Manufacturing	4
RGA 6405	Nonclinical Regulations in Biomedical Product Commercialization	4
Complete one of the following:		4
RGA 6385	Operational Aspects of Electronic Common Technical Document (eCTD) Submissions	
RGA 6420	Global IVD Regulations and Submissions	

QUALITY ASSURANCE AND COMPLIANCE

Code	Title	Hours
Complete one of the following:		2-3
RGA 6000	Introduction to Food and Drug Administration (FDA) Pharmaceutical Regulation	
RGA 6001	Introduction to Food and Drug Administration (FDA) Medical Device Regulation	
RFA 6100	Introduction to Regulatory Affairs of Food and Food Industries	

Complete the following:

RGA 6233	Application of Quality System Regulation in Medical Device Design and Manufacturing	4
RGA 6234	Risk Management: Compliance and Processes	4
RGA 6275	Product Development and Process Validation	2
Choose from the following to reach 16 quarter hours:		3-4
RGA 6221	European Union Compliance Process and Regulatory Affairs	
RGA 6410	Fundamentals of CMC Regulations and Methods	
RFA 6220	Food Safety and Surveillance: Concepts and Applications	

Sports Leadership, MSLD

The practice-oriented sports leadership master's degree is structured to accommodate midcareer athletic administrators and coaches, as well as individuals seeking to prepare for careers in the sports industry.

Developed in collaboration with Northeastern University's Center for the Study of Sport in Society, the Master of Sports Leadership seeks to prepare you for a variety of sport-related occupations—whether it's working with a professional or intercollegiate sports team; with a fitness club or wellness organization; or in marketing, communication, or sports management. Courses within this unique graduate degree examine the social and business issues that are critical to sports leadership. Offered in an online format with intensive one-week institutes in Boston and Charlotte, this practice-oriented degree seeks to provide you with a well-rounded educational experience, equipping you to advance your career in the sports industry.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
LDR 6400	Sports Management	3
LDR 6405	Sport in Society [1]	3
LDR 6410	Leadership and Organization in Sport	3
LDR 6430	Sports Law	3
LDR 6441	Sports Media Relations [1]	3

[1] Summer institute course are delivered on-ground on the Boston campus. Winter institute courses are delivered on-ground on the Charlotte campus.

Internship/Capstone

Code	Title	Hours
Complete one of the following. This course should be the last course taken and requires faculty advisor approval:		3
LDR 6961	Internship	
LDR 6980	Capstone	

The remaining 27 of 45 quarter hours may be completed by a combination of completing a concentration and additional electives or by selecting any courses listed in the concentrations and electives lists.

Concentrations

- Professional Sports Administration (p. 406)
- Collegiate Athletics Administration (p. 406)
- Analytics (p. 406)
- eSports (p. 406)

Electives List

Code	Title	Hours
Complete courses from the 6000 level. Below is a list of courses regularly offered as electives within the Sports Leadership program:		
ALY 6000	Introduction to Analytics	
ALY 6015	Intermediate Analytics	
ALY 6010	Probability Theory and Introductory Statistics	
ALY 6070	Communication and Visualization for Data Analytics	
CMN 6040	Consumer Behaviors in the Online Environment	
DGM 6400	Game Design Fundamentals	
DGM 6516	Virtual and Augmented Reality (VR/AR)	
EDU 6184	Interdisciplinary Foundations	
INT 6943	Integrative Experiential Learning	
LDR 6323	Event Management	
LDR 6427	Gender and Diversity in Sport	
LDR 6435	Fiscal Practices in Sports	
LDR 6440	Sports Marketing and Promotions	
LDR 6442	Athletic Fund-Raising	
LDR 6443	Ticket Sales and Strategies	
LDR 6445	Corporate Sponsorships	
LDR 6465	Title IX	
LDR 6455	NCAA Compliance	
LDR 6470	Bystander Strategies for the Prevention of Gender-Based Violence	
LDR 6480	The Business of eSports	
LDR 6615	Academic Advising for Student-Athletes	

Program Credit/GPA Requirements

45 total quarter hours required
Minimum 3.000 GPA required

PROFESSIONAL SPORTS ADMINISTRATION

Code	Title	Hours
LDR 6323	Event Management	3
LDR 6435	Fiscal Practices in Sports	3
LDR 6440	Sports Marketing and Promotions	3
LDR 6445	Corporate Sponsorships	3
LDR 6443	Ticket Sales and Strategies	3
LDR 6460	Risk Management in Athletics	3

COLLEGIATE ATHLETICS ADMINISTRATION

Code	Title	Hours
LDR 6427	Gender and Diversity in Sport	3
LDR 6442	Athletic Fund-Raising	3
LDR 6455	NCAA Compliance	3

LDR 6465	Title IX	3
LDR 6470	Bystander Strategies for the Prevention of Gender-Based Violence	3
LDR 6615	Academic Advising for Student-Athletes	3

ANALYTICS

Code	Title	Hours
ALY 6000	Introduction to Analytics	3
ALY 6010	Probability Theory and Introductory Statistics	3
ALY 6015	Intermediate Analytics	3
ALY 6070	Communication and Visualization for Data Analytics	3
Complete two of the following:		6
ALY 6020	Predictive Analytics	
ALY 6030	Data Warehousing and SQL	
ALY 6040	Data Mining Applications	
ALY 6110	Data Management and Big Data	

ESPORTS

Code	Title	Hours
CMN 6040	Consumer Behaviors in the Online Environment	3
LDR 6323	Event Management	3
LDR 6480	The Business of eSports	3
LDR 6445	Corporate Sponsorships	3
DGM 6400	Game Design Fundamentals	4
DGM 6516	Virtual and Augmented Reality (VR/AR)	2

Graduate Certificate Programs

Enhance your skills and career potential with a graduate certificate from Northeastern University's College of Professional Studies. We offer over 41 certificates that represent fast-growing fields such as education, project management, leadership, and technology. **Courses are delivered online**, **on campus**, or in a **hybrid format**, offering you maximum flexibility and convenience for your busy schedule.

Programs

- 3-D Animation (p. 407)
- Agile Project Management (p. 408)
- Applied Analytics (p. 408)
- Biopharmaceutical Regulatory Affairs (p. 409)
- Cloud Computing Application and Management (p. 409)
- Collegiate Athletics Administration (p. 409)
- Computer Industry Writing (p. 410)
- Construction Management (p. 410)
- Cross-Cultural Communication (p. 410)
- Digital Media Management (p. 411)
- Digital Video (p. 411)
- Emergency Management (p. 411)
- Experiential Teaching and Learning (p. 412)
- Financial Markets and Institutions (p. 412)
- Forensic Accounting (p. 413)
- Fundraising and Development (p. 413)
- Game Design (p. 413)
- Geographic Information Systems (p. 413)
- Global Studies and International Relations (p. 414)
- Health Management (p. 414)
- Higher Education Administration (p. 415)
- Human-Centered Informatics (p. 415)
- Human Resources Management (p. 416)
- Information Security Management (p. 416)
- Integrative Health and Wellness (p. 416)
- Interactive Design (p. 417)
- International Biopharmaceutical Regulatory Affairs (p. 417)
- Leadership (p. 418)
- Leading and Managing Technical Projects (p. 418)
- Learning Experience Design and Technology (p. 419)
- Medical Device Regulatory Affairs (p. 419)
- Nonclinical Biomedical Product Regulation (p. 419)
- Nonprofit Management (p. 420)
- Organizational Communication (p. 420)
- Port Security (p. 421)
- Professional Sports Administration (p. 421)
- Project Business Analysis (p. 421)
- Project Management (p. 422)
- Public and Media Relations (p. 422)
- Quality Assurance Compliance (p. 423)
- Remote Sensing (p. 423)
- Social Media for Organizational Performance
- Usability (p. 424)

3D Animation, Graduate Certificate

3D animation is not only a major component in the film and broadcast industries, it is also a crucial element in online entertainment and a driving force for the gaming industry. Companies use animation in advertisements, websites, and training programs. The growing use of gaming technologies in education and industry (often referred to as serious games) has given rise to a need for skilled animators who can work closely with business and academic institutions.

The Graduate Certificate in 3D Animation offers a practice-oriented approach to the art and science of animation, with a particular emphasis on the special requirements of 3D modeling and animating for the gaming industry. Course work is designed to develop students' powers of visualization as well as provide a conceptual basis for visual narrative. The program seeks to produce graduates who are skilled in the use of industry-standard animation applications; understand visual principles of lighting, modeling, and surfacing; and are conversant with motion and special effects compositing.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
DGM 6450	Animation Basics	4
DGM 6510	3D Modeling	4
DGM 6530	Character Animation	4

Elective Courses

Code	Title	Hours
Complete a minimum of four quarter hours from the following:		4
DGM 6515	Introduction to After Effects	
DGM 6535	Rigging Principles and Techniques	
DGM 6540	Compositing	

Program Credit/GPA Requirements

16 quarter hours required
Minimum 3.000 GPA required

Agile Project Management, Graduate Certificate

Northeastern University's graduate certificate in agile is designed to empower students to explore agile principles and practice and remain up-to-date with current trends in the agile framework. The increasingly important role of agile practitioners and managers is becoming clear as agile business development processes are being adopted by major companies because of its high degree of success in achieving improved time to market, reducing costs, and increasing overall customer satisfaction.

The graduate certificate in agile is led by highly credentialed faculty members that are agile practitioners with decades of experience in helping companies successfully implement agile in their organizations.

Through courses you take online, our agile graduate certificate project management curriculum will give you the opportunity to:

- Develop a strong framework and understanding of the role of agile management
- Develop an understanding of the agile management processes and methodologies
- Develop an understanding of how an agile approach to managing projects can deliver value to the organization
- Develop a personal leadership strategy for success as an agile practitioner
- Develop an agile evaluation plan to measure success

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
PJM 5900	Foundations of Project Management [1]	4
PJM 6810	Principles of Agile Project Management	3
PJM 6815	Advanced Agile Project Management	3
PJM 6820	Agile Implementation and Governance	3
PJM 6825	Agile Lean Product Development	3

[1] Foundations of Project Management (PJM 5900) is for students with less than three years of experience directing or leading project tasks and is recommended for students who do not have a basic working knowledge of Microsoft Project software. Students who do not complete Foundations of Project Management (PJM 5900) take project management elective credits to satisfy the required credits for the program.

Elective Courses

Code	Title	Hours
INT 6940	Experiential Learning Projects for Professionals	1-4
INT 6943	Integrative Experiential Learning	3
PJM 6075	Project Finance	3
PJM 6125	Project Evaluation and Assessment	3
PJM 6140	Managing Troubled Projects	3
PJM 6145	Global Project Management	3
PJM 6175	Project Resource Management	3
PJM 6180	Project Stakeholder Management	3
PJM 6205	Leading and Managing Technical Projects	3
PJM 6210	Communication Skills for Project Managers	3
PJM 6215	Leading Remote Project Teams	3
PJM 6710	Introduction to Program and Portfolio Management	3
PJM 6983	Topics	1-4

Program Credit/GPA Requirements

16 total quarter hours required
Minimum 3.000 GPA required

Applied Analytics, Graduate Certificate

In a global environment characterized by digital transformation, rapid change, and high levels of uncertainty, the ability to hire, reskill, and upskill analytic talent is a major driver of organizational performance. The Graduate Certificate in Applied Analytics in the College of Professional Studies is designed to prepare students to develop analytical skills that will support decision making in an organization's strategy. The certification focuses on data discipline: navigating the sea of information that's generated by machines; technical ability: understanding how machines function and how to interact with them; and the human discipline: what humans can do that machines, for the foreseeable future, cannot emulate—all with an emphasis on experiential learning. Students also will have the opportunity to tailor their studies to support their specific career objectives.

To address the needs of students who are currently in an analytical role, as well as those who are new to the field, the certification curriculum incorporates a broad menu of course options and a pathway through the program based on a student's experience level, as well as concentrations that are aligned with student career objectives.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Core Courses

Code	Title	Hours
Required Courses		
ALY 6000	Introduction to Analytics	3
ALY 6010	Probability Theory and Introductory Statistics	3
ALY 6015	Intermediate Analytics	3
ALY 6070	Communication and Visualization for Data Analytics	3

Electives		
Complete two of the following:		6
ALY 6020	Predictive Analytics	
ALY 6030	Data Warehousing and SQL	
ALY 6040	Data Mining Applications	
ALY 6110	Data Management and Big Data	

Program Credit/GPA Requirements

18 total quarter hours required
Minimum 3.000 GPA required

Biopharmaceutical Regulatory Affairs, Graduate Certificate

The biotechnology and pharmaceutical industries continue to experience rapid growth in the U.S. market. As companies in these industries seek approval to market their products in the United States, demand for qualified regulatory affairs professionals continues to increase. Product development scientists, marketers, quality personnel, as well as legal experts that guide companies through the Food and Drug Administration (FDA) approval process, will benefit from regulatory affairs training.

The Graduate Certificate in Biopharmaceutical Regulatory Affairs is designed to provide students with a greater understanding of U.S. biologic and pharmaceutical product regulation and their unique development, marketing, manufacturing, and postmarket approval-related issues. The program also seeks to prepare students to ensure regulatory compliance, proper validation, and utilization of proper quantitative measurement techniques. Courses from this certificate may be applied toward the Master of Science in Regulatory Affairs for Drugs, Biologics, and Medical Devices.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
RGA 6000	Introduction to Food and Drug Administration (FDA) Pharmaceutical Regulation	2
RGA 6101	Therapeutic Product Development: A Regulatory Overview	4
RGA 6207	Global Impact of Electronic Common Technical Document (eCTD) Submissions	4
RGA 6380	Advanced Regulatory Writing: New Drug Applications	4
Complete one of the following:		4
RGA 6217	Biomedical Product Development: From Biotech to Boardroom to Market	
RGA 6235	Emerging Product Categories in the Regulation of Drugs and Biologics	

Program Credit/GPA Requirements

18 total quarter hours required
Minimum 3.000 GPA required

Cloud Computing Application and Management, Graduate Certificate

Cloud computing is the delivery of computing services over the internet. Due to the relatively lower cost of IT solutions, many organizations have started to take advantage of cloud services provided by Amazon Web Services, Microsoft Azure, IBM Cloud and SoftLayer, Google Cloud Platform, Salesforce, and so on. These web service providers offer a broad range of global cloud-based IT products, including computing technologies, storage, databases, analytics, networking, mobile, developer tools, management tools, Internet of Things connectivity, and security and enterprise applications. These services can help organizations move faster, facilitate agile development, and better manage scalability.

The cloud computing application and management (CCA&M) graduate certificate offers students an opportunity to develop technical and management skills to address the needs of enterprise IT services. They study theoretical and practical aspects of distributed systems from both technical and business perspectives. Successful students will be able to identify frameworks, techniques, and existing IT solutions to manage internet services at different levels (infrastructure, platform, and software) and will also be able to demonstrate the ability to use APIs to integrate applications and business operations into the cloud. They can be directly employed by web service providers or instead work as IT solutions managers in organizations that contract with web service providers.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
ITC 6420	Introduction to Cloud Computing Applications and Management	3
ITC 6450	Advanced Cloud Computing Applications and Management	3
ITC 6015	Enterprise Information Architecture	3
ITC 6460	Cloud Analytics	3
ITC 6520	Network Protection and Cloud Security	3
Complete one of the following:		3-4
ITC 6355	Web Application Design and Development	
ITC 6470	Enterprise Data Storage and Management Technologies	
ITC 6480	Amazon Web Service (AWS) Cloud Architecting	

Program Credit/GPA Requirements

18 total quarter hours required
Minimum 3.000 GPA required

Collegiate Athletics Administration, Graduate Certificate

College athletics in the United States is comprised of more than 1,200 schools, conferences, and organizations that collectively invest in the well-being of student-athletes—both on and off the field.

The Graduate Certificate in Collegiate Athletics Administration offers students an opportunity to obtain an in-depth understanding of the largest amateur segment of the sports industry. Through the program's

curriculum, students will be given the opportunity to acquire leadership skills and knowledge in a variety of collegiate athletics topics including sports management, NCAA compliance, fund-raising, academic advising, gender and diversity in sport, and Title IX legislation.

Credits earned in this certificate may be used to satisfy some of the degree requirements Master of Sports Leadership (p. 406) program. For further information see the Seeking More Than One Certificate or Degree (p. 369) page.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
LDR 6427	Gender and Diversity in Sport	3
LDR 6442	Athletic Fund-Raising	3
LDR 6455	NCAA Compliance	3
LDR 6465	Title IX	3
LDR 6470	Bystander Strategies for the Prevention of Gender-Based Violence	3
LDR 6615	Academic Advising for Student-Athletes	3

Program Credit/GPA Requirements

18 total quarter hours required
Minimum 3.000 GPA required

Computer Industry Writing, Graduate Certificate

The Graduate Certificate in Computer Industry Writing delivers in-demand technical writing and editing skills used in high-tech companies. You'll have the opportunity to develop several types of technical documentation, including online help, user manuals, screencasts, quick reference guides, and a DITA project. Our courses also give you ample exposure to popular software tools used by technical communicators in the field today. Courses from this certificate also serve as a concentration the Master of Science in Technical Communication (MSTC). You can directly apply the certificate courses to the MSTC.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
TCC 6400	Structured Documentation	4
TCC 6410	Online Documentation	4
TCC 6430	Writing for the Computer Industry	4
TCC 6440	Advanced Writing for the Computer Industry	4
TCC 6630	Introduction to XML	2
TCC 6150	Writing Portfolio	2

Program Credit/GPA Requirements

20 total quarter hours required
Minimum 3.000 GPA required

Construction Management, Graduate Certificate

Over the last two decades, construction in both the public and private sector has become increasingly complex, requiring construction and project managers to have a stronger skill base to be successful in acquiring and executing projects.

The Graduate Certificate in Construction Management is intended to serve owners' representatives, consulting engineers, architects, design engineers, contractors, and subcontractors. Individuals who have a bachelor's degree, but not necessarily in construction, and who have been identified by their companies as having high potential for advancement are also good candidates for this program.

Courses from this certificate may be applied toward the Master of Science in Project Management.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
CMG 6400	Introduction to Construction Management	4
CMG 6402	Alternative Project Delivery Methods and Project Controls	4
CMG 6403	Safety, Project Risk, and Quality Management	4
CMG 6405	Construction Law	4

Program Credit/GPA Requirements

16 total quarter hours required
Minimum 3.000 GPA required

Cross-Cultural Communication, Graduate Certificate

The Graduate Certificate in Cross-Cultural Communication will help to equip professionals with the knowledge and competencies to:

- Analyze personal cross-cultural awareness and implicit bias, in addition to interpret organizational cross-cultural communication strategy to develop effective communication processes and activities
- Evaluate communication audiences from a holistic perspective, thereby constructing effective verbal and nonverbal interactions based on cross-cultural consumption
- Formulate enlightened cross-cultural communication and inclusive diversity strategies, processes, and policies
- Demonstrate critical thinking skills through research, case analysis, role-plays, and experiential learning demonstrating agility, quick response, and diplomacy employing cross-cultural communication strategies

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
CMN 6085	Strategies for Cross-Cultural Facilitation and Negotiation	3

CMN 6095	Foundations of Developing Cultural Awareness	3

Elective Courses

Code	Title	Hours
Choose from the following:		10
CMN 6096	Cultural Communications Lab	
GST 6100	Globalization and Global Politics and Economics	
GST 6101	Global Literacy, Culture, and Community	
HRM 6070	Global Human Resources Management	
INT 6900	International Field Study Experience	
ITC 6045	Information Technology Policy, Ethics, and Social Responsibility	
LDR 6145	Developing Sustainable Global Leadership	
NPM 6230	Measuring Social Impact	
PBR 6100	Introduction to Public Relations	

Program Credit/GPA Requirements

16 total quarter hours required
Minimum 3.000 GPA required

Digital Media Management, Graduate Certificate

The digital media market space can present unexpected challenges to standard business models. The Graduate Certificate in Digital Media Management offers courses designed to help managers apply best business practices to these nontraditional challenges. Students are offered the opportunity to gain skills in managing functionally diverse digital media teams, responding effectively to response-critical projects, and implementing marketing strategy in a variety of media channels.

Courses in the program were selected by faculty from the College of Professional Studies' Master of Professional Studies in Digital Media. The certificate consists of courses selected from the MPS in Digital Media (p. 383) curriculum.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
DGM 6279	Project Management for Digital Media	4
DGM 6280	Managing for Digital Media	4
DGM 6285	Interactive Marketing Fundamentals	4
Complete one of the following:		4
DGM 6230	Digital Media Entrepreneurship	
DGM 6290	Social Media and Brand Strategy Implementation	

Program Credit/GPA Requirements

16 total quarter hours required
Minimum 3.000 GPA required

Digital Video, Graduate Certificate

With the quality and ease of use of digital video camcorders, anyone can capture moving images, but the result is like a Stradivarius violin: It takes training to make music. The Graduate Certificate in Digital Video is a hands-on introduction to digital video technologies, as well as an examination of the social, cultural, and political implications of moving-image production in the digital age. Students have an opportunity to gain competency in digital production and postproduction while exploring various formal, conceptual, and structural strategies. Students will also have an opportunity to learn to generate digital video that communicates effectively and inventively, in preparation for positions in the creative industries of gaming, design, and media production.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
DGM 6435	Digital Video Production	4
DGM 6440	Editing in the Digital Studio	4
DGM 6506	Introduction to Digital Video	2
DGM 6540	Compositing	4
Complete one of the following:		2
DGM 6515	Introduction to After Effects	
DGM 6516	Virtual and Augmented Reality (VR/AR)	

Electives

Code	Title	Hours
Complete one of the following:		4
DGM 6430	Screenwriting: Linear and Interactive	
DGM 6520	Lighting for the Camera	
DGM 6545	Documentary and Nonfiction Production	

Program Credit/GPA Requirements

20 total quarter hours required
Minimum 3.000 GPA required

Emergency Management, Graduate Certificate

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
HLS 6060	Strategic Planning and Budgeting	3
HLS 6070	Emergency Management and Geographic Information Systems	3
HLS 6080	Continuity of Operations and Planning	3
HLS 6150	Essentials of Emergency Management	3
HLS 6155	Critical Infrastructure, Security, and Emergency Management	3
HLS 6160	Advanced Emergency Management	3
HLS 6170	Emergency Management Capstone	3

Program Credit/GPA Requirements

21 total quarter hours required
Minimum 3.000 GPA required

eSports, Graduate Certificate

Overview

Students will have the opportunity to take specialized courses that focus on the emerging eSports field. The certificate is designed for professionals in sports leadership careers who want to have a deeper understanding of eSports. It also provides a pathway to prepare sports and gaming enthusiasts with a combination of coursework across graduate programs to confidently enter this emerging sports sector. This is in keeping with the commitment to serve diverse students who may want to explore a nontraditional learning path as they consider a new career or wish to continue career development in synch with changes occurring in the profession around them.

Credits earned in this certificate may be used to satisfy some of the degree requirements of the Master of Sports Leadership program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
CMN 6040	Consumer Behaviors in the Online Environment	3
DGM 6400	Game Design Fundamentals	4
DGM 6516	Virtual and Augmented Reality (VR/AR)	2
LDR 6323	Event Management	3
LDR 6445	Corporate Sponsorships	3
LDR 6480	The Business of eSports	3

Program Credit/GPA Requirements

18 total quarter hours required
Minimum 3.000 GPA required

Experiential Teaching and Learning, Graduate Certificate

Experiential learning has been documented to be an effective pedagogy for promoting deeper learning, fostering student engagement, and ultimately closing the opportunity gap for underserved students. However, many educators and educational leaders are not familiar with best-practice strategies for leading, practicing, and researching experiential learning in their classrooms and therefore need themselves to become adult learners to begin the process of pedagogical transformation.

The Graduate Certificate in Experiential Teaching and Learning is designed to provide K–12 experiential educators with the knowledge, skills, and attitudes needed to design, facilitate, research, and lead engaging and meaningful learning experiences. The program explores the theoretical foundations, approaches, and strategies for learning through experience and how to apply these competencies with a commitment toward fostering educational equity.

Classroom teachers who are interested in transforming their practice as well as educators who are interested in seeking out leadership roles within schools will benefit from earning the Graduate Certificate in Experiential Teaching and Learning as the certificate covers content and skills needed for leading both student and adult experiential learning.

The certificate is comprised of 16 quarter hours, which may be applied toward the Master of Education in Learning and Instruction.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
EDU 6001	Experiential Learning Theory and Practice	4
EDU 6002	Culturally Responsive Experiential Teaching and Learning	4
EDU 6003	Applied Research in Experiential Teaching and Learning	4
EDU 6004	Leading Experiential Teaching and Learning	4

Program Credit/GPA Requirements

16 total quarter hours required
Minimum 3.000 GPA required

Financial Markets and Institutions, Graduate Certificate

In this rapidly changing business environment, the barriers between institutions are eroding, and competition is increasing due to deregulation and new product development. Managing internal operations more efficiently and adapting to the changing external environment is critical to the long-term survival of institutions. The Graduate Certificate in Financial Markets and Institutions seeks to prepare students to measure the impact of accounting decisions on performance; to manage risks, assets, and liabilities to meet corporate goals; to understand domestic and international financial systems and the institutions within them; and to build financial relationships that foster marketing financial products.

An examination of financial services industry principles and practices seeks to provide individuals working in brokerage houses, investment or commercial banks, insurance companies, or real estate with a greater understanding of financial systems as well as how to manage risks, assets, and liabilities in meeting corporate goals.

Note: Courses from this certificate may not be applied toward the Master of Science in Leadership.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
FIN 6101	Accounting Fundamentals for Financial Institutions	4
FIN 6161	Investment Analysis	4
FIN 6102	Asset and Liability Management	4
FIN 6120	Building Financial Relationships	4

Program Credit/GPA Requirements

16 total quarter hours required

Minimum 3.000 GPA required

Forensic Accounting, Graduate Certificate

News surrounding corporate corruption has had a significant impact on businesses, particularly the accounting industry. In response, the government has enacted sweeping accounting and business laws such as the Sarbanes-Oxley 2002 legislation. Additionally, many professional organizations, including the American Institute of Certified Public Accountants (AICPA) and the Association of Certified Fraud Examiners (ACFE), have made the prevention, detection, and prosecution of fraud and accounting abuse a priority.

This **four-course graduate certificate in forensic accounting** is designed to help students apply techniques in identifying, collecting, and examining evidence, including how to identify financial statement misrepresentation, transaction reconstruction, and tax evasion.

Note: Courses from this certificate may not be applied toward the Master of Science in Leadership.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Courses should be taken in the following sequence:

Code	Title	Hours
ACC 6210	Forensic Accounting Principles	4
ACC 6220	Dissecting Financial Statements	4
ACC 6230	Investigative Accounting and Fraud Examination	4
ACC 6240	Litigation Support	4

Program Credit/GPA Requirements

16 total quarter hours required
Minimum 3.000 GPA required

Fundraising and Development, Graduate Certificate

This Graduate Certificate in Fundraising and Development is designed to prepare students for a career in fundraising and development roles, or provide a transition for a more comprehensive curriculum within the Master of Science in Nonprofit Management. The certificate seeks to provide expert-level skills to students who want to gain experience with the fundraising and development fields using current industry tools and techniques through a student-centered curriculum. Courses are designed to provide a solid foundation of knowledge on fundraising and development, which are areas in the nonprofit field experiencing growth and increased career opportunities.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
NPM 6130	Fundraising and Development for Nonprofit Organizations	3
NPM 6140	Grant and Report Writing	3
NPM 6220	Donor Research and Management	3
NPM 6230	Measuring Social Impact	3
NPM 6240	Managing the Annual Fund	3

Elective Courses

Code	Title	Hours
Choose from the following:		1
CMN 6096	Cultural Communications Lab	
INT 6940	Experiential Learning Projects for Professionals	
INT 6000	Writing Lab	
NPM 6100	Strategic Management for the Nonprofit Sector	
NPM 6210	Social Value Investing and Effective Partnerships	
NPM 6995	Project	
PBR 6001	Communications Technology Lab	

Program Credit/GPA Requirements

16 total quarter hours required
Minimum 3.000 GPA required

Game Design, Graduate Certificate

Game design is one of the fastest-growing fields in entertainment, business, and education. From healthcare to political science, companies use games to educate their constituents and enhance employee skills.

The Graduate Certificate in Game Design offers a practice-oriented approach to the art and science of game making. The program emphasizes visual design and programming for video games and fosters conceptual understanding of the principles of game design for all varieties of games—from educational board games to iPhone games.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
DGM 6308	Intermediate Programming for Digital Media	4
DGM 6400	Game Design Fundamentals	4
DGM 6403	Game Engine Fundamentals	4
DGM 6405	Game Development	4
DGM 6410	Game Design Technology Lab	4

Program Credit/GPA Requirements

20 total quarter hours required
Minimum 3.000 GPA required

Geographic Information Systems, Graduate Certificate

A geographic information system (GIS) combines layers of data to give needed information on specific locations. Such a system can map environmental sensitivities or geological features or can report on how best to speed emergency personnel to an accident or crime scene. Current fields using GIS include healthcare, public safety, environmental

management, transportation and operations technology, real estate, and public utilities.

The Graduate Certificate in Geographic Information Systems program offers hands-on training, seeking to give students the necessary skills and understanding to apply GIS competently and effectively. As a result of the certificate curriculum, students should be well versed in GIS theory, have practical hands-on exposure to GIS software and hardware, understand the representation of data in both mapped and tabular forms, and know how to plan and construct spatial databases.

The courses in this certificate program may be applied to the Master of Professional Studies in Geographic Information Technology.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
GIS 5103	Foundations of Geographic Information Science	4
RMS 5105	Fundamentals of Remote Sensing	3
GIS 5201	Advanced Spatial Analysis	3

Electives

Code	Title	Hours
Complete two of the following:		6
ITC 6480	Amazon Web Service (AWS) Cloud Architecting	
GIS 6320	Use and Applications of Free and Open-Source GIS Desktop Software	
GIS 6330	Building Geospatial Systems at Scale	
GIS 6340	GIS Customization	
GIS 6345	Geospatial Programming	
GIS 6350	Planning a GIS Implementation	
GIS 6360	Spatial Databases	
GIS 6370	Internet-Based GIS	
GIS 6385	GIS/Cartography	
GIS 6983	Topics	
RMS 6293	Allied Technologies in Remote Sensing	

Program Credit/GPA Requirements

16 total quarter hours required
Minimum 3.000 GPA required

Global Studies and International Relations, Graduate Certificate

The Graduate Certificate in Global Studies and International Relations is designed to provide students with the skills and training necessary to analyze, research, and evaluate a topic of interest in a global location. Overall, the program curriculum focuses on the themes of transition and development in the global world. Core courses provide a base of knowledge about global issues and are combined with an elective that allows students to focus on a specific area of interest.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
GST 6100	Globalization and Global Politics and Economics	4
GST 6101	Global Literacy, Culture, and Community	4
GST 6320	Peace and Conflict	4

Elective

Code	Title	Hours
Complete one of the following:		4
GST 6501	Regional Studies: East Asia	
GST 6502	Regional Studies: Middle East and North Africa	
GST 6503	Regional Studies: Sub-Saharan Africa	
GST 6504	Regional Studies: Europe and Eurasia	
GST 6505	Regional Studies: Southwest and Central Asia	
GST 6506	Regional Studies: Latin America	

Program Credit/GPA Requirements

16 total quarter hours required
Minimum 3.000 GPA required

Health Management, Graduate Certificate

Projections for the healthcare industry state that job growth will remain above average into the next decade. The needs of an aging population along with the increased human life cycle are just some of the factors contributing to this growth.

The Graduate Certificate in Health Management examines the financial, political, legal, and operational aspects of a healthcare facility and explores the evolution of healthcare delivery in the United States.

Health managers are found in different roles across healthcare organizations including:

- Strategic planning
- Operations
- Human resources
- Fund-raising
- Purchasing

Health managers are responsible for designing, administering, managing, and evaluating health policies, programs, and services. The courses in this certificate also serve as a concentration in the Master of Science in Leadership program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
HMG 6110	Organization, Administration, Financing, and History of Healthcare	3
HMG 6120	Human Resource Management in Healthcare	3

NPM 6120	Financial Management for Nonprofit Organizations	3
HMG 6130	Healthcare Strategic Management	3

Elective Courses

Code	Title	Hours
Complete two of the following (minimum of 6 quarter hours):		6
NPM 6110	Legal and Governance Issues in Nonprofit Organizations	
NPM 6150	Human Resources Management in Nonprofit Organizations	
HMG 6140	Principles of Population-Based Management	
HMG 6160	Healthcare Information Systems Management	
HMG 6170	Health Law, Politics, and Policy	
HRM 6020	Talent Acquisition and Onboarding	

Program Credit/GPA Requirements

18 total quarter hours required
Minimum 3.000 GPA required

Higher Education Administration, Graduate Certificate

Institutions of higher education around the world are facing considerable pressures that range from changing demographics to financial strain amid disruptions unimaginable 20 years ago. Administrators must develop foundational skills to create conditions that allow their students and institutions to thrive in a constantly changing world. The Graduate Certificate in Higher Education Administration is designed to prepare practitioners for the unique and difficult challenges facing the next generation of higher education professionals. This program allows students the flexibility to build upon their skills in a customized manner with a focus on practical skills and course designs firmly grounded in experiential learning.

The Graduate Certificate in Higher Education Administration program seeks to prepare students with the knowledge to understand the structure, governance, and operation of various higher education organizations. Within the context of classes, students have an opportunity to develop solutions to real-world problems.

Unique Features

- The ability to complete the program 100 percent while accessing and contributing to an extensive professional network—critical in the world of higher education.
- Northeastern faculty who are currently meaningfully engaged in the field, bringing their practical expertise to our students.
- The integration of experiential projects within several courses allowing students to develop practical skills.
- Credits can be applied toward the Master of Education, Higher Education Administration (p. 380) program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Core Courses

Code	Title	Hours
EDU 6202	Faculty, Curriculum, and Academic Community	4
EDU 6205	The Demographics of the New College Student	4
EDU 6219	Higher Education Law and Policy	4

Elective

Code	Title	Hours
Complete one of the following:		4
EDU 6217	The History of Colleges and Universities	
EDU 6218	Money Matters: Financial Management in Higher Education	
EDU 6224	Strategic Leadership in Enrollment Management	
EDU 6234	Program Evaluation, Assessment, and Accreditation in Higher Education	

Program Credit/GPA Requirements

16 total quarter hours required
Minimum 3.000 GPA required

Human-Centered Informatics, Graduate Certificate

Human-centered informatics (HCI) focuses on the design, development, and evaluation of IT systems with a particular emphasis on the relations and interactions between people and IT systems. The emphasis of understanding users experience when they interact with technology in the information-rich environment and the design of interfaces between users and systems makes it different from the focus of software engineering programs or visual and artistic design programs.

The human-centered informatics graduate certificate offers students the opportunity to learn the theories of cognitive and social psychology as well as universal principles of design adopted in human-computer interaction. Students develop the technical skills to study user experience in various IT environments (home, business, social media, healthcare, etc.), focusing on user needs, information architecture, and design of user interfaces. Successful students that graduate with the HCI graduate certificate will be able to propose innovative or improve design solutions to real-world problems.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Required Courses		
ITC 6410	Fundamentals of Human Behaviors for Interactive Systems	3
DGM 6461	Interactive Information Design 1	4
DGM 6168	Usability and Human Interaction	4
DGM 6268	Usable Design for Mobile Digital Media	4
Elective		
Complete one of the following:		3-4
DGM 6463	Interactive Information Design 2	

ALY 6070	Communication and Visualization for Data Analytics
ITC 6355	Web Application Design and Development

Program Credit/GPA Requirements

18 total quarter hours required
Minimum 3.000 GPA required

Human Resources Management, Graduate Certificate

In today's multifaceted organizations, human resource professionals must respond to the growing challenges of regulatory compliance, complex benefit plans, and training and motivating employees.

The Graduate Certificate in Human Resources Management seeks to foster a deep understanding of organizational development and effective change management, workforce planning and strategic recruitment, and training and performance management.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
HRM 6015	Introduction to Human Resources Management [1]	3
HRM 6025	Workforce Analytics	3
HRM 6042	Strategic Workforce Planning	3

[1] This course is for students with less than two years of human resources experience. Students who do not complete this course take electives to satisfy required program credits.

Electives

Code	Title	Hours
Complete seven quarters hours of the following:		7
CMN 6096	Cultural Communications Lab	
HRM 6005	Creating a High-Performance Organization: Strategic Organizational and HRM Choices	
HRM 6010	Compensation and Benefits	
HRM 6020	Talent Acquisition and Onboarding	
HRM 6030	The Employment Contract	
HRM 6035	Digital Human Resources Platforms	
HRM 6047	Managing the Employee Life Cycle	
HRM 6050	Employee Engagement	
HRM 6060	Organizational Design	
HRM 6070	Global Human Resources Management	

Program Credit/GPA Requirements

16 total quarter hours required
Minimum 3.000 GPA required

Information Security Management, Graduate Certificate

Information security is a management issue with global business implications. To succeed in today's network economy requires more than simply a focus on information technology (IT) issues. Succeeding also requires a focus on security strategy and management. IT security governance is an overarching consideration in all risk-assessment and management-related endeavors and is important for information security since many issues have legal, regulatory, policy, and ethical considerations. The associated risks of business today must be clearly understood and managed.

The Graduate Certificate in Information Security Management is designed to provide a conceptual and practical overview of information security management. It begins with an overview of key information security management issues and principles. It presents security governance challenges including the policy, law, regulatory, and ethical accountability frameworks that information security risk managers must work within. The program includes review courses that prepare students for the Certified Information Systems Security Professional (CISSP) and Certified Information Systems Auditor (CISA) exams.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
ITC 6300	Foundations of Information Security	3
ITC 6305	IT Infrastructure (Systems, Networks, Telecom)	3
ITC 6310	Information Security Governance	3
ITC 6315	Information Security Risk Management	3
ITC 6520	Network Protection and Cloud Security	3

Electives

Code	Title	Hours
Complete one of the following:		3
ITC 6325	CISA Preparation	
ITC 6330	CISSP Preparation	
ITC 6530	Security Analytics	

Program Credit/GPA Requirements

18 total quarter hours required
Minimum 3.000 GPA required

Integrative Health and Wellness, Graduate Certificate

The Graduate Certificate in Integrative Health and Wellness is designed to equip students to apply cross-disciplinary approaches to patient or client health and wellness. Students explore how to interact with diverse patients or clients within a variety of settings and how to utilize a holistic model for patient care by incorporating strengths-based perspective, cross-cultural communication, resilience, advocacy, and problem solving. This certificate equips emerging and current healthcare practitioners and professionals to apply integrative well-being principles toward a wide variety of approaches and practices that create cohesive and holistic assessments and intervention plans for those they serve. Students have an oppoprtunity to learn how to advocate for access and navigate the wide variety of care options that are available, while considering social determinants of health, patient's cultural and economic belief systems, social and mental supports, and the potential appropriate interventions. Students will work side-by-side with a multidisciplinary array of practitioners to develop the needed assessment and intervention

skills to excel within the wide range of roles and applications available across integrative healthcare in our global 21st-century delivery system.

The mission of the Graduate Certificate in Integrative Health and Wellness at Northeastern University is to cultivate diverse practitioners who can use innovative assessments and resource identification tools to coordinate holistic patient care. Here, we train health practitioners and professionals on how to be agile learners, thinkers, and creators in integrative health, wellness, and resilience

Program Requirements

CURRICULUM

Core Curriculum (16 credits)

Code	Title	Hours
NTR 6105	Foundations of Integrative Health	4
NTR 6125	The Process of Health and Healing: Exploring Systems in the Body—Part 1	4
NTR 6135	The Process of Health and Healing: Exploring Systems in the Body—Part 2	4
NTR 6160	Survey of Integrative Practices and Interventions	4

Experiential Capstone (2–4 credits)

Code	Title	Hours
NTR 7880	Wellness in Practice	2-4

Interactive Design, Graduate Certificate

Digital media plays an increasingly significant role in the global culture and economy. The Graduate Certificate in Interactive Design offers an overview of courses in the creative process of storytelling and communicating through visuals and sound. Students have an opportunity to gain expertise in time-based design and interface and experience design through a practice-oriented problem-solving approach.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
DGM 6217	Typography for Interactivity	4
DGM 6317	Screen-Based Publication Design	4
DGM 6461	Interactive Information Design 1	4

Elective Courses

Code	Title	Hours
Choose from the following:		4
DGM 6463	Interactive Information Design 2	
DGM 6471	Designing Infographics	

Program Credit/GPA Requirements

16 total quarter hours required
Minimum 3.000 GPA required

International Biopharmaceutical Regulatory Affairs, Graduate Certificate

To work in today's global biopharmaceutical industry, there is a strong need to understand international regulations that impact the development, marketing, and manufacturing of pharmaceutical and biotechnology products.

The Graduate Certificate in Biopharmaceutical International Regulatory Affairs curriculum focuses on factors that facilitate the safety, performance, and efficacy of biomedical goods. Program training covers the assessment of international regulations and interpretation of their likely impact on a company's global commercialization strategies. Through participation in the program, students will have an opportunity to gain an understanding of international regulatory requirements necessary to implement such strategies.

Course work covers biotechnology and pharmaceutical product approval processes, regulatory analysis, and liability laws as they exist across different regulatory systems. The graduate certificate will provide core regulatory knowledge to students entering into the field from bench research, clinical studies, quality control/assurance, pharmacy, bioengineering, business, and legal analysis. The curriculum covers regulatory environments in Europe, Latin America, Australia, Japan, and other emerging economies. Courses from this certificate may be applied toward the Master of Science in Regulatory Affairs for Drugs, Biologics, and Medical Devices.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
RGA 6221	European Union Compliance Process and Regulatory Affairs	4
RGA 6241	Working in Multicultural Environments: Challenges and Opportunities	2
Complete a minimum of 10 quarter hours		10
RGA 6204	Legal Issues in International Food, Drug, and Medical Device Regulation	
RGA 6207	Global Impact of Electronic Common Technical Document (eCTD) Submissions	
RGA 6210	Strategic Planning and Project Management for Regulatory Affairs	
RGA 6212	Introduction to Safety Sciences	
RGA 6223	Introduction to Australian, Asian, and Latin American Regulatory Affairs	
RGA 6224	Regulation of Biomedical Product Commercialization by Health Canada	
RGA 6244	Therapeutic Product Development in Canada	
RGA 6245	Regulation of Generic Pharmaceutical and Biosimilar Products	
RGA 6249	Chinese Food and Drug Administration Regulation of Biomedical Product Commercialization	
RGA 6255	Global Convergence of Regulatory Science and Reimbursement/Market Access	

Program Credit/GPA Requirements

16 total quarter hours required
Minimum 3.000 GPA required

Leadership, Graduate Certificate

Today's cross-functional teams and organizations require a leadership style that capitalizes on the collective expertise and capabilities of the group. The development and mastery of collaborative leadership skills are not typically part of one's focused discipline preparation; hence, leadership requires deliberate development by those who assume leadership roles.

The Graduate Certificate in Leadership starts with the premise that everyone is capable of leadership. The program studies every aspect of leadership dynamics from the leader as an individual to working in teams and from the organization itself to the development of strategic leadership techniques. Course work exposes participants to a series of alternative perspectives of leadership, including collaborative models. Using the course's action-learning methods, participants build a personal model of leadership that they can put to immediate use in their workplace.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
LDR 6100	Developing Your Leadership Capability	3
LDR 6110	Leading Teams Strategically in a Global Environment	3
LDR 6120	Developing Organizational Success through Leadership Development	3
LDR 6140	Leadership Strategy, Design, and Practice	3

Leadership Electives

Code	Title	Hours
Complete two of the following:		6
LDR 6135	Ethical Leadership	
HRM 6005	Creating a High-Performance Organization: Strategic Organizational and HRM Choices	
LDR 6150	Innovation and Organizational Transformation	
CMN 6010	Strategic Communication Management	

Program Credit/GPA Requirements

18 total quarter hours required
Minimum 3.000 GPA required

Leading and Managing Technical Projects, Graduate Certificate

Whether you're an established project manager, or you're working in a technical field and aspire to be one, Northeastern's Graduate Certificate in Leading and Managing Technical Projects seeks to give you the foundational skills and practical knowledge you need to be successful.

Through courses you take online, our technical project management curriculum will give you the opportunity to:

- Develop the leadership and management skills to lead technical projects
- Learn how to communicate technical content to a nontechnical audience
- Gain practice leading remote teams, including global teams
- Plan and schedule projects using the most current and relevant methodologies
- Develop a personal leadership approach to motivate and inspire others

Credits earned in this certificate may be used to satisfy some of the degree requirements of a College of Professional Studies master's program. For further information, see the Seeking More Than One Certificate or Degree page.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
PJM 5900	Foundations of Project Management [1]	4
PJM 6205	Leading and Managing Technical Projects	3
PJM 6210	Communication Skills for Project Managers	3
PJM 6215	Leading Remote Project Teams	3
PJM 6810	Principles of Agile Project Management	3

[1] Foundations of Project Management (PJM 5900) is for students with less than three years of experience directing or leading project tasks and is recommended for students who do not have a basic working knowledge of Microsoft Project software. Students who do not complete Foundations of Project Management (PJM 5900) take project management electives to satisfy required program credits.

Elective Courses

Code	Title	Hours
INT 6940	Experiential Learning Projects for Professionals	
INT 6943	Integrative Experiential Learning	
PJM 6075	Project Finance	
PJM 6125	Project Evaluation and Assessment	
PJM 6140	Managing Troubled Projects	
PJM 6145	Global Project Management	
PJM 6175	Project Resource Management	
PJM 6180	Project Stakeholder Management	
PJM 6205	Leading and Managing Technical Projects	
PJM 6210	Communication Skills for Project Managers	
PJM 6215	Leading Remote Project Teams	
PJM 6710	Introduction to Program and Portfolio Management	
PJM 6983	Topics	

Program Credit/GPA Requirements

16 total quarter hours required
Minimum 3.000 GPA required

Learning Experience Design and Technology, Graduate Certificate

The Graduate Certificate in Learning Experience Design and Technology offers a practice-based exploration of the key skills required in the rapidly expanding field of learning design. Never before has the need for professionals with LXD expertise been so essential across all industry sectors. The certificate is designed to meet this need by grounding designers, educators, technologists, and other professionals in the art and science of effective learning design. Students will have the opportunity to build or strengthen design and technological skills that can be applied across PK–12, higher education, government, military, corporate, and nonprofit environments. Skills can be applied to learners of all ages and in online, mobile, virtual, face-to-face, and blended formats.

The program's innovative approach blends academic and workplace-based learning with a focus on how people learn, foundational learning design skills, and advanced learning design topics. Experiential opportunities are built into each course. Students will have the opportunity to develop an online portfolio of work to demonstrate their capacity to think strategically; put creative ideas into action using a variety of technologies; learning design environments that meet academic, personal, professional, and organizational goals; and interpret and clearly communicate results to stakeholders. Credits earned in this certificate may be used to satisfy some of the degree requirements of the Master of Professional Studies in Learning Experience Design and Technology program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
Core Requirements		
EDU 6319	How People Learn	4
EDU 6334	Foundations of Learning Experience Design	4
EDU 6335	Advanced Practices in Learning Experience Design	4
EDU 6323	Technology as a Medium for Learning	4

Program Credit/GPA Requirements

16 total quarter hours required
Minimum 3.000 GPA required

Medical Device Regulatory Affairs, Graduate Certificate

The national and regional medical device industries have continued to experience significant market growth, despite the fluctuations in the overall global economy. There are more than 7,000 medical device companies in the United States alone, and nearly 1,000 of these are based in Massachusetts. In total, the medical device sector in Massachusetts employs 36,000 workers, has a payroll of over $1.8 billion, and annual product shipments of $7.3 billion.

The Graduate Certificate in Medical Device Regulatory Affairs provides students with an opportunity to gain a detailed knowledge of the regulations influencing the commercialization of new and existing medical devices. The intensely practical curriculum spans the entire life cycle of product development and introduces students to the salient features governing both pre- and postapproval stages. The program content also examines the relationship between regulatory agencies and the medical device industry. Students have the opportunity to take specialized courses on regulatory systems outside the United States.

The certificate will help advance the careers of students coming from such fields as bioengineering, quality control/assurance, intellectual property, business, and marketing. The choice of several courses makes this certificate ideal for students already working in the regulatory world as well as those just entering into the profession.

Courses from this certificate may be applied toward the Master of Science in Regulatory Affairs.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirement

Code	Title	Hours
Required Courses		
RGA 6001	Introduction to Food and Drug Administration (FDA) Medical Device Regulation	2
RGA 6202	Medical Device Development: A Regulatory Overview	4
RGA 6233	Application of Quality System Regulation in Medical Device Design and Manufacturing	4
Electives		
Choose from the following:		6
RGA 6205	Emerging Trends and Issues in the Medical Device Industry	
RGA 6222	European Medical Device Regulations	
RGA 6243	Medical Device Product Development in Canada	
RGA 6275	Product Development and Process Validation	
RGA 6370	Advanced Regulatory Writing: Medical Device Submissions	

Program Credit/GPA Requirements

16 total quarter hours required
Minimum 3.000 GPA required

Nonclinical Biomedical Product Regulation, Graduate Certificate

The professional practice of nonclinical regulatory affairs involves understanding, developing, and applying global compliance standards to the biomedical product commercialization process in several cross-functional areas that are separate and distinct from direct clinical patient care. This includes, but is not limited to, design and preclinical development processes, including *in vitro* and *in vivo* animal testing, *in silico* testing, small-scale/large-scale manufacturing process development and validation, development and maintenance of supply chains, as well as product handling and distribution. The Graduate Certificate in Nonclinical Biomedical Product Regulation introduces students to the practice of understanding, developing, and effectively applying global nonclinical compliance standards to new healthcare

technologies. Students in the certificate program have the opportunity to:

- Differentiate between the nonclinical vs. clinical aspects of the global biomedical product commercialization process from a regulatory compliance perspective
- Explain the compliance-associated requirements needed to successfully practice professional nonclinical work within the global biomedical products industry
- Describe the nonclinical regulatory standards utilized by the United States Food and Drug Administration (FDA) and other global regulatory agencies to evaluate the safety and efficacy of new and existing biomedical products employed by healthcare practitioners in various patient settings
- Apply fundamental global nonclinical regulations to the biomedical product commercialization process, including therapy design, manufacturing process development and validation, cybersecurity, and supply chain risk management

Students that successfully complete this certificate may apply their courses toward the Master of Science in Regulatory Affairs (p. 404).

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
RGA 6207	Global Impact of Electronic Common Technical Document (eCTD) Submissions	4
RGA 6233	Application of Quality System Regulation in Medical Device Design and Manufacturing	4
RGA 6405	Nonclinical Regulations in Biomedical Product Commercialization	4
Complete one of the following:		4
RGA 6385	Operational Aspects of Electronic Common Technical Document (eCTD) Submissions	
RGA 6420	Global IVD Regulations and Submissions	

Program Credit/GPA Requirements

16 total quarter hours required
Minimum 3.000 GPA required

Nonprofit Management, Graduate Certificate

Nonprofits today simply require a higher level of management expertise. Nonprofit managers are required to manage people and programs more efficiently and effectively. The Graduate Certificate in Nonprofit Management focuses on developing skills in organizational management, financial management, fund-raising, grant and report writing, human resources management, and governance.

The program integrates theoretical approaches with practical application to prepare students for positions in either small or large nonprofit organizations. The program targets individuals who work in the nonprofit sector as executive directors, managers, program staff, board members, and volunteers. Students have an opportunity to participate in case studies, individual and group projects, and class discussions.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
NPM 6110	Legal and Governance Issues in Nonprofit Organizations	3
NPM 6120	Financial Management for Nonprofit Organizations	3
NPM 6125	Promoting Nonprofit Organizations	3
NPM 6130	Fundraising and Development for Nonprofit Organizations	3
NPM 6150	Human Resources Management in Nonprofit Organizations	3

Electives

Code	Title	Hours
Choose from the following:		1
CMN 6096	Cultural Communications Lab	
INT 6940	Experiential Learning Projects for Professionals	
INT 6000	Writing Lab	
NPM 6100	Strategic Management for the Nonprofit Sector	
NPM 6140	Grant and Report Writing	
NPM 6995	Project	
PBR 6001	Communications Technology Lab	

Program Credit/GPA Requirements

16 total quarter hours required
Minimum 3.000 GPA required

Organizational Communication, Graduate Certificate

The study of organizational communication focuses on the dynamics of communication in complex organizations for the purpose of learning how individuals within such organizations can become effective communicators. Whether the context of such communication is meetings or professional presentations, communicating during a crisis, or intercultural exchanges, the message is consistent: Effective communication is a crucial factor in determining organizational success.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
CMN 6010	Strategic Communication Management	3
CMN 6020	Ethical Issues in Organizational Communication	3
CMN 6910	Organizational Communication Assessment	3

Elective Courses

Code	Title	Hours
Choose from the following:		7
CMN 6080	Intercultural Communication	
CMN 6090	Organizational Culture, Climate, and Communication	
CMN 6096	Cultural Communications Lab	
CMN 6100	Communication Networks and Managing Information	
PBR 6001	Communications Technology Lab	

Program Credit/GPA Requirements

16 total quarter hours required
Minimum 3.000 GPA required

Port Security, Graduate Certificate

The Graduate Certificate in Port Security examines U.S. and international policy, laws, and regulations for maritime and aviation security in light of current security challenges, terrorism and transnational criminal threats, and the potential U.S. and global impact of maritime and aviation security failures. Emergency response and recovery mechanisms and implementation as well as organizations and associations critical to modern U.S. maritime and aviation port security infrastructure protection will be evaluated and exercised.

The certificate offers leaders an opportunity to evaluate maritime and aviation security risks, threats, and measures to mitigate within applicable U.S. and international policy, assess and implement response and planning mechanisms for maritime transportation system security and aviation and airport security requirements, and conduct real-world actionable planning and strategy development for maritime and aviation security response and crisis management, among other essential skills for senior leaders.

This certificate is ideal for homeland security professionals and industry leaders responsible for maritime and aviation port security, incident management and response, and the planning and execution of maritime and aviation operations within today's security challenges.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
HLS 6100	Maritime Port Security 1	4
HLS 6110		4
HLS 6120	Aviation Security 1	4
HLS 6130		4
HLS 6140		4

Program Credit/GPA Requirements

20 total quarter hours required
Minimum 3.000 GPA required

Professional Sports Administration, Graduate Certificate

The Graduate Certificate in Professional Sports Administration is designed to give students an in-depth understanding of this professional segment of the sports industry. Through the program's curriculum, students will be given the opportunity to acquire professional leadership skills and knowledge in a variety of topical areas including sports management, marketing, sponsorship, event management, risk management, and finance.

Credits earned in this certificate may be used to satisfy some of the degree requirements of the Master of Sports Leadership (p. 406) program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
LDR 6323	Event Management	3
LDR 6435	Fiscal Practices in Sports	3
LDR 6440	Sports Marketing and Promotions	3
LDR 6443	Ticket Sales and Strategies	3
LDR 6445	Corporate Sponsorships	3
LDR 6460	Risk Management in Athletics	3

Program Credit/GPA Requirements

18 total quarter hours required
Minimum 3.000 GPA required

Project Business Analysis, Graduate Certificate

At the heart of every project is requirements analysis. It's a critical skill set, leveraged across the spectrum of project work. This program provides practicing project managers with a solid framework and understanding of the process of developing requirements. It also emphasizes the need to engage stakeholders throughout the process to ensure outcomes meet the desired needs of the organization.

This graduate certificate allows you to possess an in-demand skill set. It gives you a better opportunity at finding entry-level positions as a PMO analyst or entry-level business analyst. And it prepares you with the knowledge, skills, and tools needed to create and manage requirements to meet stakeholder needs effectively.

In this program, you will:

- Develop a strong framework and understanding of the role of business analyst
- Understand and analyze the voice of the customer and explore potential solutions for their needs
- Apply tools and techniques to elicit requirements (business requirements, stakeholder requirements)
- Translate the needs of the business into clear, concise, quality requirements (solution requirements, functional and nonfunctional requirements)
- Apply analytical skills in the business analysis process
- Develop a personal leadership strategy for success as a business analyst

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
PJM 5900	Foundations of Project Management [1]	4
PJM 6610	Foundations of Project Business Analysis	3
PJM 6620	Project Business Analysis: Needs Assessment	3
PJM 6630	Project Business Analysis: Requirements Planning and Analysis	3
PJM 6640	Leadership Strategies for the Business Analyst	3

[1] PJM 5900 is for students with less than three years of experience directing or leading project tasks and is recommended for students who do not have a basic working knowledge of Microsoft Project software. Students who do not complete PJM5900 take project management electives to satisfy required program credits.

Elective Courses

Code	Title	Hours
INT 6940	Experiential Learning Projects for Professionals	
INT 6943	Integrative Experiential Learning	
PJM 6075	Project Finance	
PJM 6125	Project Evaluation and Assessment	
PJM 6140	Managing Troubled Projects	
PJM 6145	Global Project Management	
PJM 6175	Project Resource Management	
PJM 6180	Project Stakeholder Management	
PJM 6205	Leading and Managing Technical Projects	
PJM 6210	Communication Skills for Project Managers	
PJM 6215	Leading Remote Project Teams	
PJM 6983	Topics	

Program Credit/GPA Requirements

16 total quarter hours required
Minimum 3.000 GPA required

Project Management, Graduate Certificate

Technical and managerial employees at all levels of organizations are being asked to manage small and large projects. Many of these professionals have not been specifically trained to effectively and efficiently manage projects. The task of managing projects has its own body of knowledge. This program seeks to provide the practical and theoretical knowledge for which the Project Management Institute tests, and it is expected that individuals who successfully complete this program will be capable of fulfilling the education requirements of the Project Management Professional (PMP) certification exam.

This certificate program in project management is designed with sufficient course flexibility to accommodate professionals with various levels of project management experience. Project management principles are applicable to both manufacturing and service industries, including professionals in fields such as software engineering, construction management, and financial services.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
PJM 5900	Foundations of Project Management [1]	4
PJM 6005	Project Scope Management	3
PJM 6015	Project Risk Management	3
PJM 6025	Project Scheduling and Cost Planning	3

[1] Foundations of Project Management (PJM 5900) is for students with less than three years of experience directing or leading project tasks and is recommended for students who do not have a basic working knowledge of Microsoft Project software. Students who do not complete Foundations of Project Management (PJM 5900) take project management elective credits to satisfy required program credits.

Elective Courses

Code	Title	Hours
Choose from the following:		3
INT 6940	Experiential Learning Projects for Professionals	
INT 6943	Integrative Experiential Learning	
PJM 6075	Project Finance	
PJM 6125	Project Evaluation and Assessment	
PJM 6140	Managing Troubled Projects	
PJM 6145	Global Project Management	
PJM 6175	Project Resource Management	
PJM 6180	Project Stakeholder Management	
PJM 6205	Leading and Managing Technical Projects	
PJM 6210	Communication Skills for Project Managers	
PJM 6215	Leading Remote Project Teams	
PJM 6710	Introduction to Program and Portfolio Management	
PJM 6983	Topics	

Program Credit/GPA Requirements

16 quarter hours required
Minimum 3.000 GPA required

Public and Media Relations, Graduate Certificate

There is growing demand for communication professionals with digital media skills and a strategic perspective on brand and reputation management. According to the Bureau of Labor Statistics, employment of public relations specialists and managers will grow by 12 percent and 13 percent, respectively. The Graduate Certificate in Public and Media Relations is designed to prepare communication professionals who focus on external stakeholders for the challenges of a rapidly changing industry. This program focuses on developing strategic communication plans, crafting compelling messages, and performing audience research, while preparing students with the latest skills in digital platforms, tools, and techniques.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
PBR 6100	Introduction to Public Relations	3
PBR 6135	Public Relations Strategy and Planning	3
PBR 6710	Public Relations Research: Understanding External Audiences	3

Elective Courses

Code	Title	Hours
Complete 7 quarter hours from the following:		7
CMN 6025	Digital Era Skills: Platforms, Tools, and Techniques	
CMN 6045	Leveraging Digital Technologies: Strategy, Assessment, and Governance	
CMN 6050	Crisis Communication	
CMN 6075	Digital Marketing Analytics	
DGM 6290	Social Media and Brand Strategy Implementation	
DGM 6550	Search Engine Optimization: Strategy and Implementation	
PBR 6001	Communications Technology Lab	
PBR 6125	Community Relations and Corporate Social Responsibility	
PBR 6130	Public Relations Content Development	
PBR 6140	Advanced Public Relations Content Development	

Program Credit/GPA Requirements

16 total quarter hours required
Minimum 3.000 GPA required

Quality Assurance Compliance, Graduate Certificate

Global regulatory requirements and compliance standards for development, marketing approval, and clinical utilization of new biomedical products continue to evolve rapidly in today's dynamic healthcare environment. The professional practice of quality assurance involves ensuring compliance to appropriate industry-specific regulatory standards throughout a biomedical product's life cycle.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
Complete one of the following:		2-3
RGA 6000	Introduction to Food and Drug Administration (FDA) Pharmaceutical Regulation	
RGA 6001	Introduction to Food and Drug Administration (FDA) Medical Device Regulation	
RFA 6100	Introduction to Regulatory Affairs of Food and Food Industries	
Complete the following courses:		
RGA 6233	Application of Quality System Regulation in Medical Device Design and Manufacturing	4
RGA 6234	Risk Management: Compliance and Processes	4
RGA 6275	Product Development and Process Validation	2
Choose from the following to reach 16 quarter hours:		3-4
RGA 6221	European Union Compliance Process and Regulatory Affairs	
RGA 6410	Fundamentals of CMC Regulations and Methods	
RFA 6220	Food Safety and Surveillance: Concepts and Applications	

Program Credit/GPA Requirements

16 total quarter hours required
Minimum 3.000 GPA required

Remote Sensing, Graduate Certificate

Remote sensing is the measurement of information by a recording device that is not in physical contact with the object being measured. In practice, remote sensing is the utilization at a distance (as from aircraft, space shuttle, spacecraft, satellite, or ship) of any device for gathering information about the environment. The term remote sensing is most often applied to terrestrial and weather observations but can be applied to planetary environments and astronomy. Remote sensing is applicable to many other situations, including land-use change, pollution tracking, land-use and planning, transportation systems, and military observation.

The online Graduate Certificate in Remote Sensing aims to make education and training in remote sensing available to adult and professional students. The remote sensing certificate program seeks to produce students who are well versed in remote sensing theory, who have hands-on exposure to remote sensing software and hardware, and who have learned how to extract pertinent data from remotely sensed data sets. This six-course certificate program seeks to provide students with the necessary skills and understanding to apply remote sensing knowledge competently and effectively in a variety of areas.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Courses

Code	Title	Hours
RMS 5105	Fundamentals of Remote Sensing	3
RMS 6110	Introduction to Machine Learning for Image Data	3

Remote Sensing Electives

Code	Title	Hours
Complete four of the following:		12
GIS 6330	Building Geospatial Systems at Scale	
GIS 6345	Geospatial Programming	
ITC 6480	Amazon Web Service (AWS) Cloud Architecting	

RMS 6240	Introduction to Radar and LiDAR Remote Sensing
RMS 6280	Automated Feature Extraction for the Geospatial Professional
RMS 6290	Spectroscopic Image Analysis
RMS 6293	Allied Technologies in Remote Sensing
RMS 6983	Topics

Program Credit/GPA Requirements

18 total quarter hours required
Minimum 3.000 GPA required

Social Media for Organizational Performance, Graduate Certificate

In organizations, social media management and strategy development have become core skills required for communication professionals. According to WANTED Analytics, over 1.6 million working professionals utilize social media skills in jobs at the manager and executive level. The Graduate Certificate in Social Media for Organizational Performance focuses on strategic framework and the role digital media has in supporting organizational performance. The program integrates theory and practice, including experimenting with various tools and platforms and reflecting on lessons learned from active management and experimentation.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
CMN 6045	Leveraging Digital Technologies: Strategy, Assessment, and Governance	3
DGM 6285	Interactive Marketing Fundamentals [1]	4
DGM 6290	Social Media and Brand Strategy Implementation	4

Electives

Code	Title	Hours
Complete a minimum of five quarter hours from the following:		5
CMN 6040	Consumer Behaviors in the Online Environment	
CMN 6065	Implementation and Management of Social Media Channels and Online Communities	
CMN 6075	Digital Marketing Analytics	
CMN 6096	Cultural Communications Lab	
DGM 6168	Usability and Human Interaction	
DGM 6550	Search Engine Optimization: Strategy and Implementation [2]	
PBR 6001	Communications Technology Lab	

Program Credit/GPA Requirements

16 total quarter hours required
Minimum 3.000 GPA required

[1] Interactive Marketing Fundamentals (DGM 6285) is for students who do not have digital media marketing experience. Students who do not complete this course take additional elective credits to satisfy the required credits for the program. Students may also meet the requirement through prior learning assessment. Visit the Credit for Prior Learning (https://cps.northeastern.edu/academics/prior-learning-assessments/) page for more information.

[2] Contact your advisor to enroll in this course. Students who choose Search Engine Optimization: Strategy and Implementation (DGM 6550) are not required to complete its course prerequisites.

Usability, Graduate Certificate

The Graduate Certificate in Usability is a practical, in-demand, career-focused graduate certificate. The certificate stresses both a broad, theory-based introduction to the field, as well as the ability to choose from focused electives, with an emphasis on practical assignments. This certificate highlights the key skills and tools used by usability generalists, working in a broad variety of fields.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
DGM 6168	Usability and Human Interaction	4
DGM 6268	Usable Design for Mobile Digital Media	4
DGM 6461	Interactive Information Design 1	4
DGM 6525	Research Methods for Global User Experiences	4

Electives Courses

Code	Title	Hours
Complete 4 quarter hours from the following:		4
DGM 6308	Intermediate Programming for Digital Media	
DGM 6451	Web Development	
TCC 6110	Information Architecture	

Program Credit/GPA Requirements

20 total quarter hours required
Minimum 3.000 GPA required

College of Science

Website (http://www.northeastern.edu/cos/graduate/)

Hazel Sive, PhD, Dean
Brent Nelson, PhD, Senior Associate Dean, Academic Affairs
Jared R. Auclair, PhD, Associate Dean, Professional Programs and Graduate Affairs
Erin Cram, PhD, Associate Dean, Research
Oyinda Oyelaran, PhD, Associate Dean, Faculty Affairs
Randall Hughes, PhD, Associate Dean, Equity
Sam Inman, MBA, Associate Dean, Administration and Finance
Kevin Thompson, MPA, Associate Dean, Development
Lauren Machunis, MS, Assistant Dean, Undergraduate Advising and Enrollment Management

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617.373.5085
617.373.8583 (fax)
cos@northeastern.edu

Graduate Admissions and Student Services Office
617.373.4275
gradcos@northeastern.edu

The College of Science seeks to offer advanced students outstanding academics and real-world research experience through cutting-edge research opportunities that are both discipline-based and interdisciplinary. Our doctoral and master's degree programs in the physical sciences, life sciences, and mathematics seek to give students a deep understanding of emerging fields such as chemical biology, cognition and neuroscience, environmental and marine science, biochemistry, bioinformatics, biotechnology, nanoscience, and network science. Our programs are positioned at the forefront of discovery, invention, and innovation. We seek to prepare students and professionals to enter the scientific workforce serving the academic, government, or private sector.

Academic Policies and Procedures

Academic Appeals Policies

Northeastern University affirms that it is essential to provide an appeals mechanism to students who believe that they have been erroneously, capriciously, or otherwise unfairly treated. Information about the university appeals process and procedures can be found in the Graduate Catalog. (p. 23)

If a student feels that they have been the victim of harassment or of discrimination prohibited by law or by university policy, and that this constitutes a substantive basis for the appeal, they should consult with the Office for University Equity and Compliance (https://www.northeastern.edu/ouec/about/) as soon as they become aware of alleged prohibited harassment or discrimination, and they are not required to wait until a term grade or determination is received before seeking advice or redress. If the Office for University Equity and Compliance (https://www.northeastern.edu/ouec/about/) is advised of such alleged prohibited conduct as part of an academic appeal, the appeal shall first be pursued and investigated through the Office for University Equity and Compliance (https://www.northeastern.edu/ouec/about/). Following a resolution of the harassment/discrimination issues, any remaining academic issues will be addressed, at the request of the student, according to the academic appeals procedures.

Before invoking the appeals procedures, students are encouraged to speak informally to their instructors or academic advisors about any determination or grade about which they have questions. If students choose to pursue an appeal, the College of Science process is described in the appeals section that follows. The Graduate Curriculum Committee, which is comprised of program and department directors, serves as the Academic Appeals Committee for the College of Science.

Grade Appeals

If a graduate student wishes to dispute a grade in a course taught by a member of the College of Science faculty, the first step is for the student to discuss their concerns with the faculty member who taught the course to see if it is possible to reach agreement on the issue(s). If the student is not able to resolve his or her issues with the faculty member who taught the course, the student should work with the department/program director to attempt a department-level resolution.

If these informal attempts to resolve the issue fail, the student can enter the formal procedure at the college level.

The student should meet with the associate dean for research and graduate affairs who will attempt to resolve the issue by working with the instructor and the department/program. Contact Associate Director for Graduate Administration Melissa Rubock (m.rubock@northeastern.edu) to schedule the meeting. If it is not possible for the associate dean to resolve the issue with the department/program, the associate dean will determine whether or not there is just cause to convene the Graduate Curriculum Committee.

The decision to convene the Graduate Curriculum Committee will be based upon the following:

- The student sincerely attempted to resolve the complaint with the professor and the department/program.
- The complaint is substantive in nature (adjudication could affect student's course grade and/or academic record).
- The complaint has been brought forward in a timely manner.
  - The statement must be submitted no later than 28 calendar days from the day when the academic determination is made available to the student.
  - If a student wishes to dispute a grade in his or her final term, this must be done within 28 calendar days of degree conferral date.

If the associate dean determines the appeal should be brought to the Graduate Curriculum Committee, the student must provide a formal written complaint to the associate dean within one week of the student's meeting with the associate dean.

- The written complaint should provide a detailed timeline as well as all available evidence supporting the student's complaint.
  - It is the student's responsibility to make their case. Students may submit any evidence such as emails, quizzes, examinations, etc.
- Once the associate dean receives a formal written complaint, the associate dean will provide a copy of the complaint to the faculty member and to the department/program director and convene a meeting of the Graduate Curriculum Committee.
- If the student fails to provide a thoughtful and well-reasoned written summary of the case, then the matter will be considered closed at the college level.
- The associate dean will make a good faith effort to identify a date and time for the meeting within 35 calendar days of the student's original submission of his or her statement.

GRADUATE CURRICULUM COMMITTEE

- The Graduate Curriculum Committee serves as the Academic Appeals Committee for the College of Science.
- The Graduate Curriculum Committee is convened in order to determine whether a fair and due process was used to determine the student's grade.
- The role of the committee is to conduct a review when a grade appeal is filed by a student for one of the following reasons, concern that:
  - The course grading policy was not applied consistently to all students within a class and/or section.
  - The instructor's method of assigning grades differed from the method outlined in the instructor's course syllabus.
  - The instructor failed to provide a clear policy on how grades would be assigned.

APPEALS MEETING

The student and the faculty member have the right to attend and present their case orally to the committee. The faculty member and the student are not required to attend; however, it is usually quite helpful to make an oral presentation and answer any questions that the committee may have. If the complainant indicates that they will present their case in person and then fails to attend the scheduled hearing, the case will be dismissed. The complainant and the faculty member both have the right to testify privately and separately before the committee. Lawyers are not permitted in these proceedings. Generally, the faculty member and complainant are each given a 15-minute period to present their case.

The student usually presents their complaint to the committee first. The committee may then ask the complainant any questions they have based upon either the written statement submitted by the complainant or the complainant's oral presentation. The faculty member then presents his or her case, which is followed by questions from the committee. After both the complainant and faculty member have addressed the committee, the committee then reviews the evidence, summarizes the case, and makes a recommendation to the associate dean concerning the resolution of the complaint.

If the committee believes it cannot resolve any issues without additional information, the committee may request any information needed from either the complainant, faculty member, or department/program. This information must be provided to the committee within one week of the meeting. If the requested information is not provided in the required time frame, then the committee may weigh this failure in making its final determination regarding the original complaint.

COMMITTEE PROCESS

- All decisions of the committee will be made based on a simple majority (51 percent) vote.
- The associate dean is chair of the committee and only votes when there is a tie.
- The student bringing the complaint to the committee carries the burden of proof based on the weight of the evidence in demonstrating that the grade is incorrect or unjustified.
- If the committee decides that the grading process was unfair, the committee can request that the instructor changes the student's grade.
  - If an acceptable agreement involves a change of grade, the instructor is responsible for submitting a change of grade to the registrar in a timely manner following notification of the committee's decision.
- The student shall be notified within three business days of a decision being reached.

If the student or the faculty member is not satisfied with the committee's disposition of the matter, or if the grade appeal is not resolved within 35 calendar days after the written statement is submitted to the college, he or she may further pursue the matter by requesting in writing that the university convene an academic appeals resolution committee to review the issue. This must be submitted within 10 calendar days of the notification from the college. This committee has been designated as the final authority on these matters. Students may obtain information on this process by contacting the Office of the Provost.

Academic Dismissal Appeal

If a student wishes to dispute an academic dismissal, the first step is to consult the graduate director about appealing to the department/program. If and when all departmental appeals are exhausted, the student can enter the formal procedure at the college level.

The student will meet with the associate dean for research and graduate affairs who will attempt to resolve the issue by working with the department/program. Contact Associate Director for Graduate Administration Melissa Rubock (m.rubock@northeastern.edu) to schedule the meeting. If it is not possible for the associate dean to resolve the issue with the department/program, the associate dean will determine if the complaint is substantive and there is just cause to convene the Graduate Curriculum Committee.

The student must provide a formal written complaint to the associate dean within one week of the student's meeting with the associate dean. The statement must be submitted no later than 28 calendar days from the day when the academic determination is made available to the student. The written complaint should provide a detailed timeline as well as all available evidence supporting the student's complaint. Once the associate dean receives a formal written complaint, the associate dean will provide a copy of the complaint to the department/program director and convene a meeting of the Graduate Curriculum Committee. If the student fails to provide a thoughtful and well-reasoned written summary of the case, then the matter will be considered closed at the college level.

The associate dean will make a good faith effort to identify a date and time for the meeting within 35 calendar days of the student's original submission of his or her statement.

GRADUATE CURRICULUM COMMITTEE

- The Graduate Curriculum Committee serves as the Academic Appeals Committee for the College of Science.
- The Graduate Curriculum Committee is convened in order to determine whether a fair and due process was used.

APPEALS MEETING

The student has the right to attend and present their case orally to the committee. The student is not required to attend; however, it is usually quite helpful to make an oral presentation and answer any questions that the committee may have. If the complainant indicates that they will present their case in person and then fails to attend the scheduled hearing, the case will be dismissed. Lawyers are not permitted in these proceedings.

The student usually presents their complaint to the committee first. The committee may then ask the complainant questions based upon either the written case submitted by the complainant or the complainant's oral presentation. The committee then reviews the evidence, summarizes the case, and makes a recommendation to the associate dean concerning the resolution of the complaint.

If the committee believes it cannot resolve any issues without additional information, the committee may request any information needed from

either the complainant or department/program. This information must be provided to the committee within one week of the meeting. If the needed information is not provided in the time frame required, then the committee may weigh this failure in making its final determination regarding the original complaint.

COMMITTEE PROCESS

- All decisions of the committee will be made based on a simple majority (51 percent) vote.
- The associate dean is chair of the committee and only votes when there is a tie.
- The student bringing the complaint to the committee carries the burden of proof based on the weight of the evidence in demonstrating that the dismissal is incorrect or unjustified.
- If the committee decides that the academic dismissal should be revoked, the committee can request that the department reinstate the student immediately.

If the student is not satisfied with the committee's disposition of the matter, or if the dismissal appeal is not resolved within 35 calendar days after the written statement is submitted to the college, he or she may further pursue the matter by requesting in writing that the university convene an academic appeals resolution committee to review the issue. This must be submitted within 10 calendar days of the notification from the college. This committee has been designated as the final authority on these matters. Students may obtain information on this process by contacting the Office of the Provost.

Awards

Only those students who are registered in degree programs are eligible for awards. Award recipients will receive an official award letter from the College of Science via email. Pay attention to this letter as it is an official contract that should be read carefully. In addition, to maintain awards, students must be making satisfactory progress toward their degrees.

Receipt of financial support administered by the College of Science is contingent on satisfactory academic progress toward the degree and on meeting department-specific guidelines. The College of Science requires that all students receiving awards will generally have two semesters to reach a 3.000 grade-point average (GPA). Students whose cumulative GPA is below 3.000 will be reviewed by their departments and by the College of Science and may have their funding terminated on recommendation of their department or by decision of the College of Science in consultation with their department. Renewals of awards will depend on the student making satisfactory academic progress toward the degree, including a GPA of 3.000 or the department's minimum GPA, if it is higher than the College of Science minimum, and satisfactory performance of any duties required by the award.

Changes in Requirements

The continuing development of the college may result in regular revision of curricula. When curriculum changes are made, students are allowed to complete the degree requirements of the program when they matriculated. If a student wishes to follow the new curriculum/program, they may request this in writing to the COS Graduate Admissions and Student Services office at the time of the announcement of said changes.

Cooperative Education Policies

The College of Science Graduate Cooperative Education Program (co-op) is one option for experiential learning and is available to students enrolled full-time at Northeastern University in a degree-granting program.

The goals of cooperative education are for students to:

- ***Integrate knowledge*** and skills learned in the classroom and co-op to identify and solve problems
- ***Gain new knowledge*** and develop new skills to successfully engage in unfamiliar activities and projects
- ***Identify and leverage opportunities*** to learn beyond the classroom
- ***Articulate*** the intellectual skills that underlie the work they engage in
- ***Assess, critique, and improve*** their work
- ***Adapt*** their behavior to different audiences they interact with (e.g., communication, self-representation, etc.)
- ***Behave professionally*** in various environments (i.e., team, independent, etc.) by adhering to ethical standards and being accountable for their commitments

Master's-level students must meet the eligibility requirements and follow the guidelines below. Co-op is not guaranteed, and students must compete and be selected for a limited number of co-op opportunities.

Eligibility Requirement for Co-op

- To be eligible for co-op, College of Science graduate students must:
  - Be enrolled full-time at Northeastern University. Approval is required from the co-op faculty for exceptions.
  - Have completed a minimum of 16 master's-level academic credits prior to the start of co-op.
  - Meet the 3.000 minimum grade-point average (GPA) requirement.
  - Have no incomplete grades, not be on academic probation, or have any outstanding disciplinary issues.
  - Have at least two required courses remaining in their program after completing co-op (for programs that do not require co-op).
- International students on an F-1 visa must have a valid I-20 and must follow Curricular Practical Training (CPT) protocol.
- Students must successfully complete Introduction to Co-op. This course covers the College of Science co-op performance standards, which encourage professional and ethical behaviors throughout the co-op process and clarify procedures required for continued success of students and the co-op program. The standards establish professional expectations of the student throughout the co-op search process and during the co-op term and address co-op related issues that may involve performance.
- Students must receive approval from the co-op faculty prior to accepting a placement.

Guidelines

1. Students may participate in co-op activities with a single company for a four-, six-, or eight-month period. The total duration of co-op cannot exceed eight months or be shorter than 11 weeks.
2. Co-ops are aligned with academic terms (fall, spring, and full summer or summer 1 and summer 2).
3. Co-ops are required to be full-time, a minimum of 32 hours per week.
4. Course enrollment while on co-op is dependent upon academic program.

5. Students can create their own co-op placement outside of NUcareers. Approval from the co-op faculty and adherence to all guidelines are required.
6. Students working in industry can complete an industry project to fulfill the co-op requirement. This must be approved by the co-op faculty and program director.
7. The College of Science only allows students to utilize NUCareers co-op placement once per degree.

Registering for Co-op

Students are registered for the co-op work experience course based on the job placement in NUcareers. All co-op placements need to be approved by the co-op faculty.

Co-op Documentation

Students who fully and successfully participate in co-op will receive a grade of Satisfactory (S). Those who fail to complete their co-op assignment will receive a grade of Unsatisfactory (U). These grades will appear on the student's academic transcript. Academic credit is not awarded for the completed co-op.

Seattle, San Francisco, and Silicon Valley

Seattle, San Francisco, and Silicon Valley graduate students are required to fulfill the co-op requirement and must adhere to all guidelines *(biotechnology and bioinformatics students only).*

The College of Science Co-op Standing Committee

In the event a situation arises that requires special consideration, the College of Science students who are dismissed from or resign from a co-op job for circumstances beyond their control will have an opportunity to meet with the co-op standing committee for a review. A decision will be made on future co-op eligibility and access to NUCareers.

PhD Students

Please contact your department or Graduate Admissions and Student Services to inquire about guidelines for experiential learning opportunities.

Course Registration

Students are encouraged to obtain advisor approval of course selections each semester. This approval is required for all assistantship recipients, and some departments require it for all students. Students should check with individual departments for specific guidelines.

The Doctor of Philosophy Degree (PhD)

The Doctor of Philosophy degree is awarded to candidates who provide evidence of high scholastic attainment and research ability in their major field. Specific degree requirements are administered by a committee in charge of the degree program. It is the responsibility of the chair of this committee to certify to the College of Science the completion of each requirement for each candidate.

Residence Requirement

A Doctor of Philosophy degree student must spend the equivalent of at least one academic year in residence at the university as a full-time graduate student. The committee of each degree program specifies the method by which the residence requirement is satisfied.

Qualifying Exam

In programs where a qualifying exam is required, students must complete this requirement within the time limit set by the program of study.

Comprehensive Examination

Degree programs may require a comprehensive examination. Generally, students are expected to complete all of the required degree coursework prior to taking the comprehensive examination. Students must complete this requirement within the time limit set by the program of study, usually within one term of completing the required coursework.

Doctoral Degree Candidacy

PhD degree candidacy is established when students have completed all departmental and university requirements for candidacy. These requirements vary by department and include completing the minimum number of graduate semester hours required of doctoral students by the department (this may include an earned master's degree accepted by the department) and passing a qualifying examination and/or a comprehensive examination. Once students reach doctoral degree candidacy they will be certified, in writing, by the college. Registration in coursework is not permitted once a student reaches candidacy.

Continuity of Registration

For each of the first two semesters that a doctoral candidate has established candidacy, the student must register for Dissertation. For each semester beyond the two Dissertation registrations, the student must register for Doctoral Dissertation Continuation until the dissertation is approved by the College of Science. During the terms when a student is registered for Doctoral Dissertation or Dissertation Continuation, coursework is not permitted as the course requirements for the degree have already been met. If the academic program requires enrollment in seminars or courses in addition to Dissertation or Dissertation Continuation, the department's graduate director will make a recommendation to the College of Science for approval. Approval must happen prior to registration. Students must be registered for Dissertation or Dissertation Continuation during the semester in which they take the final oral examination (including the full summer semester if that is when defense occurs). Any student who does not attend Northeastern University for a period of one year may be required to apply for readmission. A student who does not enroll for a period of three semesters, or one year, will be required to apply for readmission. Readmission is done via Apply Yourself. A student who does not enroll for a period of two semesters, or less than one year, may petition his or her department for reactivation. If the department is supportive, the student will be required to submit a written request to the departmental graduate committee. If the graduate committee feels the student is worthy of reactivation, the student's written request must be submitted to Graduate Admissions and Student Services. Please note that college admissions deadlines apply to requests for readmission and reactivation.

Dissertation

Each doctoral student must complete a dissertation that embodies the results of extended research and makes an original contribution to the field. This work should give evidence of the candidate's ability to carry out investigation and interpret in a logical manner the results of the research. The method of approval of the dissertation is established by the committee in charge of the degree program. The chair of the dissertation committee must be a full-time member of the faculty of Northeastern University. In addition, the chair of the dissertation committee must hold a doctoral degree. Typically, only one external committee member is allowed.

Final Oral Examination

The final oral examination will be on the subject matter of the doctoral dissertation and on important developments in the field of the dissertation. Other fields may be included if recommended by the examining committee. This examination will be taken after completion of all other degree requirements and must be held at least two weeks prior to the commencement at which the PhD is awarded. The oral exam must take place on campus in the presence of the chair/advisor and other dissertation committee members. The dissertation defense must be publicly announced prior to the defense and the opportunity given for other students, staff, and faculty to attend.

Interdisciplinary Doctoral Programs

Some graduate students may wish to pursue doctoral programs that involve substantial work in two or more departments. To meet this need, an interdisciplinary program may be established that corresponds in scope and depth to doctoral standards but does not agree exactly with the individual departmental regulations. Consult this graduate catalog for policies and guidelines pertaining to this doctoral option.

Grading Policies

In the College of Science, not more than two courses or 6 semester hours of credit, whichever is greater, may be repeated to satisfy the requirements for the degree. Only such repeats will be counted in calculating the cumulative grade-point average.

No grade changes are permitted after the end of the final examination period one calendar year from the semester in which the student registered for the course. In calculating the overall cumulative average, all graduate-level coursework completed at the time of clearance for graduation will be counted unless the student is immediately continuing on for a PhD degree in his or her department.

Students cannot elect a pass/fail grading scheme for College of Science courses, unless the course grading scheme is designated pass/fail.

The Master's Degree Academic Requirements

A candidate for the master's degree must complete a minimum of 30 semester hours of graduate-level coursework and such other study as may be required by the department in which the student is registered.

To qualify for the degree, a minimum cumulative grade-point average of 3.000, equivalent to a grade of B, must be obtained. This average will be calculated each semester according to the university grading system and will exclude any transfer credits or repeated courses. A student who does not make satisfactory progress toward degree requirements, as specified by the individual department, may be terminated from the program.

Comprehensive Examination

A final written or oral comprehensive examination is required in some programs. This examination will be given by the department concerned at least two weeks before the commencement at which the degree is expected to be conferred.

Thesis

A master's thesis is required in some programs and should demonstrate the individual's capacity to execute independent work based on original material. Registration for Thesis is required in most programs.

Theses must be approved by the departmental graduate committee and, in cases in which a grade is required, must receive a grade of B (3.000) or better to be accepted.

Continuity of Registration

Students are expected to maintain satisfactory progress toward their intended degrees. All students must be registered in the last semester of their program. A student who does not enroll for a period of three semesters, or one year, will be required to apply for readmission. Readmission is done via Apply Yourself. A student who does not enroll for a period of two semesters, or less than one year, may petition his or her department for reactivation. If the department is supportive, the student will be required to submit a written request to the departmental graduate committee. If the graduate committee feels the student is worthy of reactivation, the student's written request must be submitted to Graduate Admissions and Student Services. Please note that college admissions deadlines apply to requests for readmission and reactivation.

Satisfactory Progress

Satisfactory progress means satisfying requirements in the College of Science, in this graduate catalog, and in the regulations specified by the departments.

The College of Science sets minimum standards for all students to fulfill. Departments and programs may have additional requirements that exceed those of the College of Science. Students in the College of Science must be making satisfactory progress, including working toward the graduation requirement of a grade-point average of 3.000 in their coursework and the timely completion of coursework and comprehensive/qualifying examinations. See also the university's policy on academic standing ("Minimum Cumulative GPA (p. 36)").

Time Limitation

Refer to university policy regarding time limitations. If students wish to apply for an extension of the time limit, they must submit a petition to their department of study. The petition must include a detailed plan for completion of all remaining degree requirements. In the case of master's degree time limit extension requests for coursework, the department must certify that the content of each of the courses has not changed since the time the student completed the course. If deemed appropriate, the department will recommend a time limit extension to graduate student services. The associate dean for research and graduate affairs has final approval of time limit extensions.

Transfer Credit

A student may petition to transfer up to 9 semester hours of his or her degree program using credits from another institution, provided that the credits transferred consist of a grade of B (3.000) or better in graduate-level courses, have been earned at an accredited institution, and have not been used toward any other degree. Students transferring credit from an international institution must submit a course-by-course credential evaluation.

Note: If approved by the College of Science, credits from Northeastern University's College of Professional Studies (CPS) transfer to the College of Science as external credits and count toward the maximum amount of transfer credit. As courses at other institutions may not parallel courses at Northeastern, the student's academic department will determine the number of semester hours the external course will be worth. This

calculation may result in fewer semester hours than the course was assigned at the institution at which the student completed the course. In addition, courses accepted for transfer credit must have been completed within five years of the date the student is admitted to graduate study. Grades are not transferred. Some departments may accept fewer transfer credits.

Biology

Website (http://www.northeastern.edu/biology/)

Jonathan L.Tilly, PhD
University Distinguished Professor and Chair

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gradbio@northeastern.edu

The PhD program in biology emphasizes close interaction between graduate students and faculty in developing the intellectual and experimental skills required for creative independent research. Rigorous courses in a core biology curriculum, as well as advanced courses in particular research interests, are complemented by intensive research culminating in completion of a dissertation under faculty supervision. Students have an opportunity to declare a concentration in either cell and molecular biology or molecular microbiology.

The Department of Biology oversees the bioinformatics Master of Science program. The interdisciplinary program provides cross-disciplinary training in biology, computer science, and informational technology preparing students for cutting-edge jobs in the biotechnology and pharmaceutical industries. The program consists of four parts: fundamental courses, core courses, co-op, and electives.

The Graduate Certificate in Bioinformatics offers professionals working in the research, healthcare, and pharmaceutical industries the ability to employ bioinformatics algorithms and techniques to biological problems in their current practice. It also gives people looking to switch careers the data and genomic analysis skills needed to be more competitive in the biological and pharmaceutical industries.

Programs

Doctor of Philosophy (PhD)

- Biology (p. 430)

Master of Science (MS)

- Bioinformatics (p. 432)

Graduate Certificate

- Bioinformatics (p. 434)

Biology, PhD

The PhD program entails course work from a core biology curriculum along with advanced courses in the student's area of research interest. This is complemented by intensive research and completion of a dissertation under faculty supervision. Faculty research includes biochemistry, microbiology, cell and molecular biology, genetics, neurobiology, regenerative biology, and the biology of reproduction. Two optional concentrations are available: cell and molecular biology and molecular microbiology.

Students who have completed required coursework with a cumulative GPA of 3.000 or better may be eligible to receive an (p. 521)MS Biology (p. 431) *degree. In addition, students who do not qualify for the doctoral degree, but who have completed required coursework with a cumulative GPA of 3.000 or better, may be eligible to receive a terminal* MS Biology (p. 431) *degree. Note that no students will be admitted directly into the* MS Biology (p. 431) *to pursue a master's degree.*

Program Requirements

Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Qualifying examination
Annual review
Dissertation committee
Dissertation proposal
Colloquia (minimum of three)
First-author publication
Dissertation defense

Core Requirements

Code	Title	Hours
Research Ethics		
Complete one of the following courses:		4
BIOL 7399	Research Problem Solving, Ethics, and Communication Skills	
BIOL 5599	Principles of Data Management and Peer Review in Biology	
Colloquium		
Complete the following (repeatable) course twice:		2
BIOL 5100	Biology Colloquium	

BIOLOGY PHD WITHOUT CONCENTRATION

Code	Title	Hours
Required Course Work		
Complete 8 semester hours from the following:		8
BIOL 6303	Neurobiology and Behavior	
BIOL 6399	Dynamics of Microbial Ecology	
BIOL 6401	Research Methods and Critical Analysis in Molecular Cell Biology	
BIOL 6405	Prokaryotic Cell and Molecular Biology	
BIOL 6407	Biochemistry for Molecular Biologists	
Electives		
Complete 16 semester hours from the following:		16
BIOL 5103 to BIOL 9984		

Concentrations

- Cell and Molecular Biology (p.)
- Molecular Microbiology (p. 431)

CELL AND MOLECULAR BIOLOGY CONCENTRATION

Code	Title	Hours
Required Course Work		
BIOL 6401	Research Methods and Critical Analysis in Molecular Cell Biology	4
BIOL 6407	Biochemistry for Molecular Biologists	4
Electives		

In consultation with faculty advisor, complete 16 semester hours from the topic of cell and molecular biology:	16
BIOL 5103 to BIOL 9984	

MOLECULAR MICROBIOLOGY CONCENTRATION

Code	Title	Hours
Required Course Work		
Complete 8 semester hours from the following:		8
BIOL 6399	Dynamics of Microbial Ecology	
BIOL 6405	Prokaryotic Cell and Molecular Biology	
BIOL 6407	Biochemistry for Molecular Biologists	
Electives		
In consultation with faculty advisor, complete 16 semester hours from the topic of molecular microbiology:		16
BIOL 5103 to BIOL 9984		

Dissertation

Code	Title	Hours
BIOL 9990	Dissertation Term 1	
BIOL 9991	Dissertation Term 2	

Program Credit/GPA Requirements

30 total semester hours required
Minimum 3.000 GPA required

Advanced Entry PhD Program Requirements

The biology PhD program seeks to provide a broad background knowledge base in conjunction with in-depth study of a specialized area of biology. The program emphasizes close interaction between graduate students and faculty members in developing the intellectual and experimental skills required for creative, independent research.

Students entering the PhD program with a related Master of Science degree typically have significantly reduced course loads. An individualized course of study is designed by the biology graduate curriculum committee in consultation with the student and the student's advisor. The student can then focus on intensive research and completion of a dissertation under faculty supervision. Faculty research includes biochemistry, microbiology, cell and molecular biology, genetics, neurobiology, regenerative biology, and the biology of reproduction. Financial support (teaching assistantships or research assistantships) is normally provided for PhD students who are making satisfactory progress toward completion of their degree.

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Qualifying examination
Annual review
Dissertation committee
Dissertation proposal
Colloquia (minimum of three)
First-author publication
Dissertation defense

Core Requirements

APPROVED COURSE WORK

Consult your faculty adviser for acceptable courses.

APPROVED ELECTIVES

Consult your faculty adviser for acceptable electives.

Dissertation

Code	Title	Hours
BIOL 9990	Dissertation Term 1	
BIOL 9991	Dissertation Term 2	

Program Credit/GPA Requirements

Variable total semester hours required
Minimum 3.000 GPA required

Biology, MS

Please see PhD (p. 430)*Biology* for further information about this program. No students will be admitted directly into this program to pursue a master's degree.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Research Ethics		
Complete one of the following:		4
BIOL 7399	Research Problem Solving, Ethics, and Communication Skills	
BIOL 5599	Principles of Data Management and Peer Review in Biology	
Colloquium		
Complete the following (repeatable) course twice:		2
BIOL 5100	Biology Colloquium	

BIOLOGY MS WITHOUT CONCENTRATION

Code	Title	Hours
Required Coursework		
Complete 8 semester hours from the following:		8
BIOL 6303	Neurobiology and Behavior	
BIOL 6399	Dynamics of Microbial Ecology	
BIOL 6401	Research Methods and Critical Analysis in Molecular Cell Biology	
BIOL 6405	Prokaryotic Cell and Molecular Biology	
BIOL 6407	Biochemistry for Molecular Biologists	
Electives		
Complete 16 semester hours from the following:		16
BIOL 5103 to BIOL 9984		

Concentrations

- Cell and Molecular Biology (p.)
- Molecular Microbiology (p.)

CELL AND MOLECULAR BIOLOGY CONCENTRATION

Code	Title	Hours
Required Coursework		
BIOL 6401	Research Methods and Critical Analysis in Molecular Cell Biology	4
BIOL 6407	Biochemistry for Molecular Biologists	4

Electives	
In consultation with faculty advisor, complete 16 semester hours from the topic of cell and molecular biology:	16
BIOL 5103 to BIOL 9984	

MOLECULAR MICROBIOLOGY CONCENTRATION

Code	Title	Hours
Required Coursework		
Complete 8 semester hours from the following:		8
BIOL 6399	Dynamics of Microbial Ecology	
BIOL 6405	Prokaryotic Cell and Molecular Biology	
BIOL 6407	Biochemistry for Molecular Biologists	
Electives		
In consultation with faculty advisor, complete 16 semester hours from the topic of molecular microbiology:		16
BIOL 5103 to BIOL 9984		

Program Credit/GPA Requirements

30 total semester hours required (20 semester hours must be taken for a letter grade)

Minimum 3.000 GPA required

Bioinformatics, MS

The Master of Science (MS) in Bioinformatics seeks to provide students with core knowledge in bioinformatics programming, integrating knowledge from the biological, computational, and mathematical disciplines. Upon completion, students are equipped to apply bioinformatics and computational methods to biological problems. Students in the MS program have the opportunity to gain professional work experience via co-op.

The program consists of core course work in computational methods, programming, and statistics, enhanced by electives in molecular biology, biochemistry, molecular modeling, web development, database design and management, data mining, and other related topics.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Computational Methods		
BINF 6308	Bioinformatics Computational Methods 1	4
BINF 6309	Bioinformatics Computational Methods 2	4
Research and Seminar		
BIOL 6381	Ethics in Biological Research	2
BIOT 5219	The Biotechnology Enterprise	2
Statistics and Programming		
BINF 6200	Bioinformatics Programming	4
MATH 7340	Statistics for Bioinformatics	4
Co-op		
BINF 6500	Professional Development for Co-op	0
BINF 6964	Co-op Work Experience	0

Concentrations

- Bioinformatics and Chemoinformatics
- Bioinformatics Enterprise
- Biotechnology
- Data Analytics (p. 432)
- Health Informatics (p. 432)
- Medical Health Informatics (p. 432)
- Omics

BIOINFORMATICS AND CHEMOINFORMATICS CONCENTRATION

Code	Title	Hours
BINF 6400	Genomics in Bioinformatics	4
BIOL 6299	Molecular Cell Biology for Biotechnology	3
CHEM 6500	Cheminformatics	3
Elective (from list below)		2

BIOINFORMATICS ENTERPRISE CONCENTRATION

Code	Title	Hours
BIOT 5225	Managing and Leading a Biotechnology Company	3
BIOT 5227	Launching Your Science: Biotechnology Entrepreneurship	3
BIOT 5400	Scientific Information Management for Biotechnology Managers	3
Elective (from list below)		3

BIOTECHNOLOGY CONCENTRATION

Code	Title	Hours
BIOT 5120	Foundations in Biotechnology	3
BIOT 5631	Cell Culture Processes for Biopharmaceutical Production	3
BIOL 6299	Molecular Cell Biology for Biotechnology (Electives)	3
Elective (from list below)		3

DATA ANALYTICS CONCENTRATION

Code	Title	Hours
DA 5020	Collecting, Storing, and Retrieving Data	4
INSH 5302	Information Design and Visual Analytics	4
DA 5030	Introduction to Data Mining/Machine Learning (or Elective from list below)	4

HEALTH INFORMATICS CONCENTRATION

Code	Title	Hours
HINF 5101	Introduction to Health Informatics and Health Information Systems	3
HINF 5102	Data Management in Healthcare	3
HINF 6220	Database Design, Access, Modeling, and Security	3
Elective (from list below)		3

MEDICAL HEALTH INFORMATICS CONCENTRATION

Code	Title	Hours
HINF 5105	The American Healthcare System	3
HINF 5110	Global Health Information Management	3

HINF 5200	Theoretical Foundations in Personal Health Informatics	4
Elective (from list below)		3

OMICS CONCENTRATION

Code	Title	Hours
BINF 6400	Genomics in Bioinformatics	4
BINF 6410	Proteomics in Bioinformatics	4
BINF 6420	Omics in Bioinformatics (or Elective from list below)	4

ELECTIVE OPTION

Code	Title	Hours
Complete 12 semester hours from the approved elective list below.		

Elective List

Code	Title	Hours
Electives outside this list may be chosen in consultation with faculty adviser.		
BIOE 5235	Biomedical Imaging	4
BIOE 5420	Cellular Engineering	4
BIOE 6100	Medical Physiology	4
BIOL 5100	Biology Colloquium	1
BIOL 5543	Stem Cells and Regeneration	4
BIOL 5549	Inventions in Microbial Biotechnology	4
BIOL 5569	Advanced Microbiology	4
BIOL 5573	Medical Microbiology	4
BIOL 5581	Biological Imaging	4
BIOL 5583	Immunology	4
BIOL 5585	Evolution	4
BIOL 5587	Comparative Neurobiology	4
BIOL 5591	Advanced Genomics	4
BIOL 5593	Cell and Molecular Biology of Aging	4
BIOL 5597	Immunotherapies of Cancer and Infectious Disease	4
BIOL 6299	Molecular Cell Biology for Biotechnology	3
BIOL 6300	Biochemistry	4
BIOL 6301	Molecular Cell Biology	4
BIOL 6303	Neurobiology and Behavior	4
BIOL 6399	Dynamics of Microbial Ecology	4
BIOL 6407	Biochemistry for Molecular Biologists	4
BIOT 5120	Foundations in Biotechnology	3
BIOT 5145	Basic Biotechnology Lab Skills	1
BIOT 5219	The Biotechnology Enterprise	2
BIOT 5225	Managing and Leading a Biotechnology Company	3
BIOT 5226	Biotechnology Entrepreneurship	3
BIOT 5227	Launching Your Science: Biotechnology Entrepreneurship	3
BIOT 5560	Bioprocess Fundamentals	3
BIOT 5631	Cell Culture Processes for Biopharmaceutical Production	3
BIOT 5635	Downstream Processes for Biopharmaceutical Production	3
BIOT 5640	Drug Product Processes for Biopharmaceuticals	3
BIOT 5700	Molecular Interactions of Proteins in Biopharmaceutical Formulations	3
BIOT 5810	Cutting-Edge Applications in Molecular Biotechnology	3
BIOT 5850	Higher-Order Structure Analytics	3
BIOT 7245	Biotechnology Applications Laboratory	3
CHEM 5550	Introduction to Glycobiology and Glycoprotein Analysis	3
CHEM 5616	Protein Mass Spectrometry	3
CHEM 5617	Protein Mass Spectrometry Laboratory	3
CHEM 5620	Protein Chemistry	3
CHEM 5638	Molecular Modeling	3
CHEM 7317	Analytical Biotechnology	3
CS 5010	Programming Design Paradigm	4
CS 5100	Foundations of Artificial Intelligence	4
CS 5200	Database Management Systems	4
CS 5400	Principles of Programming Language	4
CS 5500	Foundations of Software Engineering	4
CS 5600	Computer Systems	4
CS 5610	Web Development	4
CS 5700	Fundamentals of Computer Networking	4
CS 5800	Algorithms	4
CS 6140	Machine Learning	4
CS 6200	Information Retrieval	4
CS 6220	Data Mining Techniques	4
DA 5020	Collecting, Storing, and Retrieving Data	4
DA 5030	Introduction to Data Mining/Machine Learning	4
EEMB 5130 and EEMB 5131	Ecological Dynamics and Lab for EEMB 5130	5
HINF 5101	Introduction to Health Informatics and Health Information Systems	3
HINF 5102	Data Management in Healthcare	3
HINF 5105	The American Healthcare System	3
HINF 5110	Global Health Information Management	3
HINF 5200	Theoretical Foundations in Personal Health Informatics	4
HINF 6220	Database Design, Access, Modeling, and Security	3
INSH 5301	Introduction to Computational Statistics	4
INSH 5302	Information Design and Visual Analytics	4
MATH 5131	Introduction to Mathematical Methods and Modeling	4
MATH 7203	Numerical Analysis 1	4
MATH 7205	Numerical Analysis 2	4
MATH 7233	Graph Theory	4
MATH 7241	Probability 1	4
MATH 7341	Probability 2	4
MATH 7342	Mathematical Statistics	4
MATH 7344	Regression, ANOVA, and Design	4
PHSC 6214	Experimental Design and Biostatistics	2

PHYS 5116	Complex Networks and Applications	4
PHYS 7331	Network Science Data	4
PHYS 7332	Network Science Data 2	4

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

Bioinformatics, Graduate Certificate

The Graduate Certificate in Bioinformatics seeks to provide students with core knowledge in bioinformatics programming, integrating knowledge from the biological, computational, and mathematical disciplines. Students gain the data and genomic analysis skills needed to employ bioinformatics techniques to biological problems. The graduate certificate consists of four courses, three bioinformatics courses and one elective, totaling 15–16 semester hours.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
BINF 6200	Bioinformatics Programming	4
BINF 6308	Bioinformatics Computational Methods 1	4
BINF 6309	Bioinformatics Computational Methods 2	4

Elective

Code	Title	Hours
Complete one of the following. Electives outside this list may be chosen in consultation with faculty adviser.		3-4
BIOE 5235	Biomedical Imaging	
BIOE 5420	Cellular Engineering	
BIOE 6100	Medical Physiology	
BIOL 5543	Stem Cells and Regeneration	
BIOL 5549	Inventions in Microbial Biotechnology	
BIOL 5569	Advanced Microbiology	
BIOL 5573	Medical Microbiology	
BIOL 5581	Biological Imaging	
BIOL 5583	Immunology	
BIOL 5585	Evolution	
BIOL 5587	Comparative Neurobiology	
BIOL 5591	Advanced Genomics	
BIOL 5593	Cell and Molecular Biology of Aging	
BIOL 5597	Immunotherapies of Cancer and Infectious Disease	
BIOL 6299	Molecular Cell Biology for Biotechnology	
BIOL 6300	Biochemistry	
BIOL 6301	Molecular Cell Biology	
BIOL 6303	Neurobiology and Behavior	
BIOL 6399	Dynamics of Microbial Ecology	
BIOL 6407	Biochemistry for Molecular Biologists	
BIOT 5120	Foundations in Biotechnology	
BIOT 5145	Basic Biotechnology Lab Skills	
BIOT 5219	The Biotechnology Enterprise	
BIOT 5225	Managing and Leading a Biotechnology Company	
BIOT 5226	Biotechnology Entrepreneurship	
BIOT 5227	Launching Your Science: Biotechnology Entrepreneurship	
BIOT 5560	Bioprocess Fundamentals	
BIOT 5631	Cell Culture Processes for Biopharmaceutical Production	
BIOT 5635	Downstream Processes for Biopharmaceutical Production	
BIOT 5640	Drug Product Processes for Biopharmaceuticals	
BIOT 5700	Molecular Interactions of Proteins in Biopharmaceutical Formulations	
BIOT 5810	Cutting-Edge Applications in Molecular Biotechnology	
BIOT 5850	Higher-Order Structure Analytics	
BIOT 7245	Biotechnology Applications Laboratory	
CHEM 5550	Introduction to Glycobiology and Glycoprotein Analysis	
CHEM 5616	Protein Mass Spectrometry	
CHEM 5617	Protein Mass Spectrometry Laboratory	
CHEM 5620	Protein Chemistry	
CHEM 7317	Analytical Biotechnology	
CS 5010	Programming Design Paradigm	
CS 5100	Foundations of Artificial Intelligence	
CS 5200	Database Management Systems	
CS 5400	Principles of Programming Language	
CS 5500	Foundations of Software Engineering	
CS 5600	Computer Systems	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 5800	Algorithms	
CS 6140	Machine Learning	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
DA 5020	Collecting, Storing, and Retrieving Data	
DA 5030	Introduction to Data Mining/Machine Learning	
INSH 5301	Introduction to Computational Statistics	
INSH 5302	Information Design and Visual Analytics	
MATH 5131	Introduction to Mathematical Methods and Modeling	
MATH 7203	Numerical Analysis 1	
MATH 7205	Numerical Analysis 2	
MATH 7233	Graph Theory	
MATH 7241	Probability 1	
MATH 7341	Probability 2	
MATH 7342	Mathematical Statistics	
MATH 7344	Regression, ANOVA, and Design	
PHSC 6214	Experimental Design and Biostatistics	

PHYS 5116	Complex Networks and Applications
PHYS 7331	Network Science Data
PHYS 7332	Network Science Data 2

Note: International students are required to select a 4-credit elective to maintain a full-time status, 8SH.

Program Credit/GPA Requirements

15–16 total semester hours required
Minimum 3.000 GPA required

Chemistry and Chemical Biology

Website (http://www.northeastern.edu/chemistry/)

Penny Beuning, PhD
Professor and Chair

617.373.2822

The PhD program in chemistry provides research and professional opportunities for students that are based on fundamental chemical principles with translational applications to the real world. The program is built on academic rigor and research impact, based on the creativity and strengths of an increasingly diverse faculty and student body. We have harnessed our extensive connections in industry to create and maintain a thriving industry-entry PhD program and provide our regular PhD students with internship opportunities in industry, government laboratories, and other venues that may lead to a wide range of careers. Students in our program leave with flexible skills that can be applied in creative and meaningful ways in academics, industry, and beyond. We are aligned in our core values with the mission of Northeastern University to "educate students for a life of fulfillment and accomplishments and create and translate knowledge to meet global and societal needs." This mission is at the core of the curriculum, research, mentoring strategies, and professional development opportunities offered to our students. It is implemented in a highly multidisciplinary and transparent environment where students have a voice and take real ownership and responsibility for their professional success. Within this context, PhD students work with chemistry and chemical biology faculty in interdisciplinary areas that include biochemistry and chemical biology, synthetic chemistry, medicinal chemistry, polymer and materials chemistry, computational chemistry, and bioanalytical chemistry.

The Master of Science in Chemistry is designed to allow practicing chemical professionals who have an earned bachelor's degree in chemistry or a closely related field to pursue a master's degree in chemistry by completing a coursework program during the evening weekday hours. Full-time or part-time options are available. The department offers a diverse range of courses that mirror the faculty's research interests in biochemistry, chemical biology, synthetic chemistry, medicinal chemistry, polymer and materials chemistry, computational chemistry, and bioanalytical chemistry.

The Department of Chemistry and Chemical Biology oversees the biotechnology graduate programs. The Master of Science in Biotechnology, a professional science master's degree program, is an innovative, nonthesis graduate degree. It combines advanced interdisciplinary training in biotechnology, biology, chemistry, and pharmaceutical sciences with the development of high-value business skills critical to success in today's dynamic workplace. Students are offered the opportunity to gain hands-on experience during the program through Northeastern's established co-op program.

The biotechnology program also offers several graduate certificates in the areas of biotechnology, experimental biotechnology, molecular biotechnology, process science, biopharmaceutical analytical sciences, pharmaceutical technologies, regulatory science, manufacturing and quality operations, and biotechnology enterprise.

Programs

Doctor of Philosophy (PhD)

- Chemistry (p. 435)

Master of Science (MS)

- Biotechnology (p. 436)
- Chemistry (p. 440)

Graduate Certificate

- Biodefense and Biosecurity (p. 441)
- Biopharmaceutical Analytical Sciences (p. 264)
- Biotechnology (p. 441)
- Biotechnology Enterprise (p. 441)
- Biotechnology Regulatory Science (p. 442)
- Experimental Biotechnology (p. 442)
- Manufacturing and Quality Operations in Biotechnology (p. 442)
- Molecular Biotechnology (p. 442)
- Pharmaceutical Technologies (p. 443)
- Process Science (p. 443)
- Vaccine Development (p. 443)

Chemistry, PhD

The PhD program in chemistry is designed for students who have earned a bachelor's or a master's degree in chemistry or related areas and who wish to earn a doctorate in chemistry. Research spans a wide range of multidisciplinary fields, with strengths in clean energy, polymers, materials, medicinal chemistry, bioanalytical chemistry, and chemical biology. Our research programs draw from a strong foundation in analytical, organic, physical, and biological chemistry in a collaborative and diverse environment. Our student-focused approach to mentoring, a strong graduate student association, and faculty deeply rooted both in academics and industry provide a flexible platform for student development toward a large diversity of career paths.

Students typically take courses their first year while supported on teaching assistantships and achieve PhD candidacy in the second year. The primary emphasis of the program is on the completion of an original research project, its articulation in a well-written thesis, and its subsequent defense before the thesis committee through an open seminar followed by oral examination by the committee members.

PhD Program Requirements

Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Three qualifying examinations
Annual review
Candidacy
Minimum of two seminars
Dissertation committee
Dissertation proposal

Dissertation defense

Core Requirements

Code	Title	Hours
Required Core		
CHEM 5600	Research Skills and Ethics in Chemistry	3
CHEM 7710	Laboratory Rotations in Chemistry and Chemical Biology	0
CHEM 7750	Advanced Problem Solving	3
Complete the following (repeatable) course three times:		3
CHEM 5501	Chemical Safety in the Research Laboratory	
Seminar		
At least one seminar must be taken for a letter grade.		
CHEM 8504	Graduate Seminar	1
Research		
CHEM 8984	Research	1-6
Chemistry		
Complete 18 semester hours from the following:		18
CHEM 5550 or within the range of CHEM 5610 to CHEM 7320		

Dissertation

Code	Title	Hours
Complete the following courses:		
CHEM 9990	Dissertation Term 1	
CHEM 9991	Dissertation Term 2	
Registration in the following course is required for any additional terms taken to complete the dissertation.		
CHEM 9996	Dissertation Continuation	

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

Advanced Entry PhD Program Requirements

Advanced entry into the PhD program requires a master's degree in chemistry or a related area. Graduate courses taken during acquisition of the Master of Science degree allow completion of the PhD program with fewer course credits. Other than the course requirements, which are specified separately, see the PhD program requirements for details.

Industry Entry PhD

This program is strictly for students who already have a master's degree in chemistry or related area and have full-time employment at a company. The company must commit to all financial responsibilities accrued in obtaining the degree and allow time for the student to work on a PhD thesis in collaborative research with a company supervisor and one of our faculty members. Graduate courses in the Department of Chemistry and Chemical Biology are generally taught in the evenings to accommodate the fact that our students work in industry during the day.

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Three qualifying examinations
Annual review
Candidacy
Minimum of two seminars
Dissertation committee
Dissertation proposal
Dissertation defense

Core Requirements

Code	Title	Hours
Required Core		
CHEM 5600	Research Skills and Ethics in Chemistry	3
CHEM 7750	Advanced Problem Solving	3
Seminar		
CHEM 8504	Graduate Seminar	1

Dissertation

Code	Title	Hours
CHEM 9990	Dissertation Term 1	
CHEM 9991	Dissertation Term 2	

Program Credit/GPA Requirements

7 total semester hours required
Minimum 3.000 GPA required

Biotechnology, MS

Overview

Northeastern's Master of Science in Biotechnology is a professional master's program, an innovative, nonthesis graduate degree. It combines advanced interdisciplinary training in biotechnology, biology, chemistry, and pharmaceutical sciences with the development of high-value business skills critical to success in today's dynamic workplace. This program is designed to prepare graduates to innovate, collaborate, and lead as research, managerial, or technical professionals in a wide range of biotechnology specialties.

AGRICULTURAL BIOTECHNOLOGY CONCENTRATION

The agricultural concentration goes beyond the production of biological drugs and focuses on the key agricultural biotechnology (agritech) principles and methods used today. Students have an opportunity to learn the principles of agritech and the role they play in the concepts and fundamentals of agriculture today. The concentration addresses plant, animal, food, and ecological biotechnology. The learning of the students is reinforced by both lecture courses and project-driven laboratory experience that provides hands-on learning of modern agricultural methodologies.

BIODEFENSE CONCENTRATION

The biodefense concentration is designed to prepare students for the initial homeland biodefense and bioterrorism response. Students have an opportunity to learn the microbiology and epidemiology of biological agents that are potential threats, identify and propose countermeasures, and develop expertise in response and recovery strategies and policies. The learning combines the foundational biotechnology courses with case-based and hands-on bioethical, biowarfare, and bioterrorism courses.

BIOPHARMACEUTICAL ANALYTICAL SCIENCES CONCENTRATION

The biopharmaceutical analytical sciences concentration focuses on structures and activities of biological molecules and their variants formed during the production of biopharmaceuticals. Students have an opportunity to learn the diversity of molecular forms derived from the biological products through various biological and chemical mechanisms and the impact of these structural changes on the safety and efficacy of these biopharmaceuticals. The students have an opportunity to learn the

science and practice applied in the biotechnology industry to analyze and characterize these molecular forms. This is accomplished through both lecture courses of the analytical sciences and project-driven laboratory experience that utilizes analytical techniques such as mass spectrometry and molecular separations.

BIOTECHNOLOGY ENTERPRISE CONCENTRATION

The biotechnology enterprise concentration integrates business and management skills with the science of biotechnology. Students have an opportunity to learn the fundamental concepts of leadership, entrepreneurship, innovation, financial decision making, and marketing. They gain teamwork, management, and business development skills in the process and graduate prepared to become scientist-managers.

BIOTECHNOLOGY REGULATORY SCIENCE CONCENTRATION

The biotechnology regulatory science concentration focuses on the science behind good regulatory practice today. This concentration addresses the issues surrounding current and innovative science practices that influence regulatory decisions. Students have an opportunity to learn the science behind compliance. This is accomplished through both lecture courses and project-driven laboratory experience that provides hands-on learning of the science behind dossier analysis.

MANUFACTURING AND QUALITY OPERATIONS CONCENTRATION

The manufacturing and quality operations concentration has been designed in response to a need in the biotechnology industry for individuals with an advanced knowledge of the principles and practices of state-of-the-art biopharmaceutical manufacturing and quality operations. In particular, the focus of this concentration is training the workforce to ensure quality medicines are produced. Individuals, particularly those who are working in the various sectors of biotechnology including basic research of biological systems, discovery, development, and manufacturing of biopharmaceuticals, have an opportunity to improve their competency and learn new practical skills, which enables them to increase productivity and further contribute to their professions.

MOLECULAR BIOTECHNOLOGY CONCENTRATION

The molecular biotechnology concentration provides students with didactic and practical knowledge in molecular biotechnology, protein expression, and structural biology. Students have an opportunity to learn how to generate and optimize molecular forms used to express recombinant proteins to be used as biopharmaceuticals. Particular attention is paid to cutting-edge technologies such as RNAi and CRISPR/CAS9. In addition, the students have an opportunity to learn how to purify biopharmaceuticals and analyze aggregation and how to prevent it.

PHARMACEUTICAL TECHNOLOGIES CONCENTRATION

The pharmaceutical technologies concentration focuses on the conversion of purified proteins to biopharmaceutical drug products that are compatible for clinical use. This concentration addresses the design of the product formulation and the development and implementation of the drug product manufacturing processes. Students have an opportunity to learn the sciences of the interactions of the biologic molecules in the process conditions and the relevant process technology, such as aseptic operations and freeze-drying, needed for drug product manufacturing. This is accomplished through both lecture courses and project-driven laboratory experience that offers hands-on learning of formulation design and drug product process development.

PROCESS SCIENCE CONCENTRATION

The process science concentration focuses on the production of drug substance of biopharmaceuticals from cell culture process to purification of the biologic molecules. Students have an opportunity to learn the principles of development and implementation of biological manufacturing processes through the integration of concepts and fundamentals of engineering and life sciences. The concentration addresses biochemical engineering, mammalian cell culture process development, and protein purification. The learning of the students is reinforced by both lecture courses and project-driven laboratory experience that provides hands-on learning of cell culture and protein separation.

SCIENTIFIC INFORMATION MANAGEMENT CONCENTRATION

The scientific information management concentration focuses on the collection, analysis, and visualization of scientific data. This concentration addresses the issues surrounding big data that face industry today. Students have an opportunity to learn how to manage, store, visualize, and provide overall analysis of large scientific data sets. This is accomplished through both lecture courses and project-driven laboratory experience that provide hands-on learning of the impacts of data on the scientific process.

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Biotechnology with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Biotechnology in addition to earning a Graduate Certificate in Engineering Leadership (p. 245). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The certificate program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 42-semester-hour master's degree and certificate requires 26 hours of biotechnology coursework.

Northeastern's Experiential Master of Science in Biotechnology is an intensive, accelerated, experiential, job-relevant master's program featuring an adaptable array of experiential options hosted by employer partners with a built-in talent acquisition pathway. The experiential MS builds on five pillars to create an innovative, evidence-based, work-based learning (WBL) experience to deliver a robust, industry-aligned curriculum with richly integrated experiential learning centered on deep employer engagement; problem solving and critical thinking skills; and augmented with support layers for *problem solving, critical thinking*, *student services*, career design, and *built-in talent acquisition* to match rising professionals with hiring employer partners in high-demand domains.

Traditional Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Required Core		
BIOT 5120	Foundations in Biotechnology	3
BIOT 5219	The Biotechnology Enterprise	2
BIOT 5400	Scientific Information Management for Biotechnology Managers	3
BIOT 5631	Cell Culture Processes for Biopharmaceutical Production	3
BIOT 6214	Experimental Design and Biostatistics	2
BIOL 6299	Molecular Cell Biology for Biotechnology	3
CHEM 5620	Protein Chemistry	3
Co-op		

BIOT 6500	Professional Development for Co-op	0
BIOT 6964	Co-op Work Experience	0

Concentrations

Complete one of the following concentrations or the elective option:

- Agricultural Biotechnology (p. 438)
- Biodefense (p. 438)
- Biopharmaceutical Analytical Sciences (p. 438)
- Biotechnology Enterprise (p. 438)
- Biotechnology Regulatory (p.) Science (p.) (formerly *Regulatory Science*)
- Manufacturing and Quality Operations (p. 438)
- Molecular Biotechnology (p. 438)
- Pharmaceutical Technologies (p.)
- Process Science (p.)
- Scientific Information Management (p.)(formerly *Scientific Information Science*)
- Elective Option (p.)

AGRICULTURAL BIOTECHNOLOGY CONCENTRATION

Code	Title	Hours
BIOT 5145	Basic Biotechnology Lab Skills	1
BIOT 6100	Agricultural Biotechnology	3
BIOT 7245	Biotechnology Applications Laboratory	3
ENVR 6102	Environmental Science and Policy Seminar 2	4
Electives (p. 439)		4

BIODEFENSE CONCENTRATION

Code	Title	Hours
BIOT 5145	Basic Biotechnology Lab Skills	1
BIOT 5810	Cutting-Edge Applications in Molecular Biotechnology	3
BIOT 6600	Agents of Bioterrorism	3
BIOT 6610	Biosecurity and Bioterrorism	3
PPUA 6532	Building Resilience into Local Government	4
Electives (p. 439)		1

BIOPHARMACEUTICAL ANALYTICAL SCIENCES CONCENTRATION

Code	Title	Hours
BIOT 5145	Basic Biotechnology Lab Skills	1
BIOT 7245	Biotechnology Applications Laboratory	3
CHEM 5550	Introduction to Glycobiology and Glycoprotein Analysis	3
BIOT 6320	Quality Management Systems and Validation	3
Electives (p. 439)		5

BIOTECHNOLOGY ENTERPRISE CONCENTRATION

Code	Title	Hours
BIOT 5225	Managing and Leading a Biotechnology Company	3
BIOT 5227	Launching Your Science: Biotechnology Entrepreneurship	3
Electives (p. 439)		9

BIOTECHNOLOGY REGULATORY SCIENCE CONCENTRATION

Code	Title	Hours
BIOT 5145	Basic Biotechnology Lab Skills	1
BIOT 5330	Drug Safety and Immunogenicity	3
BIOT 5500	Concepts in Regulatory Science	3
BIOT 6320	Quality Management Systems and Validation	3
or BIOT 5340	Introduction to Biotherapeutic Approvals	
BIOT 7245	Biotechnology Applications Laboratory	3
Electives (p. 439)		2

MANUFACTURING AND QUALITY OPERATIONS CONCENTRATION

Code	Title	Hours
BIOT 5145	Basic Biotechnology Lab Skills	1
BIOT 6300	Pharmaceutical Microbiology	3
BIOT 6320	Quality Management Systems and Validation	3
BIOT 6340	Sterile Manufacturing Operations	3
BIOT 7245	Biotechnology Applications Laboratory	3
Electives (p. 439)		2

MOLECULAR BIOTECHNOLOGY CONCENTRATION

Code	Title	Hours
BIOT 5145	Basic Biotechnology Lab Skills	1
BIOT 5810	Cutting-Edge Applications in Molecular Biotechnology	3
BIOT 5850	Higher-Order Structure Analytics	3
BIOT 7245	Biotechnology Applications Laboratory	3
Electives (p. 439)		5

PHARMACEUTICAL TECHNOLOGIES CONCENTRATION

Code	Title	Hours
BIOT 5145	Basic Biotechnology Lab Skills	1
BIOT 5640	Drug Product Processes for Biopharmaceuticals	3
BIOT 5700	Molecular Interactions of Proteins in Biopharmaceutical Formulations	3
BIOT 7245	Biotechnology Applications Laboratory	3
Electives (p. 439)		5

PROCESS SCIENCE CONCENTRATION

Code	Title	Hours
BIOT 5145	Basic Biotechnology Lab Skills	1
BIOT 5560	Bioprocess Fundamentals	3
BIOT 5635	Downstream Processes for Biopharmaceutical Production	3
BIOT 7245	Biotechnology Applications Laboratory	3
Electives (p. 439)		5

SCIENTIFIC INFORMATION MANAGEMENT CONCENTRATION

Code	Title	Hours
BIOT 5145	Basic Biotechnology Lab Skills	1
BIOT 7245	Biotechnology Applications Laboratory	3
DA 5020	Collecting, Storing, and Retrieving Data	4
or DA 5030	Introduction to Data Mining/Machine Learning	

INSH 5301	Introduction to Computational Statistics	4
Electives (p. 439)		3

ELECTIVE OPTION

Code	Title	Hours
BIOT 5145	Basic Biotechnology Lab Skills	1
BIOT 7245	Biotechnology Applications Laboratory	3
Electives (p. 439)		11

Elective List

Code	Title	Hours
Complete electives from the following list and/or 1-credit BUSN graduate-level courses. Electives not on this list may be chosen with faculty advisor approval.		
BINF 6308	Bioinformatics Computational Methods 1	
BIOE 5430	Principles and Applications of Tissue Engineering	
BIOE 6000	Principles of Bioengineering	
BIOL 5307	Biological Electron Microscopy	
BIOL 5543	Stem Cells and Regeneration	
BIOL 5549	Inventions in Microbial Biotechnology	
BIOL 5569	Advanced Microbiology	
BIOL 5573	Medical Microbiology	
BIOL 5581	Biological Imaging	
BIOL 5583	Immunology	
BIOL 5587	Comparative Neurobiology	
BIOL 5591	Advanced Genomics	
BIOL 6381	Ethics in Biological Research	
BIOL 6399	Dynamics of Microbial Ecology	
BIOT 5220	The Role of Patents in the Biotechnology Industry, Past and Future	
BIOT 5225	Managing and Leading a Biotechnology Company	
BIOT 5226	Biotechnology Entrepreneurship	
BIOT 5227	Launching Your Science: Biotechnology Entrepreneurship	
BIOT 5330	Drug Safety and Immunogenicity	
BIOT 5340	Introduction to Biotherapeutic Approvals	
BIOT 5400	Scientific Information Management for Biotechnology Managers	
BIOT 5500	Concepts in Regulatory Science	
BIOT 5560	Bioprocess Fundamentals	
BIOT 5635	Downstream Processes for Biopharmaceutical Production	
BIOT 5640	Drug Product Processes for Biopharmaceuticals	
BIOT 5700	Molecular Interactions of Proteins in Biopharmaceutical Formulations	
BIOT 5810	Cutting-Edge Applications in Molecular Biotechnology	
BIOT 5850	Higher-Order Structure Analytics	
BIOT 6300	Pharmaceutical Microbiology	
BIOT 6310	CGMP Statutes and Regulation	
BIOT 6320	Quality Management Systems and Validation	
BIOT 6330	Plant Design and Facilities	
BIOT 6340	Sterile Manufacturing Operations	
CHEM 5550	Introduction to Glycobiology and Glycoprotein Analysis	
CHEM 5616	Protein Mass Spectrometry	
CHEM 5617	Protein Mass Spectrometry Laboratory	
CHEM 5621	Principles of Chemical Biology for Chemists	
CHEM 5625	Chemistry and Design of Protein Pharmaceuticals	
CHEM 5638	Molecular Modeling	
CHEM 7247	Advances in Nanomaterials	
CHME 7340	Chemical Engineering Kinetics	
DA 5020	Collecting, Storing, and Retrieving Data	
DA 5030	Introduction to Data Mining/Machine Learning	
ENTR 6200	Enterprise Growth and Innovation	
ENTR 6210	Managing Operations in Early Stage Ventures	
ENTR 6211	Entrepreneurship: Services and Retail Business Creation	
ENTR 6212	Business Planning for New Ventures	
ENTR 6225	Acquisitions, Alliances, and Growth	
HINF 5105	The American Healthcare System	
HINF 6201	Organizational Behavior, Work Flow Design, and Change Management	
INSH 5301	Introduction to Computational Statistics	
INTB 6200	Managing the Global Enterprise	
INTB 6212	Cultural Aspects of International Business	
MGMT 6210	Law for Managers and Entrepreneurs	
MGSC 6200	Information Analysis	
NNMD 5270	Introduction to Nanomedicine	
NNMD 5470	Nano/Biomedical Commercialization: Concept to Market	
PHSC 5300	Pharmaceutical Biochemistry	
PHSC 5560	Nanotoxicity	
PHSC 6218	Biomedical Chemical Analysis	
PHSC 6224	Behavioral Pharmacology and Drug Discovery	
PHSC 6290	Biophysical Methods in Drug Discovery	
PHSC 7010	Pharmaceutical Sciences Laboratory	
POLS 7341	Security and Resilience Policy	
POLS 7346	Resilient Cities	
POLS 7343	Counterterrorism	
POLS 7344	Hard Power, Soft Power, and Smart Power	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5262	Big Data for Cities	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	

TECE 6230	Entrepreneurial Marketing and Selling
TECE 6250	Lean Design and Development

Program Credit/GPA Requirements

34 total semester hours required
Minimum 3.000 GPA required

Experiential Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Required Core		
BIOL 6299	Molecular Cell Biology for Biotechnology	3
BIOT 5120	Foundations in Biotechnology	3
BIOT 5219	The Biotechnology Enterprise	2
BIOT 5400	Scientific Information Management for Biotechnology Managers	3
BIOT 5500	Concepts in Regulatory Science	3
BIOT 5631	Cell Culture Processes for Biopharmaceutical Production	3
BIOT 6214	Experimental Design and Biostatistics	2
BIOT 6980	Biotechnology Capstone	2
BIOT 7245	Biotechnology Applications Laboratory	3
BIOT 7250	Advanced Biotechnology Applications Laboratory	3
CHEM 5620	Protein Chemistry	3
Co-op		
BIOT 6500	Professional Development for Co-op	0
BIOT 6964	Co-op Work Experience	0

Program Credit/GPA Requirements

30 total semester hours required
Minimum 3.000 GPA required

Sample Plan of Study for Experiential Program

Year 1

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
BIOT 5120 (Term A)	3	CHEM 5620 (Part A)	3	BIOT 6500	0
BIOT 5631 (Term A)	3	BIOL 6299 (Part A)	3	BIOT 6964	0
BIOT 7245 (Hybrid, 1 week residency)	3	BIOT 7250 (Hybrid, 1 week residency)	3	BIOT 6980 (Portfolio)	2
BIOT 5219 (Term B)	2	BIOT 6214 (Term B)	2		
BIOT 5400 (Term B)	3	BIOT 5500 (Term B)	3		
	14		14		2

Total Hours: 30

Experiential Program Plan of Study

Year 1

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
BIOT 5120 (Term A)	3	CHEM 5620 (Part A)	3	BIOT 6500	0
BIOT 5631 (Term A)	3	BIOL 6299 (Part A)	3	BIOT 6964	0
BIOT 7245 (Hybrid, 1 week residency)	3	BIOT 7250 (Hybrid, 1 week residency)	3	BIOT 6980 (Portfolio)	2
BIOT 5219 (Term B)	2	BIOT 6214 (Term B)	2		
BIOT 5400 (Term B)	3	BIOT 5500 (Term B)	3		
	14		14		2

Total Hours: 30

Chemistry, MS

Master's Coursework Option

The Department of Chemistry and Chemical Biology offers a full-time or part-time, course-based master's degree. Classes are generally offered in the evenings to accommodate students who have full-time jobs. A research thesis is not a requirement for the degree.

Master's Thesis Option

The department welcomes applications for the thesis-based master's degree only from students who are currently enrolled at Northeastern.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete 30 semester hours from the following courses:		30
CHEM 5550 to CHEM 7750		

THESIS OPTION

Code	Title	Hours
Course Work		
Complete 18 semester hours from the following:		18
CHEM 5550, or within the range of CHEM 5610 to CHEM 7320		
Graduate Seminar		
Seminar must be completed twice. At least one seminar must be taken for a letter grade.		2
CHEM 5904	Seminar	
or CHEM 8504	Graduate Seminar	
Laboratory		
Complete the following (repeatable) course twice:		2
CHEM 5501	Chemical Safety in the Research Laboratory	
Research		

CHEM 5984	Research	4-6
or CHEM 8984	Research	
Thesis		
CHEM 7990	Thesis	4

Program Credit/GPA Requirements

30 total semester hours required
Minimum 3.000 GPA required

Biodefense and Biosecurity, Graduate Certificate

The Graduate Certificate in Biodefense and Biosecurity has been designed in response to a need in the biotechnology industry for individuals who desire to become professionals in biodefense or biosecurity. The concentration seeks to give individuals a background into the technology to detect, analyze, and respond to biosecurity threats. Enrolled students will study the microbiology and epidemiology of biological agents that are potential threats; identify and propose what countermeasures can be used; and through coursework develop expertise in the response, strategies, and policies related to biodefense and biosecurity. The graduate certificate consists of three biotechnology courses and one public policy and urban affairs course totaling 13-semester-hour credits.

Program Requirements

Required Courses

Code	Title	Hours
BIOT 6600	Agents of Bioterrorism	3
BIOT 6610	Biosecurity and Bioterrorism	3
BIOT 5400	Scientific Information Management for Biotechnology Managers	3
PPUA 6532	Building Resilience into Local Government	4

Program Credit/GPA Requirements

13 total semester hours required
Minimum 3.000 GPA required

Biopharmaceutical Analytical Sciences, Graduate Certificate

The Graduate Certificate in Biopharmaceutical Analytical Sciences has been designed in response to a need in the biotechnology industry for individuals with an advanced knowledge of the principles and practices of state-of-the-art analyses of protein with focus on the characterization of innovator and biosimilars. Individuals, particularly those who are working in the various sectors of biotechnology including basic research of biological systems, discovery, development, and manufacturing of biopharmaceuticals, have an opportunity to improve their competency and learn new practical skills that enable them to increase productivity and further contribute to their professions. In addition, the certificate was designed for both individuals with and without experience in biopharmaceuticals and their analysis.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
BIOT 5400	Scientific Information Management for Biotechnology Managers	3
BIOT 6320	Quality Management Systems and Validation	3
CHEM 5550	Introduction to Glycobiology and Glycoprotein Analysis	3
CHEM 5617	Protein Mass Spectrometry Laboratory	3

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

Biotechnology, Graduate Certificate

The Graduate Certificate in Biotechnology has been designed in response to a need in the biotechnology industry for individuals without a biotechnology background to obtain a strong foundation in basic biotechnology concepts and skills. Individuals, particularly those who are working in fields other than biotechnology, will acquire competency and learn new practical skills enabling them to increase productivity and allow for transitions into more biotechnology-related fields.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
BIOL 6299	Molecular Cell Biology for Biotechnology	3
BIOT 5120	Foundations in Biotechnology	3
BIOT 5631	Cell Culture Processes for Biopharmaceutical Production	3
CHEM 5620	Protein Chemistry	3

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

Biotechnology Enterprise, Graduate Certificate

The graduate certificate in biotechnology enterprise has been designed in response to a need in the biotechnology industry for individuals with a biotechnology background to obtain a strong foundation in the business aspects of biotechnology. Individuals, particularly those who are working in the field of biotechnology, will improve their business competency enabling them to better manage a team or move into a more business-orientated role.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Required Courses		
BIOT 5225	Managing and Leading a Biotechnology Company	3

BIOT 5227	Launching Your Science: Biotechnology Entrepreneurship	3
BIOT 5400	Scientific Information Management for Biotechnology Managers	3

Elective

Code	Title	Hours
Complete one elective from the following list:		3
ENTR 6200	Enterprise Growth and Innovation	
ENTR 6210	Managing Operations in Early Stage Ventures	
ENTR 6211	Entrepreneurship: Services and Retail Business Creation	
ENTR 6212	Business Planning for New Ventures	
ENTR 6225	Acquisitions, Alliances, and Growth	
INTB 6200	Managing the Global Enterprise	
INTB 6212	Cultural Aspects of International Business	
MGMT 6210	Law for Managers and Entrepreneurs	
MGSC 6200	Information Analysis	

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

Biotechnology Regulatory Science, Graduate Certificate

This certificate was designed in response to a need in the biotechnology industry for individuals, in particular regulators, to obtain a strong foundation in the science behind good regulatory practice today, specifically in relation to biopharmaceuticals.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
BIOT 5330	Drug Safety and Immunogenicity	3
BIOT 5500	Concepts in Regulatory Science	3
BIOT 6320	Quality Management Systems and Validation	3
or BIOT 5340	Introduction to Biotherapeutic Approvals	
CHEM 5620	Protein Chemistry	3

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

Experimental Biotechnology, Graduate Certificate

The graduate certificate in experimental biotechnology has been designed in response to a need in the biotechnology industry for individuals without a biotechnology background to obtain a strong foundation in lab-based, hands-on, biotechnology skills. Individuals, particularly those who are working in fields other than biotechnology, will acquire competency and learn new practical lab skills enabling them to increase productivity and transition into more biotechnology-related fields.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
BIOT 5145	Basic Biotechnology Lab Skills	1
BIOT 5219	The Biotechnology Enterprise	2
BIOL 5549	Inventions in Microbial Biotechnology	4
BIOT 6214	Experimental Design and Biostatistics	2
BIOT 7245	Biotechnology Applications Laboratory	3

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

Manufacturing and Quality Operations in Biotechnology, Graduate Certificate

The graduate certificate in manufacturing and quality operations has been designed in response to a need in the biotechnology industry for individuals with an advanced knowledge of the principles and practices of state-of-the-art biopharmaceutical manufacturing and quality operations. In particular, the focus of this certificate is training the workforce to ensure quality medicines are produced. Individuals, particularly those who are working in the various sectors of biotechnology including basic research of biological systems, discovery, development, and manufacturing of biopharmaceuticals, have an opportunity to improve their competency and learn new practical skills, which enables them to increase productivity and further contribute to their professions.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
BIOT 6300	Pharmaceutical Microbiology	3
BIOT 6310	CGMP Statutes and Regulation	3
BIOT 6320	Quality Management Systems and Validation	3
BIOT 6340	Sterile Manufacturing Operations	3

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

Molecular Biotechnology, Graduate Certificate

The graduate certificate in molecular biotechnology has been designed in response to a need in the biotechnology industry for individuals with an advanced knowledge of the principles and practices of state-of-the-art molecular biology techniques and advanced protein structure analysis. Individuals, particularly those who are working in the various sectors of biotechnology including basic research of biological systems, discovery, development and manufacturing of biopharmaceuticals, will improve

improve their competency and learn new practical skills enabling them to increase productivity and further contribute to their professions.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
BIOT 5400	Scientific Information Management for Biotechnology Managers	3
BIOT 5700	Molecular Interactions of Proteins in Biopharmaceutical Formulations	3
BIOT 5810	Cutting-Edge Applications in Molecular Biotechnology	3
BIOT 5850	Higher-Order Structure Analytics	3

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

Pharmaceutical Technologies, Graduate Certificate

The Graduate Certificate in Pharmaceutical Technologies has been designed in response to a need in the biotechnology industry for individuals with an advanced knowledge of the principles and practices of the stages of drug development, biopharmaceutical development. Individuals, particularly those who are working in the various sectors of biotechnology including basic research of biological systems, discovery, development, and manufacturing of biopharmaceuticals, will improve their competency and learn new practical skills enabling them to increase productivity and further contribute to their professions.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
BIOT 5400	Scientific Information Management for Biotechnology Managers	3
BIOT 5640	Drug Product Processes for Biopharmaceuticals	3
BIOT 5700	Molecular Interactions of Proteins in Biopharmaceutical Formulations	3
CHEM 5550	Introduction to Glycobiology and Glycoprotein Analysis	3

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

Process Science, Graduate Certificate

The graduate certificate in process sciences has been designed in response to a need in the biotechnology industry for individuals with an advanced knowledge of the principles and practices of process development of biopharmaceuticals. Individuals, particularly those who are working in the various sectors of biotechnology including basic research of biological systems, discovery, development and manufacturing of biopharmaceuticals, will improve their competency and learn new practical skills enabling them to increase productivity and further contribute to their professions.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
BIOT 5400	Scientific Information Management for Biotechnology Managers	3
BIOT 5560	Bioprocess Fundamentals	3
BIOT 5635	Downstream Processes for Biopharmaceutical Production	3
BIOT 5640	Drug Product Processes for Biopharmaceuticals	3

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

Vaccine Development, Graduate Certificate

The SARS-CoV-2 pandemic has reemphasized the importance of vaccines in our medical toolkit to prevent the spread of infectious diseases. The Certificate in Vaccine Development explores what vaccines are, how they work (immunization), how regulatory science has evolved in vaccine approvals, and how vaccines are created. This certificate includes three courses specifically focused on the science of vaccines and two courses focusing on cell culture and good manufacturing practices. Credits earned in this certificate may be used to satisfy requirements in the Master of Science in Biotechnology.

Program Requirements

Core Requirements

Code	Title	Hours
BIOT 5631	Cell Culture Processes for Biopharmaceutical Production	3
BIOT 5910	Vaccines and Immunization	3
BIOT 5920	Foundations in Vaccine Regulatory Science	3
BIOT 5930	Molecular Tools for Vaccine Design	3
BIOT 6310	CGMP Statutes and Regulation	3

Program Credit/GPA Requirements

15 total semester hours required
Minimum 3.000 GPA required

Marine and Environmental Sciences

Website (http://www.northeastern.edu/mes/)

Geoffrey C. Trussell, PhD
Professor and Chair

Marine Science Center
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gradmes@northeastern.edu

The PhD program in marine and environmental sciences is designed to train high-caliber and independent scientists whose research addresses fundamental and applied ecological and evolutionary questions at local, regional, national, and global scales.

This training will include both general and specialized coursework in ecology and evolution, geoscience, sustainability, and marine sciences, with curricular programs providing specialized options tailored to each student's research interests. Students benefit from top-notch research facilities at the Marine Science Center in Nahant and on the main campus in Boston. Graduates of the program are prepared for careers in academia, government agencies, and the private sector.

The Master of Science in Marine Biology, also known as the Three Seas Program, gives students an opportunity to learn in three world-renowned research facilities in New England, the Caribbean, and the Pacific Northwest. In addition to rigorous coursework, the program offers the opportunity for students to formulate research questions, design and conduct critical experiments, and interpret and present results. The 15-month program culminates with an internship in the field and independent research project.

The Master of Science in Environmental Science and Policy is a joint program between the College of Science and the College of Social Sciences and Humanities. The interdisciplinary program aims to prepare the next generation of environmental professionals for dynamic opportunities focused on the science and policy of sustainability and resilience.

Programs

Doctor of Philosophy (PhD)

- Marine and Environmental Sciences (p. 444)

Master of Science (MS)

- Environmental Science and Policy (p. 446)
- Marine Biology—Three Seas Program (p. 448)

Marine and Environmental Sciences, PhD

The PhD in Marine and Environmental Sciences (MES) program provides students with advanced course work and training in the concentration areas of marine sciences, geosciences, sustainability sciences, and ecology and evolutionary biology.

Students must pass three examinations during the course of their graduate studies:

1. An oral examination by the student's dissertation committee.
2. A proposal defense presented to the student's dissertation committee that explains the research areas that the student proposes to work in.
3. A defense of the student's written dissertation consisting of a public seminar, public question-and-answer period, and private defense of their work to their dissertation committee. Dissertation committees consist of at least four Northeastern faculty and one external faculty member.

A cumulative GPA of 3.000 is required for graduation. All PhD students are required to have at least two first-authored publications submitted to or accepted in a peer-reviewed journal prior to their defense. The PhD will be awarded following submission of a dissertation, approved by the candidate's dissertation committee, to the College of Science.

Students who do not qualify for the doctoral degree, but who have completed required coursework with a cumulative GPA of 3.000 or better, may be eligible to receive a terminal MS Marine and Environmental Sciences (p. 449) *degree. Note that no students will be admitted directly into the Marine and Environmental Sciences program to pursue a master's degree.*

PhD Program Requirements

Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review
Dissertation committee
Qualifying examination
Dissertation proposal
Candidacy
First-author publication
Dissertation defense

Core Requirements

Code	Title	Hours
Statistics		
Complete one of the following:		4-5
ENVR 6500 and ENVR 6501	Biostatistics and Lab for ENVR 6500	
EEMB 5522	Experimental Design Marine Ecology	
Alternative statistics course as approved by graduate committee		
Research		
Complete the following (repeatable) course twice:		8
EEMB 8984	Research	

Concentration

Complete one of the following concentrations:

- Ecology and Evolutionary Biology (p. 444)
- Sustainability Sciences (p. 445)
- Geosciences (p. 445)
- Marine Sciences (p. 445)

ECOLOGY AND EVOLUTIONARY BIOLOGY

Code	Title	Hours
Seminars		
EEMB 7102	Seminar in Ecology and Evolutionary Biology	2
Complete one of the following:		2
EEMB 7101	Seminar in Marine Sciences	
EEMB 7103	Seminar in Sustainability Sciences	
EEMB 7104	Seminar in Geosciences	
Readings		
EEMB 8102	Readings in Ecology and Evolutionary Biology	2
Concentration-Specific Electives		
Complete 12 semester hours from the following:		12
ENVR 5210	Environmental Planning	
ENVR 5242 and ENVR 5243	Ancient Marine Life and Lab for ENVR 5242	
ENVR 5260	Geographical Information Systems	

EEMB 5130 and EEMB 5131	Ecological Dynamics and Lab for EEMB 5130
EEMB 5504	Biology of Corals
EEMB 5506	Biology and Ecology of Fishes
EEMB 5508	Marine Birds and Mammals
EEMB 5516 and EEMB 5517	Oceanography and Lab for EEMB 5516
EEMB 5518	Ocean and Coastal Processes
EEMB 5520	Tropical Marine Ecology
EEMB 5532	Physiological and Molecular Marine Ecology
Substitutions may be made with approval of graduate committee.	

SUSTAINABILITY SCIENCES

Code	Title	Hours
Seminars		
EEMB 7103	Seminar in Sustainability Sciences	2
Complete one of the following:		2
EEMB 7101	Seminar in Marine Sciences	
EEMB 7102	Seminar in Ecology and Evolutionary Biology	
EEMB 7104	Seminar in Geosciences	
Readings		
EEMB 8103	Readings in Sustainability Sciences	2
Concentration-Specific Electives		
Complete 12 semester hours from the following:		12
ENVR 5115	Advanced Topics in Environmental Geology	
ENVR 5260	Geographical Information Systems	
EEMB 5130 and EEMB 5131	Ecological Dynamics and Lab for EEMB 5130	
EEMB 5506	Biology and Ecology of Fishes	
EEMB 5516 and EEMB 5517	Oceanography and Lab for EEMB 5516	
EEMB 5518	Ocean and Coastal Processes	
INSH 5301	Introduction to Computational Statistics	
INSH 5302	Information Design and Visual Analytics	
INSH 6406	Analyzing Complex Digitized Data	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 7346	Resilient Cities	
POLS 7334	Social Networks	
Substitutions may be made with approval of graduate committee.		

GEOSCIENCES

Code	Title	Hours
Seminars		
EEMB 7104	Seminar in Geosciences	2
Complete one of the following:		2
EEMB 7101	Seminar in Marine Sciences	
EEMB 7102	Seminar in Ecology and Evolutionary Biology	
EEMB 7103	Seminar in Sustainability Sciences	
Readings		
EEMB 8104	Readings in Geosciences	2
Concentration-Specific Electives		
Complete 12 semester hours from the following:		12
ENVR 5115	Advanced Topics in Environmental Geology	
ENVR 5190	Soil Science	
ENVR 5210	Environmental Planning	
ENVR 5240 and ENVR 5241	Sedimentary Basin Analysis and Lab for ENVR 5240	
ENVR 5242 and ENVR 5243	Ancient Marine Life and Lab for ENVR 5242	
ENVR 5260	Geographical Information Systems	
ENVR 5270 and ENVR 5271	Glacial and Quaternary History and Lab for ENVR 5270	
EEMB 5518	Ocean and Coastal Processes	
Substitutions may be made with approval of graduate committee.		

MARINE SCIENCES

Code	Title	Hours
Seminars		
EEMB 7101	Seminar in Marine Sciences	2
Complete one of the following:		2
EEMB 7102	Seminar in Ecology and Evolutionary Biology	
EEMB 7103	Seminar in Sustainability Sciences	
EEMB 7104	Seminar in Geosciences	
Readings		
EEMB 8101	Readings in Marine Sciences	2
Concentration-Specific Electives		
Complete 12 semester hours from the following:		12
ENVR 5242 and ENVR 5243	Ancient Marine Life and Lab for ENVR 5242	
ENVR 5260	Geographical Information Systems	
ENVR 5270 and ENVR 5271	Glacial and Quaternary History and Lab for ENVR 5270	
EEMB 5130 and EEMB 5131	Ecological Dynamics and Lab for EEMB 5130	
EEMB 5504	Biology of Corals	
EEMB 5506	Biology and Ecology of Fishes	
EEMB 5508	Marine Birds and Mammals	
EEMB 5516 and EEMB 5517	Oceanography and Lab for EEMB 5516	
EEMB 5518	Ocean and Coastal Processes	
EEMB 5520	Tropical Marine Ecology	
Substitutions may be made with approval of graduate committee.		

Dissertation

Code	Title	Hours
EEMB 9990	Dissertation Term 1	
EEMB 9991	Dissertation Term 2	

Program Credit/GPA Requirements

30 total semester hours required

Minimum 3.000 GPA required

Advanced Entry PhD Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review
Dissertation committee
Qualifying examination
Dissertation proposal
Candidacy
First-author publication
Dissertation defense

Core Requirements

Code	Title	Hours
Statistics		
Complete one of the following:		4-5
ENVR 6500 and ENVR 6501	Biostatistics and Lab for ENVR 6500	
EEMB 5522	Experimental Design Marine Ecology	
Alternative statistics course as approved by graduate committee		

Concentration

Complete one of the following concentrations:

- Ecology and Evolutionary Biology (p. 444)
- Sustainability Sciences (p. 445)
- Geosciences (p. 445)
- Marine Sciences (p. 445)

ECOLOGY AND EVOLUTIONARY BIOLOGY

Code	Title	Hours
Seminars		
EEMB 7102	Seminar in Ecology and Evolutionary Biology	2
Complete one of the following:		2
EEMB 7101	Seminar in Marine Sciences	
EEMB 7103	Seminar in Sustainability Sciences	
EEMB 7104	Seminar in Geosciences	
Readings		
EEMB 8102	Readings in Ecology and Evolutionary Biology	2

SUSTAINABILITY SCIENCES

Code	Title	Hours
Seminars		
EEMB 7103	Seminar in Sustainability Sciences	2
Complete one of the following:		2
EEMB 7101	Seminar in Marine Sciences	
EEMB 7102	Seminar in Ecology and Evolutionary Biology	
EEMB 7104	Seminar in Geosciences	
Readings		
EEMB 8103	Readings in Sustainability Sciences	2

GEOSCIENCES

Code	Title	Hours
Seminars		
EEMB 7104	Seminar in Geosciences	2
Complete one of the following:		2
EEMB 7101	Seminar in Marine Sciences	
EEMB 7102	Seminar in Ecology and Evolutionary Biology	
EEMB 7103	Seminar in Sustainability Sciences	
Readings		
EEMB 8104	Readings in Geosciences	2

MARINE SCIENCES

Code	Title	Hours
Seminars		
EEMB 7101	Seminar in Marine Sciences	2
Complete one of the following:		2
EEMB 7102	Seminar in Ecology and Evolutionary Biology	
EEMB 7103	Seminar in Sustainability Sciences	
EEMB 7104	Seminar in Geosciences	
Readings		
EEMB 8101	Readings in Marine Sciences	2

Dissertation

Code	Title	Hours
EEMB 9990	Dissertation Term 1	
EEMB 9991	Dissertation Term 2	

Program Credit/GPA Requirements

10 total semester hours required
Minimum 3.000 GPA required

Environmental Science and Policy, MS

The Master of Science in Environmental Science and Policy program emphasizes a broadly interdisciplinary and synthetic approach that integrates knowledge in the environmental sciences (conservation biology, climate change, fisheries science, ecosystem function, biodiversity, restoration ecology) with the social sciences (policy, economics, sociology, political science, and development) and humanities (environmental history, philosophy, and ethics). The goal of the program is to equip professionals with substantive breadth in knowledge and skills at the intersection of environmental science and policy. The program focuses on training students to think critically about the underlying causes of environmental problems and understanding the reciprocal relationships between coupled human-natural ecosystems and the interconnections between social and technological innovations. The program explores practical approaches and potential solutions that decision makers need to evaluate in policy debates related to promoting environmental sustainability.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Seminars		
PPUA 6101	Environmental Science and Policy Seminar 1	4
ENVR 6102	Environmental Science and Policy Seminar 2	4
Skills Courses		
Complete 2 courses from the following. At least one course needs to be taken from the College of Science Skills Course List and one course from the College of Social Sciences and Humanities Skills Course List.		8
College of Science Skills Course List		
EEMB 5130	Ecological Dynamics	
ENVR 5150	Climate and Atmospheric Change	
EEMB 5522	Experimental Design Marine Ecology	
ENVR 5210	Environmental Planning	
ENVR 5240	Sedimentary Basin Analysis	
ENVR 5260	Geographical Information Systems	
ENVR 6500	Biostatistics	
College of Social Sciences and Humanities Skills Course List		
INSH 5301	Introduction to Computational Statistics	
INSH 6300	Research Methods in the Social Sciences	
INSH 7400	Quantitative Analysis	
LPSC 7311	Strategizing Public Policy	
PPUA 5260	Ecological Economics	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
PPUA 6212	Research Toolkit for Urban and Regional Policy: Project Management	
PPUA 6213	Research Toolkit for Urban and Regional Policy: Data Visualization	
PPUA 6216	Research Toolkit for Urban and Regional Policy: Grant Writing	
PPUA 6502	Economic Analysis for Policy and Planning	
PPUA 6505	Public Budgeting and Financial Management	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6509	Techniques of Program Evaluation	
PPUA 6525	Institutions and Public Policy	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	

Electives

Complete five courses from the following list. At least one course must be taken from the College of Science Elective Course List and one courses from the College of Social Sciences and Humanities Elective Course List. Any skills course not taken to fulfill the skills courses requirement can be taken as an elective. Students may petition to enroll in other relevant graduate courses offered by other schools at Northeastern University.

COLLEGE OF SCIENCE ELECTIVE LIST

Code	Title	Hours
EEMB 5130 - EEMB 8984		
ENVR 5115 - ENVR 6900		

COLLEGE OF SOCIAL SCIENCES AND HUMANITIES ELECTIVE LIST

Code	Title	Hours
INSH 5302	Information Design and Visual Analytics	
INTL 5100	Climate and Development	
LPSC 7311	Strategizing Public Policy	
LPSC 7312	Cities, Sustainability, and Climate Change	
PHTH 5214	Environmental Health	
PHTH 5230	Global Health	
PPUA 5225	The Open Classroom: Public Debates on Public Policy	
PPUA 5230	Housing Policy	
PPUA 5234	Land Use and Urban Growth Policy	
PPUA 5249	Sustainable Urban Coastal Policy	
PPUA 5260	Ecological Economics	
PPUA 5262	Big Data for Cities	
PPUA 5264	Energy Democracy and Climate Resilience: Technology, Policy, and Social Change	
PPUA 5266	Urban Theory and Science	
PPUA 5268	International Environmental Policy	
PPUA 5270	Food Systems and Public Policy	
PPUA 5390	Special Topics in Public Policy and Urban Affairs	
PPUA 6201	The 21st-Century City: Urban Opportunities and Challenges in a Global Context	
PPUA 6505	Public Budgeting and Financial Management	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6522	Administrative Ethics and Public Management	
PPUA 6551	Nonprofit Organizations and Social Change	
PPUA 6552	The Nonprofit Sector in Civil Society and Public Affairs	
PPUA 6553	Nonprofit Financial Resource Development	
PPUA 6862	Internship with Research	
PPUA 6966	Practicum	
PPUA 7346	Resilient Cities	
PPUA 7673	Capstone in Public Policy and Urban Affairs	
SOCL 7267	Environment, Health, and Society	
SOCL 7287	Social Movements in Health	

Program Credit/GPA Requirements

36 total semester hours required
Minimum 3.000 GPA required

Marine Biology, MS

The MS in Marine Biology provides students the opportunity to study marine biology in three distinct environments at three world-renowned research facilities in New England, the Caribbean, and the Pacific Northwest. An internship in the field and independent research project provide the capstone to the fifteen-month graduate program.

Much more than course work in a classroom, the MS in Marine Biology delivers inquiry-based curriculum in marine science during which our students formulate research questions, design and conduct critical experiments, and interpret and present results. You will have an opportunity not only learn science, you have an opportunity to learn how to do science and become a marine scientist.

This program is for students eager to broaden their knowledge of marine biology or who want to further refine their interests.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Students register for International Study—Three Seas Program (ABRS 5120) for the fall and spring terms of year 1.

Code	Title	Hours
Seminar		
EEMB 5303	Marine Biology Careers Seminar	1-2
or EEMB 5305	Professional Development for Ocean Sciences	
Biology		
EEMB 5504 and EEMB 5505	Biology of Corals and Lab for EEMB 5504	3
EEMB 5506 and EEMB 5507	Biology and Ecology of Fishes and Lab for EEMB 5506	3
EEMB 5508	Marine Birds and Mammals	3
EEMB 5518 and EEMB 5519	Ocean and Coastal Processes and Lab for EEMB 5518	3
EEMB 5533 and EEMB 5535	Marine Invertebrate Zoology and Botany and Lab for EEMB 5533	3
Sustainability		
EEMB 5538	Conservation and Restoration of Marine Systems	3
EEMB 5542	Marine Spatial Planning	4
EEMB 5546	Sustainability of the Land-Sea Interface	3
Ecology		
EEMB 5520	Tropical Marine Ecology	2
EEMB 5522	Experimental Design Marine Ecology	3-4
or EEMB 5525	Advanced Field Methods in Marine Ecology	
EEMB 5540 and EEMB 5541	Changing Global Oceans and Lab for EEMB 5540	3
Research		
EEMB 5589	Diving Research Methods	2
Take the following (repeatable) course twice:		2
EEMB 7674	Marine Biology Research Project	

Program Credit/GPA Requirements

40 total semester hours required

Minimum 3.000 GPA required

Plan of Study

Fall Start

Year 1

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
EEMB 5305	2	EEMB 5504 and EEMB 5505	3	EEMB 7674	1
EEMB 5522	4	EEMB 5506 and EEMB 5507	3		
EEMB 5589	2	EEMB 5508	3		
EEMB 5546	3	EEMB 5518 and EEMB 5519	3		
EEMB 5542	4	EEMB 5520	2		
EEMB 5533 and EEMB 5535	3	EEMB 5538	3		
		EEMB 5540 and EEMB 5541	3		
	18		20		1

Year 2

Fall	Hours
EEMB 7674	1
	1

Total Hours: 40

Summer II Start

Year 1

	Summer 2	Hours
	EEMB 5546	3
	EEMB 5589	2
	EEMB 5525	3
		8

Year 2

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
EEMB 5508	3	EEMB 5542	4	EEMB 7674	1
EEMB 5538	3	EEMB 5305	2		
EEMB 5504 and EEMB 5505	3	MES Elective 5000+	4		
EEMB 5533 and EEMB 5535	3				
EEMB 5506 and EEMB 5507	3				
EEMB 5518 and EEMB 5519	3				
EEMB 5520	2				
	20		10		1

Year 3	
Fall	**Hours**
EEMB 7674	1
	1

Total Hours: 40

Marine and Environmental Sciences, MS

Please see PhD (p. 444)*Marine and Environmental Sciences* for further information about this program. No students will be admitted directly into this program to pursue a master's degree.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
All students must complete 30 SH; 20 SH must be graded coursework.		
Statistics		
Complete one of the following:		4
ENVR 6500	Biostatistics	
ENVR 6501	Lab for ENVR 6500	
An alternative statistics course may be completed upon approval by the graduate committee.		
Research		
Complete the following (repeatable) course twice:		8
EEMB 8984	Research	

Concentrations

Complete one of the following concentrations:

- Ecology and Evolutionary Biology (p. 449)
- Sustainability Sciences (p.)
- Geosciences (p.)
- Marine Sciences (p. 449)

ECOLOGY AND EVOLUTIONARY BIOLOGY

Code	Title	Hours
Seminars		
EEMB 7102	Seminar in Ecology and Evolutionary Biology	2
Complete one of the following:		2
EEMB 7101	Seminar in Marine Sciences	
EEMB 7103	Seminar in Sustainability Sciences	
EEMB 7104	Seminar in Geosciences	
Readings		
EEMB 8102	Readings in Ecology and Evolutionary Biology	2
Concentration-Specific Electives		
Complete 12 semester hours from the following:		12
ENVR 5210	Environmental Planning	
ENVR 5242 and ENVR 5243	Ancient Marine Life and Lab for ENVR 5242	
ENVR 5260	Geographical Information Systems	
EEMB 5130 and EEMB 5131	Ecological Dynamics and Lab for EEMB 5130	
EEMB 5504	Biology of Corals	
EEMB 5506	Biology and Ecology of Fishes	
EEMB 5508	Marine Birds and Mammals	
EEMB 5516 and EEMB 5517	Oceanography and Lab for EEMB 5516	
EEMB 5520	Tropical Marine Ecology	
EEMB 5532	Physiological and Molecular Marine Ecology	

Substitutions may be made with approval of graduate committee.

SUSTAINABILITY SCIENCES (P.)

Code	Title	Hours
EEMB 7103	Seminar in Sustainability Sciences	2
Complete one of the following:		2
EEMB 7101	Seminar in Marine Sciences	
EEMB 7102	Seminar in Ecology and Evolutionary Biology	
EEMB 7104	Seminar in Geosciences	
Complete 3 SH of coursework in statistics. The following list includes potential courses:		3
ENVR 6500	Biostatistics	
EEMB 5522	Experimental Design Marine Ecology	

GEOSCIENCES

Code	Title	Hours
EEMB 7104	Seminar in Geosciences	2
Complete one of the following:		2
EEMB 7101	Seminar in Marine Sciences	
EEMB 7102	Seminar in Ecology and Evolutionary Biology	
EEMB 7103	Seminar in Sustainability Sciences	
Complete 3 SH of coursework in statistics. The following list includes potential courses:		3
ENVR 6500	Biostatistics	
EEMB 5522	Experimental Design Marine Ecology	

MARINE SCIENCES

Code	Title	Hours
EEMB 7101	Seminar in Marine Sciences	2
Complete one of the following:		2
EEMB 7102	Seminar in Ecology and Evolutionary Biology	
EEMB 7103	Seminar in Sustainability Sciences	
EEMB 7104	Seminar in Geosciences	
Complete 3 SH of coursework in statistics. The following list includes potential courses:		3
EEMB 5522	Experimental Design Marine Ecology	
ENVR 6500	Biostatistics	

Program Credit/GPA Requirements

30 total semester hours required
Minimum 3.000 GPA required

Mathematics

Website (http://www.northeastern.edu/cos/mathematics/)

Egon Schulte, PhD
Professor and Chair

617.373.2450
617.373.5658 (fax)

Mathematics is of ever-increasing importance to our society and everyday life. It has long been the language of science and technology and provides a rich source of methods for analyzing and solving problems encountered in the physical world. Today, mathematics is essential in virtually all fields of human endeavor, including business, the arts, and the social sciences.

PhD students work with internationally recognized faculty in research programs in both pure and applied mathematics. The program is designed to provide students with a broad overview of current mathematics and a strong command of areas of specialization.

The Department of Mathematics also offers Master of Science degrees in mathematics, applied mathematics, and operations research. These programs prepare students for careers in business, industry, or government. Students pursuing degrees in applied math and operations research take part in Northeastern's signature co-op program.

In addition to the numerous seminars and colloquia at Northeastern, there are ample opportunities for students in the Boston area to learn about important recent advances in the field.

Programs

Doctor of Philosophy (PhD)

- Mathematics (p. 450)

Master of Science (MS)

- Applied Mathematics (p. 454)
- Mathematics (p. 455)

Master of Science in Operations Research (MSOR)

- Operations Research (p. 455)

Graduate Certificate

- Applied Mathematics (p. 456)

Mathematics, PhD

Course Requirements

Students entering with a bachelor's degree are required to take 64 semester hours of course work divided between foundational and advanced offerings. Students entering the program will be allowed to place out of some (possibly all) of the eight basic-level courses; the graduate coordinator together with the first-year graduate advisor will determine the allowable course substitutions and will advise the student which foundational courses to take. Students may satisfy requirements for Algebra 1 (MATH 5111) and Analysis 1: Functions of One Variable (MATH 5101) by taking qualifying exams in algebra 1 and in analysis 1 at the start of the program. Students may satisfy foundational course requirements if they demonstrate proficiency by passing an assessment exam in the course at the beginning of the semester or by demonstrating that they have taken a similar course and have adequate knowledge of the course material (syllabus and transcript are required; a brief oral examination is also required in that case). Academic advising will happen just before the start of each term and during the add/drop period in order to plan a student's course registration for the term. A complete listing of foundational and advanced courses is available from the Department of Mathematics and the graduate dean's office. Students are not permitted to register for more than two "readings" courses and three "topics" courses for credit toward the degree without explicit permission from the graduate dean. A minimum grade-point average (GPA) of 3.000 is required for degree conferral.

Teaching Requirement

Some teaching experience is required while in the program. Students must attend university-led TA training at the start of the program; attend a one-semester TA training course conducted by faculty from the Department of Mathematics teaching committee; spend one semester shadowing faculty in the undergraduate classroom; and perform recitations and grading for the undergraduate course they are shadowing.

Qualifying Exams

Qualifying exam sessions are given once in spring and once in fall. Students will be required to pass four qualifying exams: algebra 1, analysis 1, and two other exams. The possible additional topics for qualifying exams are algebra 2, analysis 2, combinatorics, geometry, ordinary differential equations, partial differential equations, probability, statistics, topology, and algebraic geometry. A qualifying exam may be taken twice by any student. Additional attempts may be allowed at the discretion of the graduate committee with permission from the graduate dean in the College of Science. Two qualifying exams should be passed no later than the end of the second year and all four by the end of the third year.

Doctoral Candidacy

PhD candidacy is reached when all of the following conditions are met:

- Completion of eight advanced courses
- Identification of an unsolved research problem
- Successful passing of four qualifying exams
- Assignment of PhD supervisor and creation of a 1-page initial plan
- Completion of a 3-page plan of research
- Completion of a 10-page progress report and a one-hour defense of proposal, presented to supervisor and three faculty members of graduate committee

Dissertation Requirement

Each candidate must complete a dissertation that embodies the results of extended research and makes an original contribution to the field. This work should give evidence of the candidate's ability to carry out independent investigation and interpret, in a logical manner, the results of the research. There are two stages to this process:

- **Stage 1:** Students in the PhD program must have a dissertation supervisor within two years after joining the PhD program. The department views the failure of a student to find a supervisor within two years of joining the PhD program with concern and considers this sufficient cause to review the student's status in the PhD program. The process of obtaining a dissertation supervisor always involves two choices—the student chooses the supervisor, and the supervisor chooses the student. For this reason, the department does not guarantee a dissertation supervisor for every student, but the department recognizes its responsibility to help the student find a satisfactory match. This aid is usually provided by the student's graduate advisor, who should be familiar with the student's progress in finding a dissertation supervisor. The dissertation supervisor

guides the student's further education as well as directs the student's dissertation. The dissertation itself must represent an original solution of a problem in the chosen area of mathematics that makes a significant contribution to the mathematical knowledge in that area. Students must enroll in Dissertation or Dissertation Continuation while fulfilling the dissertation requirements.

- **Stage 2 (dissertation defense):** The final oral examination on the dissertation is held in accordance with university regulations and given by a dissertation committee of four faculty members (three from the university, including the supervisor, and one from outside Northeastern University). The dissertation supervisor should propose this dissertation committee to the graduate committee for its approval at least one month before the PhD dissertation defense.

Program Requirements

Bachelor's Degree Entry

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Four qualifying examinations
Annual review
Teaching requirement
Doctoral candidacy
Dissertation committee
Dissertation proposal
Progress report and presentation
Dissertation defense

Prerequisites

Code	Title	Hours
Algebra and Analysis		
MATH 5101	Analysis 1: Functions of One Variable	4
MATH 5111	Algebra 1	4

Tracks

Complete one of the following three tracks:

- Pure Track (p. 451)
- Discrete Track (p. 451)
- Probability and Statistics Track (p. 451)

PURE TRACK

Code	Title	Hours
Analysis		
MATH 5102	Analysis 2: Functions of Several Variables	4
Algebra		
MATH 5112	Algebra 2	4
Foundational Courses		
Complete up to 16 semester hours from the following:		16
MATH 7202	Partial Differential Equations 1	
MATH 7203	Numerical Analysis 1	
MATH 7205	Numerical Analysis 2	
MATH 7221	Topology 2	
MATH 7233	Graph Theory	
MATH 7241	Probability 1	
MATH 7341	Probability 2	
MATH 7342	Mathematical Statistics	
MATH 7343	Applied Statistics	
Advanced Course Work		
Complete 32 semester hours from the advanced coursework list. Only two readings and three topics courses are allowed. (p. 452)		32

DISCRETE TRACK

Code	Title	Hours
Algebra		
MATH 5112	Algebra 2	4
Probability		
MATH 7241	Probability 1	4
Foundational Courses		
Complete up to 16 semester hours from the following:		16
MATH 5102	Analysis 2: Functions of Several Variables	
MATH 5111	Algebra 1	
MATH 5112	Algebra 2	
MATH 7202	Partial Differential Equations 1	
MATH 7203	Numerical Analysis 1	
MATH 7205	Numerical Analysis 2	
MATH 7221	Topology 2	
MATH 7233	Graph Theory	
MATH 7341	Probability 2	
MATH 7342	Mathematical Statistics	
MATH 7343	Applied Statistics	
Advanced Course Work		
Complete 32 semester hours from the advanced coursework list. Only two readings and three topics courses are allowed. (p. 452)		32

PROBABILITY AND STATISTICS TRACK

Code	Title	Hours
Analysis		
Complete 4 semester hours from the following:		4
MATH 5102	Analysis 2: Functions of Several Variables	
MATH 7203	Numerical Analysis 1	
Probability		
MATH 7241	Probability 1	4
or MATH 7342	Mathematical Statistics	
Foundational Courses		
Complete up to 16 semester hours from the following:		16
MATH 5102	Analysis 2: Functions of Several Variables	
MATH 5112	Algebra 2	
MATH 7202	Partial Differential Equations 1	
MATH 7203	Numerical Analysis 1	
MATH 7205	Numerical Analysis 2	
MATH 7221	Topology 2	
MATH 7233	Graph Theory	
MATH 7241	Probability 1	
MATH 7341	Probability 2	
MATH 7342	Mathematical Statistics	
MATH 7343	Applied Statistics	
Advanced Course Work		

Complete 32 semester hours from the advanced coursework list. Only two readings and three topics courses are allowed. (p. 452)		32

Advanced Course Work List

Code	Title	Hours
MATH 7206	Inverse Problems: Radon Transform, X-Ray Transform, and Applications	
MATH 7234	Optimization and Complexity	
MATH 7301	Functional Analysis	
MATH 7303	Complex Manifolds	
MATH 7315	Algebraic Number Theory	
MATH 7316	Lie Algebras	
MATH 7320	Modern Algebraic Geometry	
MATH 7344	Regression, ANOVA, and Design	
MATH 7346 to MATH 7361		
MATH 7371	Morse Theory	
MATH 7374	Riemannian Geometry and General Relativity	
MATH 7976 to MATH 8986		
MATH 9984	Research	
Topics		
Only three topics courses are allowed.		
MATH 7362	Topics in Algebra	
MATH 7364	Topics in Representation Theory	
MATH 7376	Topics in Differential Geometry	
MATH 7381	Topics in Combinatorics	
MATH 7382	Topics in Probability	
MATH 7392	Topics in Geometry	
Readings		
Only two readings courses are allowed.		
MATH 7721	Readings in Topology	
MATH 7732	Readings in Combinatorial Geometry	
MATH 7733	Readings in Graph Theory	
MATH 7734	Readings in Algebra	
MATH 7735	Readings in Algebraic Geometry	
MATH 7741	Readings in Probability and Statistics	
MATH 7751	Readings: Analysis	
MATH 7771	Readings in Geometry	

Dissertation

Code	Title	Hours
MATH 9990	Dissertation Term 1	
MATH 9991	Dissertation Term 2	

Program Credit/GPA Requirements

64 total semester hours required
Minimum 3.000 GPA required

Advanced Entry PhD Program Requirements

Course Requirements

Advanced students who enter the PhD program with a master's degree (or equivalent) will be allowed to place out of some (possibly all) of the eight basic-level courses; the graduate coordinator together with the first-year graduate advisor will determine the allowable course substitutions and will advise the student which foundational courses to take. Students may satisfy requirements for Algebra 1 (Algebra 1 (MATH 5111) and Analysis 1: Functions of One Variable (MATH 5101)) by taking qualifying exams in algebra 1 and in analysis 1 at the start of the program. Students may satisfy foundational course requirements if they demonstrate proficiency by passing an assessment exam in the course at the beginning of the semester or by demonstrating that they have taken a similar course and have adequate knowledge of the course material (syllabus and transcript are required; a brief oral examination is also required in that case). Academic advising will happen just before the start of each term and during the add/drop period in order to plan a student's course registration for the term. A complete listing of foundational and advanced courses is available from the Department of Mathematics and the graduate dean's office. Students are not permitted to register for more than two "readings" courses and three "topics" courses for credit toward the degree without explicit permission from the graduate dean. A minimum grade-point average (GPA) of 3.000 is required for degree conferral.

Teaching Requirement

Some teaching experience is required while in the program. Students must attend university-led TA training at the start of the program; attend a one-semester TA training course conducted by faculty from the Department of Mathematics teaching committee; spend one semester shadowing faculty in the undergraduate classroom; and perform recitations and grading for the undergraduate course they are shadowing.

Qualifying Exams

Qualifying exam sessions are given once in spring and once in fall. Students will be required to pass four qualifying exams: algebra 1, analysis 1, and two other exams. The possible additional topics for qualifying exams are algebra 2, analysis 2, combinatorics, geometry, ordinary differential equations, partial differential equations, probability, statistics, topology, and algebraic geometry. A qualifying exam may be taken twice by any student. Additional attempts may be allowed at the discretion of the graduate committee with permission from the graduate dean in the College of Science. Two qualifying exams should be passed no later than the end of the second year and all four by the end of the third year.

Doctoral Candidacy

PhD candidacy is reached when all of the following conditions are met:

- Completion of eight advanced courses
- Identification of an unsolved research problem
- Successful passing of four qualifying exams
- Assignment of PhD supervisor and creation of a 1-page initial plan
- Completion of a 3-page plan of research
- Completion of a 10-page progress report and a one-hour defense of proposal, presented to supervisor and three faculty members of graduate committee

Dissertation Requirement

Each candidate must complete a dissertation that embodies the results of extended research and makes an original contribution to the field. This work should give evidence of the candidate's ability to carry out independent investigation and interpret, in a logical manner, the results of the research. There are two stages to this process:

- **Stage 1:** Students in the PhD program must have a dissertation supervisor within two years after joining the PhD program. The department views the failure of a student to find a supervisor within two years of joining the PhD program with concern and considers this sufficient cause to review the student's status in the PhD

program. The process of obtaining a dissertation supervisor always involves two choices—the student chooses the supervisor, and the supervisor chooses the student. For this reason, the department does not guarantee a dissertation supervisor for every student, but the department recognizes its responsibility to help the student find a satisfactory match. This aid is usually provided by the student's graduate advisor, who should be familiar with the student's progress in finding a dissertation supervisor. The dissertation supervisor guides the student's further education as well as directs the student's dissertation. The dissertation itself must represent an original solution of a problem in the chosen area of mathematics that makes a significant contribution to the mathematical knowledge in that area. Students must enroll in Dissertation or Dissertation Continuation while fulfilling the dissertation requirements.

- **Stage 2 (dissertation defense):** The final oral examination on the dissertation is held in accordance with university regulations and given by a dissertation committee of four faculty members (three from the university, including the supervisor, and one from outside Northeastern University). The dissertation supervisor should propose this dissertation committee to the graduate committee for its approval at least one month before the PhD dissertation defense.

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Four qualifying examinations
Annual review
Dissertation committee
Teaching requirement
Doctoral candidacy
Dissertation committee
Dissertation proposal
Progress report and presentation
Dissertation defense

Code	Title	Hours
Complete 0–16 semester hours of the following courses:		
MATH 5101	Analysis 1: Functions of One Variable	
MATH 5102	Analysis 2: Functions of Several Variables	
MATH 5111	Algebra 1	
MATH 5112	Algebra 2	

Tracks

Complete one of the following three tracks:

- Pure Track (p. 451)
- Discrete Track (p. 451)
- Probability and Statistics Track (p. 451)

PURE TRACK

Code	Title	Hours
Foudational Courses		
Complete 0–16 semester hours from the following:		0-16
MATH 7202	Partial Differential Equations 1	
MATH 7203	Numerical Analysis 1	
MATH 7205	Numerical Analysis 2	
MATH 7221	Topology 2	
MATH 7233	Graph Theory	
MATH 7241	Probability 1	
MATH 7341	Probability 2	
MATH 7342	Mathematical Statistics	
MATH 7343	Applied Statistics	
Advanced Course Work		
Complete 32 semester hours from the advanced coursework list. Only two readings and three topics courses are allowed. (p. 452)		32

DISCRETE TRACK

Code	Title	Hours
Foundational Courses		
Complete 0–16 semester hours from the following:		0 - 16
MATH 5102	Analysis 2: Functions of Several Variables	
MATH 5111	Algebra 1	
MATH 5112	Algebra 2	
MATH 7202	Partial Differential Equations 1	
MATH 7203	Numerical Analysis 1	
MATH 7205	Numerical Analysis 2	
MATH 7221	Topology 2	
MATH 7233	Graph Theory	
MATH 7341	Probability 2	
MATH 7342	Mathematical Statistics	
MATH 7343	Applied Statistics	
Advanced Course Work		
Complete 32 semester hours from the advanced coursework list. Only two readings and three topics courses are allowed. (p. 452)		32

PROBABILITY AND STATISTICS TRACK

Code	Title	Hours
Foundational Courses		
Complete 0–16 semester hours from the following:		0 - 16
MATH 5102	Analysis 2: Functions of Several Variables	
MATH 5112	Algebra 2	
MATH 7202	Partial Differential Equations 1	
MATH 7203	Numerical Analysis 1	
MATH 7205	Numerical Analysis 2	
MATH 7221	Topology 2	
MATH 7233	Graph Theory	
MATH 7241	Probability 1	
MATH 7341	Probability 2	
MATH 7342	Mathematical Statistics	
MATH 7343	Applied Statistics	
Advanced Course Work		
Complete 32 semester hours from the advanced coursework list. Only two readings and three topics courses are allowed. (p. 452)		32

Advanced Course Work List

Code	Title	Hours
MATH 7206	Inverse Problems: Radon Transform, X-Ray Transform, and Applications	
MATH 7234	Optimization and Complexity	

MATH 7301	Functional Analysis
MATH 7303	Complex Manifolds
MATH 7315	Algebraic Number Theory
MATH 7316	Lie Algebras
MATH 7320	Modern Algebraic Geometry
MATH 7344	Regression, ANOVA, and Design
MATH 7346 to MATH 7361	
MATH 7371	Morse Theory
MATH 7374	Riemannian Geometry and General Relativity
MATH 7976 to MATH 8986	
MATH 9984	Research
Topics	
Only three topics courses are allowed.	
MATH 7362	Topics in Algebra
MATH 7364	Topics in Representation Theory
MATH 7376	Topics in Differential Geometry
MATH 7381	Topics in Combinatorics
MATH 7382	Topics in Probability
MATH 7392	Topics in Geometry
Readings	
Only two readings courses are allowed.	
MATH 7721	Readings in Topology
MATH 7732	Readings in Combinatorial Geometry
MATH 7733	Readings in Graph Theory
MATH 7734	Readings in Algebra
MATH 7735	Readings in Algebraic Geometry
MATH 7741	Readings in Probability and Statistics
MATH 7751	Readings: Analysis
MATH 7771	Readings in Geometry

Dissertation

Code	Title	Hours
MATH 9990	Dissertation Term 1	
MATH 9991	Dissertation Term 2	

Program Credit/GPA Requirements

32–64 total semester hours required
Minimum 3.000 GPA required

Applied Mathematics, MS

New applications of mathematics are constantly being discovered, and established techniques are being applied in new ways and in emerging fields. Students have the option to participate in one of two tracks offered: data science or coursework. The track option allows students to be able to personalize their education with more in-depth knowledge of data science or other areas of interest. Northeastern's Master of Science in Applied Mathematics caters to students who are looking to enter or who are currently working in a variety of applied math careers, such as financial service and investment firms, data science and high-tech firms, computer information and software firms, and academic institutions and research institutes.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Methods and Modeling		
MATH 5131	Introduction to Mathematical Methods and Modeling	4
Algebra and Analysis		
Complete one of the following:		4
MATH 5101	Analysis 1: Functions of One Variable	
MATH 5110	Applied Linear Algebra and Matrix Analysis	
MATH 5111	Algebra 1	
MATH 7241	Probability 1	
Statistics		
Complete one of the following:		4
MATH 7243	Machine Learning and Statistical Learning Theory	
MATH 7342	Mathematical Statistics	
MATH 7343	Applied Statistics	

Tracks

Complete one of the following two tracks:

- Data Science Track (p.)
- Coursework Track (p.)

DATA SCIENCE TRACK

Code	Title	Hours
Data Science Courses		
Complete two of the following:		8
CS 6140	Machine Learning	
CS 6220	Data Mining Techniques	
DA 5020	Collecting, Storing, and Retrieving Data	
DA 5030	Introduction to Data Mining/Machine Learning	
DS 5220	Supervised Machine Learning and Learning Theory	
DS 5230	Unsupervised Machine Learning and Data Mining	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
MATH 7243	Machine Learning and Statistical Learning Theory	

Students may take other courses not on the list above from the Khoury College of Computer Sciences in consultation with their faculty adviser.

COURSEWORK TRACK

Code	Title	Hours
Coursework		
Complete 8 semester hours from any subject area. Courses outside of MATH may be chosen with faculty approval.		8

Electives

Code	Title	Hours
Complete 12 semester hours in the following subject area:		12
MATH		

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

Mathematics, MS

A total of 32 semester hours, this program offers students with a bachelor's degree in mathematics or a related field an opportunity to broaden their knowledge in the several fields of mathematics and its applications. The program is designed to prepare graduates for careers in business, industry, or government. Previous course work will be evaluated to determine proficiency in certain content areas and degree plan may be tailored accordingly. In some cases, a student may be required to take an assessment exam to determine content and knowledge proficiency. No course can be used to satisfy both a requirement and an elective. To qualify for degree conferral, students must obtain a minimum cumulative average of 3.000, equivalent to a grade of B.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Algebra 1 and Analysis 1		
MATH 5101	Analysis 1: Functions of One Variable	4
or MATH 5102	Analysis 2: Functions of Several Variables	
MATH 5111	Algebra 1	4
or MATH 5112	Algebra 2	
Algebra 2 and Analysis 2		
MATH 5102	Analysis 2: Functions of Several Variables	4
Complete 4 semester hours from the following:		4
MATH 5112	Algebra 2	
Elective chosen from the list below		

Electives

Code	Title	Hours
Complete 16 semester hours from the following:		16
MATH 7202	Partial Differential Equations 1	
MATH 7203	Numerical Analysis 1	
MATH 7205	Numerical Analysis 2	
MATH 7221	Topology 2	
MATH 7233	Graph Theory	
MATH 7234	Optimization and Complexity	
MATH 7241	Probability 1	
MATH 7301	Functional Analysis	
MATH 7341	Probability 2	
MATH 7342	Mathematical Statistics	
MATH 7343	Applied Statistics	
MATH 7344	Regression, ANOVA, and Design	
MATH 7349	Stochastic Calculus and Introduction to No-Arbitrage Finance	

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

Operations Research, MSOR

This program seeks to train students in the basic techniques and theory of operations research and their applications to real-world problems. Graduates should have developed their analytical skills to attack complex, large-scale optimization problems of both a deterministic and stochastic nature. Eight 4-semester-hour graduate courses are required for this degree. Previous course work will be evaluated to determine proficiency in certain content areas and degree plan may be tailored accordingly. In some cases, a student may be required to take an assessment exam to determine content and knowledge proficiency. No course can be used to satisfy both a requirement and an elective. To qualify for degree conferral, a minimum cumulative grade-point average of 3.000, equivalent to a grade of B, must be obtained. Some courses listed for this program are offered in the College of Engineering or the Khoury College of Computer Sciences.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Probability		
Complete 4 semester hours from the following:		4
MATH 7241	Probability 1	
MATH 7341	Probability 2	
OR 7230	Probabilistic Operation Research	
Statistics		
MATH 7342	Mathematical Statistics	4
or MATH 7343	Applied Statistics	
Operations Research		
OR 6205	Deterministic Operations Research	4
Optimization and Complexity		
MATH 7234	Optimization and Complexity	4

Electives

Code	Title	Hours
Complete 16 semester hours from the following:		16
CS 5800	Algorithms	
CS 6140	Machine Learning	
CS 7805	Complexity Theory	
CSYE 6200	Concepts of Object-Oriented Design	
CSYE 6205	Concepts of Object-Oriented Design with C++	
EMGT 5220	Engineering Project Management	
EMGT 6225	Economic Decision Making	
EMGT 6305	Financial Management for Engineers	
GE 5010	Customer-Driven Technical Innovation for Engineers	
GE 5100	Product Development for Engineers	

IE 5400	Healthcare Systems Modeling and Analysis
IE 5500	Systems Engineering in Public Programs
IE 5617	Lean Concepts and Applications
IE 5630	Biosensor and Human Behavior Measurement
IE 6300	Manufacturing Methods and Processes
IE 7200	Supply Chain Engineering
IE 7215	Simulation Analysis
IE 7275	Data Mining in Engineering
IE 7280	Statistical Methods in Engineering
IE 7285	Statistical Quality Control
IE 7290	Reliability Analysis and Risk Assessment
IE 7315	Human Factors Engineering
MATH 7233	Graph Theory
MATH 7346	Time Series
MATH 7349	Stochastic Calculus and Introduction to No-Arbitrage Finance
OR 7235	Inventory Theory
OR 7240	Integer and Nonlinear Optimization
OR 7310	Logistics, Warehousing, and Scheduling

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

Applied Mathematics, Graduate Certificate

Large streams of data have brought mathematical modeling to nearly every field and industry. More than ever, a deep understanding of the fundamentals and applications of these models is the differentiator between the success and failure of projects in statistics, machine learning, probabilistic modeling, and optimization. From constructing financial tools and optimizing supply chains, to computer-guided brain surgery and to quantum computing, a foundational understanding of advanced mathematics can give you the tools to create the ideas and technology that will drive the 21st century.

A graduate certificate in applied mathematics gives you the opportunity to study the fundamentals of statistical reasoning, mathematical modeling, and modern mathematical methods in a Tier One research department. Shorter than the full master's, the graduate certificate allows you to take up to four courses from the Department of Mathematics. Our courses cover a wide range of topics, from theory courses about the fundamental structures of mathematical objects, to project-based applied courses where students use modeling to solve research-level problems from academic and industry partners.

All applied mathematics courses are taught in the evening to accommodate working students. Mathematics and pure math courses also count toward this certificate.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Modeling		
Complete 4 semester hours from the following:		
MATH 5110	Applied Linear Algebra and Matrix Analysis	
MATH 5131	Introduction to Mathematical Methods and Modeling	
MATH 7203	Numerical Analysis 1	
MATH 7233	Graph Theory	
MATH 7241	Probability 1	
Statistics		
Complete 4 semester hours from the following:		
MATH 7243	Machine Learning and Statistical Learning Theory	
MATH 7343	Applied Statistics	

Electives

Code	Title	Hours
Complete 8 semester hours from subject area MATH, including but not limited to the following:		
MATH 5101	Analysis 1: Functions of One Variable	
MATH 5111	Algebra 1	
MATH 5121	Topology 1	
MATH 7202	Partial Differential Equations 1	
MATH 7205	Numerical Analysis 2	
MATH 7206	Inverse Problems: Radon Transform, X-Ray Transform, and Applications	
MATH 7234	Optimization and Complexity	
MATH 7235	Discrete Geometry 1	
MATH 7301	Functional Analysis	
MATH 7342	Mathematical Statistics	
MATH 7343	Applied Statistics	
MATH 7344	Regression, ANOVA, and Design	
MATH 7349	Stochastic Calculus and Introduction to No-Arbitrage Finance	

Program Credit/GPA Requirements

16 total semester hours required
Minimum 3.000 GPA required

Physics

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Physics PhD and Master of Science students at Northeastern University have the opportunity to explore, discover, and apply the fundamental principles that run the universe. The program specializes in several subfields that reflect the forefront research activities of the department. These specializations include biological physics, condensed matter

physics, elementary particle physics, nanomedicine, nanophysics, and network science.

The Department of Physics also offers a Graduate Certificate in Nanomedicine. The certificate is designed for students, engineers, and physicians to develop competency and practical skills in the application of nanotechnology to problems in medicine. This program is appropriate for those working in or seeking careers in biotechnology, pharmaceutical, biomedical, or clinical fields.

Programs

Doctor of Philosophy (PhD)

- Physics (p. 457)

Master of Science (MS)

- Physics (p. 461)

Graduate Certificate

- Nanomedicine (p. 463)

Physics, PhD

The Department of Physics offers a Doctor of Philosophy in Physics with specializations in different subfields that reflect the forefront research activities of the department, including biological physics, condensed matter physics, elementary particle physics, nanomedicine, and network science. The program for the PhD degree consists of the required course work, a qualifying examination, a preliminary research seminar, the completion of a dissertation based upon original research performed by the student, and a dissertation defense upon completion of the dissertation. Based on these measures, students are expected to obtain a graduate-level understanding of basic physics concepts and demonstrate the ability to formulate a research plan, communicate orally a research plan, and conduct and present independent research.

Coursework

The required courses are grouped into two sets, Part 1 and Part 2, having a total of 42 semester hours as a minimum. Part 1 courses (first-year courses) are typically taken prior to the qualifying exam. Students without a master's degree must complete all Part 1 courses in the first year to remain in good academic standing in the graduate program. Part 2 courses (second-year courses) may be taken before or after passing the qualifying exam.

Grade Requirements

The minimum grade required for the successful completion of the Part 1 courses is a B (3.000) average. Students will only be allowed to take the qualifying exam if they fulfill this requirement. The minimum grade required for the successful completion of Part 2 (excluding advanced research) is at least a B (3.000) average for the Part 2 courses. The Part 2 courses, including any makeup of grade-point-average deficiencies (see following), must be completed within two calendar years of passing the qualifying exam. The department expects students to complete the bulk of these courses in the first year after the qualifying exam. The cumulative average will be calculated each semester. No more than two courses or 8 semester hours of credit, whichever is greater, may be repeated in order to satisfy the requirement for the PhD degree. A student who does not maintain a 3.000 cumulative average for two consecutive semesters, or is otherwise not making satisfactory progress toward the PhD degree requirements, may be recommended for termination at the discretion of the graduate committee. Within the above limitations, a required course for which a grade of F is received must be repeated with a grade of C or better and may be repeated only once. In calculating the overall cumulative average, all graduate-level course work completed at the time of clearance for graduation will be counted.

Qualifying Exam Requirement

A student who fails to achieve the required B average for the Part 1 courses must petition the graduate committee in order to remain in the graduate program and be eligible to take the qualifying exam. A student who fails to achieve the required B average for the Part 2 courses must petition the graduate committee in order to remain in the graduate program. All students registered in the PhD program are required to pass a qualifying exam unless they are granted an exemption (see below). The qualifying exam may include both written and oral parts.

The qualifying exam consists of two parts:

- **Part 1:** Classical physics (based on classical mechanics and mathematical methods), electromagnetic theory, and statistical physics.
- **Part 2:** Quantum physics (based on quantum mechanics and its applications) and statistical physics. The content of the qualifying exam will be based on the content of the first-year courses, excluding Principles of Experimental Physics (PHYS 5318). A syllabus is available and on request will be distributed by the graduate coordinator to any student prior to the exam.

The qualifying exam is given twice yearly: once prior to the start of the fall semester and again within the first two weeks of the start of the spring semester. The exam will consist of one day each on Part 1 (classical physics/mathematical methods, electromagnetism, and statistical physics) and Part 2 (quantum physics and statistical physics).

All students enrolled in the PhD program must take the fall qualifying exam after completing their first-year course of study with the required grade-point average unless they are granted an exemption. Students taking the exam for the first time must take both Part 1 and Part 2. A student who does not pass the exam on his or her first attempt must pass the exam the next time it is given in order to continue in the PhD program. However, a student who passes one part of the first attempt is not required to repeat that part.

Any PhD student will be exempt from taking the quantum part of the qualifying exam if they receive both a grade of B+ or higher inQuantum Theory 1 (PHYS 7315), Quantum Theory 2 (PHYS 7316), and Statistical Physics (PHYS 7305) and have a GPA of 3.670 or higher in those three courses. To meet this standard, they must take all the above courses. Any PhD student will be exempt from taking the classical part of the qualifying exam if they receive both a grade of B+ or higher in Classical Mechanics/Math Methods (PHYS 7301), Electromagnetic Theory (PHYS 7302), and Statistical Physics (PHYS 7305) and have a GPA of 3.670 or higher in these three courses. To meet this standard, they must take all three of these courses.

A student who fails the written exam by less than 5 percent of the total possible score on the second attempt for that part will be automatically given an oral exam. A student who fails the written exam by more than 10 percent is excluded from taking an oral exam. These provisions apply separately to Parts 1 and 2 of the exam.

PhD Candidacy

Degree candidacy is established when the student has passed the qualifying examination and completed both the Part 1 and Part 2 course requirements. PhD candidacy may be achieved before completion of the advanced elective if the elective in the student's specialization is not offered in a given year. The elective must be taken at the next opportunity. PhD degree candidacy is certified by the college. A maximum of five years

after the establishment of doctoral degree candidacy is allowed for the completion of degree requirements.

PhD Dissertation Requirement

All PhD students are required to complete a dissertation based upon new and original research in one of the three following options:

- In one of the current theoretical or experimental research programs in the department, under direct supervision of an advisor from the Department of Physics. A dissertation committee will be formed consisting of the advisor, two full-time members of the department, and an additional member, either from within the department or from an outside department or institution.
- In a recognized interdisciplinary field involving another research area of the university, under the direct supervision of a faculty member in that field. In this case, an interdisciplinary committee is formed under the approval of the graduate committee, consisting of the direct supervisor, a departmental advisor, one other member of the department, and an additional member of either the department or the external department.
- In an area of applied research in one of the industrial or high-technology laboratories associated with the department's industrial PhD program. The direct supervisor is associated with the institution where the research is performed. In this case, a dissertation advisory committee is established by the graduate committee, consisting of the direct supervisor, the departmental advisor, and two other members of the department.

PhD students must select their departmental advisor no later than the end of the spring semester of their second year or their second semester after having passed the qualifying examination, whichever comes first. This process should start as soon as the student has identified a field of research or has passed the qualifying exam.

PhD Dissertation Committee, Preliminary Thesis Proposal, and Preliminary Research Seminar

By the end of the spring semester of the third year or the second semester in which the student is enrolled for PhD dissertation, whichever comes first, each PhD student must have an approved dissertation committee and thesis proposal.

The student (with the aid and approval of his or her thesis advisor) will submit a PhD thesis proposal to the graduate committee clearly outlining a plan to carry out new and original research in the context of previously published research in the scientific literature and also describe the methodologies to be employed. The thesis proposal is limited to 15 pages or less, including references. A proposed makeup of the dissertation committee will be submitted at the same time.

The graduate committee will evaluate the merit of the proposal and make recommendations for improvements when necessary, including any changes to the composition of the dissertation committee. No more than two submissions for a particular proposal may be made. In the case where a revised proposal does not meet a minimum academic standard that provides a basis for making such improvements, the graduate committee may instruct the student to select a different thesis topic or advisor.

After approval by the graduate committee, the proposal is circulated to the general faculty for comments. If the graduate coordinator receives any objections, the proposal will be referred back to the graduate committee for final resolution.

After the proposal and dissertation committee have been approved, the student will make a public presentation of the material in the preliminary research seminar before the dissertation committee in a format open to the full department and advertised one week in advance. The dissertation committee will then meet in closed session to evaluate the seminar. The preliminary research seminar must take place no later than the semester after the thesis proposal is approved and, normally, in the same semester.

In the event that the dissertation advisor is changed, a new committee must be formed, with the approval of the graduate committee, and a new preliminary research seminar given.

PhD Dissertation Defense

The dissertation defense consists of a public presentation, followed by a question period conducted by the dissertation committee and limited to them and the department faculty. The date of the dissertation presentation must be publicized and a copy of the thesis deposited with the graduate program coordinator at least one week prior to the defense. If during this posting period or in the two business days following the defense a written objection to the thesis is lodged with the department chair by a member of the faculty, the chair may appoint an ad hoc postdefense review committee to provide advice on the scientific issues raised by the objection. Students should note that they must be registered for Dissertation or Dissertation Continuation during the semester in which they defend their dissertation and that they should schedule their defenses well in advance of the end of the semester in order to accommodate the review/waiting period and the time required to deposit the thesis.

The final dissertation defense is held in accordance with the College of Science regulations.

PhD Specialization Options

Students choose a specialization in biological physics; particle physics; condensed matter physics; or, with preapproval of a faculty member, in the following areas: nanomedicine or network science.

Multiple specializations are allowed if the individual requirements for each specialization are met.

Note that the specialization will not appear on the degree diploma or on the official transcript but can be listed as the field of study on CVs and grant proposals.

Transfer Credit

Students must petition in writing through the graduate committee to the director of graduate student services for all transfer credit. A copy of an official transcript must be attached to the Request for Transfer Credit form. A maximum of 9 semester hours of credit obtained at another institution may be accepted toward the PhD degree provided that the credits transferred consist of a grade of B or better; are graduate-level courses; have been earned at an accredited institution; and have not been used toward any other degree. Grades are not transferred.

Course Waivers

Course waivers may be accepted toward the PhD degree course requirements, though they will not change the numbers of credits required for the program. The student must have received a B grade or better in equivalent graduate-level core courses that have been earned at an accredited institution. Students must petition in writing to the graduate committee for all course waivers and provide documentation in the form of official transcripts to support their petition.

Residence Requirement

The residence requirement is satisfied by at least one year of full-time graduate work (i.e., enrollment in PhD Dissertation, for two consecutive semesters). Students must be continually enrolled throughout the pursuit of the dissertation.

Internship Option

A PhD candidate may spend one year in a participating high-technology, industrial, or government laboratory immediately after passing the PhD qualifying examination. In this program, the student is expected to remain in touch with the university by taking one course per semester at the university and by frequent contact with a faculty advisor. After the one-year paid internship, the student returns to the university to do the dissertation. Eligibility for this program is contingent on acceptance both by the department and by the external laboratory.

Program Requirements

Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Two qualifying examinations
Annual review
Candidacy
Preliminary research seminar proposal with proposed dissertation committee
Preliminary research seminar talk
Dissertation defense

Core Requirements [1]

Code	Title	Hours
Principles		
PHYS 5318	Principles of Experimental Physics	4
Computational		
PHYS 7301	Classical Mechanics/Math Methods	4
PHYS 7305	Statistical Physics	4
PHYS 7321	Computational Physics	4
Theory		
PHYS 7302	Electromagnetic Theory	4
PHYS 7315	Quantum Theory 1	4
PHYS 7316	Quantum Theory 2	4
Research		
PHYS 7210	Introduction to Research in Physics (Take this repeatable course twice)	0
PHYS 9984	Advanced Research	1-8

Electives

Code	Title	Hours
Complete 8 semester hours from the following:		8
If preapproved to specialize in nanomedicine or network science, consult program director.		
PHYS 7322	Nonequilibrium Physics	
PHYS 7323	Elementary Particle Physics	
PHYS 7324	Condensed Matter Physics	
PHYS 7325	Quantum Field Theory 1	
PHYS 7731	Biological Physics 1	
Specialization Elective		
Choose 4 semester hours from your specialization below:		4

PhD Specialization Options

A specialization is required.[2]
Note: Specialization in nanomedicine or network science requires prior approval.

Code	Title	Hours
Biological Physics [3]		
PHYS 7731	Biological Physics 1	4
PHYS 7741	Biological Physics 2	4
Particle Physics [4]		
PHYS 7323	Elementary Particle Physics	4
PHYS 7733	Topics: Elementary Particle Physics and Cosmology	4
Condensed Matter Physics		
PHYS 7324	Condensed Matter Physics	4
PHYS 7734	Topics: Condensed Matter Physics	4
Nanomedicine		
NNMD 5270	Introduction to Nanomedicine	3
NNMD 5370	Nanomedicine Research Techniques	4
Network Science		
PHYS 5116	Complex Networks and Applications	4
PHYS 7331	Network Science Data	4

Dissertation

Code	Title	Hours
Taken third year and beyond.		
PHYS 9990	Dissertation Term 1	
PHYS 9991	Dissertation Term 2	
Complete the following (repeatable) course until graduation:		
PHYS 9996	Dissertation Continuation	

Program Credit/GPA Requirements

42 total semester hours required
Minimum 3.000 GPA required

1. Methods for Teaching in the Introductory Physics Laboratory 1 (PHYS 7220) and Methods for Teaching Introductory Physics Laboratory 2 (PHYS 7230) are required for students awarded a Teaching Assistantship.
2. Note that the specialization will not appear on the degree diploma or on the official transcript but can be listed as the field of study on CVs and grant proposals.
3. By approval of the graduate committee, biological physics students may substitute graduate courses in biology, physics, or chemistry from the following list instead of PHYS 7741:
Biochemistry (BIOL 6300), Molecular Cell Biology (BIOL 6301), Optical Methods of Analysis (CHEM 5613), Molecular Modeling (CHEM 5638), . Additional appropriate courses may also be substituted by approval of the physics graduate committee.
4. Elementary Particle Physics (PHYS 7323) is required for a specialization in particle physics. The advanced elective may be Topics: Elementary Particle Physics and Cosmology (PHYS 7733).

Plan of Study

Year 1				
Fall	**Hours**		**Spring**	**Hours**
PHYS 7210		0	PHYS 5318	4
PHYS 7301		4	PHYS 7210	0
PHYS 7302		4	PHYS 7305	4
PHYS 7315		4	PHYS 7316	4
		12		12
Year 2				
Fall	**Hours**		**Spring**	**Hours**
PHYS 7321		4	PHYS 9984	2-8
Electives		8	Advanced elective	4
		12		6-12
Year 3				
Fall	**Hours**		**Spring**	**Hours**
PHYS 9990		0	PHYS 9991	0
		0		0

Total Hours: 42-48

Advanced Entry PhD Program Requirements

The Department of Physics offers a Doctor of Philosophy in Physics with specializations in different subfields that reflect the forefront research activities of the department, including biological physics, condensed matter physics, elementary particle physics, nanomedicine, and network science. The program for the PhD degree consists of the required course work, a qualifying examination, a preliminary research seminar, the completion of a dissertation based upon original research performed by the student, and a dissertation defense upon completion of the dissertation. Based on these measures, students are expected to obtain a graduate-level understanding of basic physics concepts and demonstrate the ability to formulate a research plan, communicate orally a research plan, and conduct and present independent research.

Coursework

Students entering with an approved MS degree from a U.S. institution will be required to take 10 semester hours of courses. The courses required will be determined by the graduate coordinator based on the student's transcripts.

Grade Requirements

The minimum grade required is a B (3.000) average. A student who does not maintain a 3.000 cumulative average for two consecutive semesters, or is otherwise not making satisfactory progress toward the PhD degree requirements, may be recommended for termination at the discretion of the graduate committee.

Qualifying Exam Requirement

All students registered in the PhD program are required to pass a qualifying exam unless they are granted an exemption. The qualifying exam may include both written and oral parts. Students who enter with a Masters degree from a US institution may take either the classical or the quantum exam, or both, at the first opportunity upon entering the program in the fall. In this case, the exam will count as a first attempt only if the student submits the exam to the examiner.

The qualifying exam consists of two parts:

- **Part 1:** Classical physics (based on classical mechanics and mathematical methods), electromagnetic theory, and statistical physics.
- **Part 2:** Quantum physics (based on quantum mechanics and its applications) and statistical physics. A syllabus is available and on request will be distributed by the graduate coordinator to any student prior to the exam.

The qualifying exam is given twice yearly: once prior to the start of the fall semester and again within the first two weeks of the start of the spring semester. The exam will consist of one day each on Part 1 (classical physics/mathematical methods, electromagnetism, and statistical physics) and Part 2 (quantum physics and statistical physics).

All students enrolled in the PhD program must take the fall qualifying exam after completing their first-year course of study with the required grade-point average. Students taking the exam for the first time must take both Part 1 and Part 2. A student who does not pass the exam on his or her first attempt must pass the exam the next time it is given in order to continue in the PhD program. However, a student who passes one part of the first attempt is not required to repeat that part.

A student who fails the written exam by less than 5 percent of the total possible score on the second attempt for that part will be automatically given an oral exam. A student who fails the written exam by more than 10 percent is excluded from taking an oral exam. These provisions apply separately to Parts 1 and 2 of the exam.

PhD Candidacy

Degree candidacy is established when the student has passed the qualifying examination and completed 10 semester hours of courses. PhD degree candidacy is certified by the college. A maximum of five years after the establishment of doctoral degree candidacy is allowed for the completion of degree requirements.

PhD Dissertation Requirement

All PhD students are required to complete a dissertation based upon new and original research in one of the three following options:

- In one of the current theoretical or experimental research programs in the department, under direct supervision of an advisor from the Department of Physics. A dissertation committee will be formed consisting of the advisor, two full-time members of the department, and an additional member, either from within the department or from an outside department or institution.
- In a recognized interdisciplinary field involving another research area of the university, under the direct supervision of a faculty member in that field. In this case, an interdisciplinary committee is formed under the approval of the graduate committee, consisting of the direct supervisor, a departmental advisor, one other member of the department, and an additional member of either the department or the external department.
- In an area of applied research in one of the industrial or high-technology laboratories associated with the department's industrial PhD program. The direct supervisor is associated with the institution where the research is performed. In this case, a dissertation advisory committee is established by the graduate committee, consisting of the direct supervisor, the departmental advisor, and two other members of the department.

PhD students must select their departmental advisor no later than the end of the spring semester of their second year or their second semester after having passed the qualifying examination, whichever comes first.

This process should start as soon as the student has identified a field of research or has passed the qualifying exam.

PhD Dissertation Committee, Preliminary Thesis Proposal, and Preliminary Research Seminar

By the end of the spring semester of the third year or the second semester in which the student is enrolled for PhD dissertation, whichever comes first, each PhD student must have an approved dissertation committee and thesis proposal.

The student (with the aid and approval of his or her thesis advisor) will submit a PhD thesis proposal to the graduate committee clearly outlining a plan to carry out new and original research in the context of previously published research in the scientific literature and also describe the methodologies to be employed. The thesis proposal is limited to 15 pages or less, including references. A proposed makeup of the dissertation committee will be submitted at the same time.

The graduate committee will evaluate the merit of the proposal and make recommendations for improvements when necessary, including any changes to the composition of the dissertation committee. No more than two submissions for a particular proposal may be made. In the case where a revised proposal does not meet a minimum academic standard that provides a basis for making such improvements, the graduate committee may instruct the student to select a different thesis topic or advisor.

After approval by the graduate committee, the proposal is circulated to the general faculty for comments. If the graduate coordinator receives any objections, the proposal will be referred back to the graduate committee for final resolution.

After the proposal and dissertation committee have been approved, the student will make a public presentation of the material in the preliminary research seminar before the dissertation committee in a format open to the full department and advertised one week in advance. The dissertation committee will then meet in closed session to evaluate the seminar. The preliminary research seminar must take place no later than the semester after the thesis proposal is approved and, normally, in the same semester.

In the event that the dissertation advisor is changed, a new committee must be formed, with the approval of the graduate committee, and a new preliminary research seminar given.

PhD Dissertation Defense

The dissertation defense consists of a public presentation, followed by a question period conducted by the dissertation committee and limited to them and the department faculty. The date of the dissertation presentation must be publicized and a copy of the thesis deposited with the graduate program coordinator at least one week prior to the defense. If during this posting period or in the two business days following the defense a written objection to the thesis is lodged with the department chair by a member of the faculty, the chair may appoint an ad hoc postdefense review committee to provide advice on the scientific issues raised by the objection. Students should note that they must be registered for Dissertation or Dissertation Continuation during the semester in which they defend their dissertation and that they should schedule their defenses well in advance of the end of the semester in order to accommodate the review/waiting period and the time required to deposit the thesis.

The final dissertation defense is held in accordance with the College of Science regulations.

Residence Requirement

The residence requirement is satisfied by at least one year of full-time graduate work (i.e., enrollment in PhD Dissertation, for two consecutive semesters). Students must be continually enrolled throughout the pursuit of the dissertation.

Internship Option

A PhD candidate may spend one year in a participating high-technology, industrial, or government laboratory immediately after passing the PhD qualifying examination. In this program, the student is expected to remain in touch with the university by taking one course per semester at the university and by frequent contact with a faculty advisor. After the one-year paid internship, the student returns to the university to do the dissertation. Eligibility for this program is contingent on acceptance both by the department and by the external laboratory.

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Two qualifying examinations
Annual review
Candidacy
Preliminary research seminar proposal with proposed dissertation committee
Preliminary research seminar talk
Dissertation defense

Core Requirements

Code	Title	Hours
Course Work		
Students entering with an approved MS degree from a U.S. institution will be required to take 10 semester hours of courses. The courses required will be determined by the graduate program director based on the student's transcripts.[1]		10

Dissertation

Code	Title	Hours
PHYS 9990	Dissertation Term 1	
PHYS 9991	Dissertation Term 2	
Complete the following (repeatable) course until graduation:		
PHYS 9996	Dissertation Continuation	

Program Credit/GPA Requirements

10 total semester hours required
Minimum 3.000 GPA required

[1] Methods for Teaching in the Introductory Physics Laboratory 1 (PHYS 7220) is required for students awarded a Teaching Assistantship.

Physics, MS

The Department of Physics offers Master of Science degrees with several options. The standard physics MS can be obtained by taking a specified set of courses without an MS thesis. Alternatively, an MS thesis may substitute for 8 credit hours of coursework. Both of these options may be pursued either full time or part time. Upon completion of the MS degree in physics, students should be able to apply graduate-level knowledge

and solve problems in the areas of electrodynamics, quantum mechanics, classical mechanics, statistical mechanics, and advanced mathematical methods.

Grade Requirements

To qualify for the MS degree, a cumulative average of 3.000, equivalent to a grade of B, must be obtained. No more than two courses or 6 semester hours of credit, whichever is greater, may be repeated in order to satisfy the requirements for the MS degree. A student who does not maintain a 3.000 cumulative average for two consecutive semesters, or is otherwise not making satisfactory progress toward the MS degree requirements, may be recommended for termination at the discretion of the graduate committee.

Within the above limitations, a required course for which a grade of F is received must be repeated with a grade of C or better and may be repeated only once. Elective courses in which an F has been received may be repeated once to obtain a C or better.

Transfer Credit

Students must petition, in writing, through the graduate committee to the director of graduate student services for all transfer credit. An official transcript must be attached to the Request for Transfer Credit Form. A maximum of 9 semester hours of credit obtained at another institution may be accepted toward the MS degree provided that the credits transferred consist of a grade of B or better in graduate-level courses and have not been used toward any other degree. Grades are not transferred.

Current MS Students Interested in the PhD Program

MS students interested in applying to the PhD program must submit a complete application for admission.

Special Student Status

Special students are allowed to earn credit for a maximum of 12 semester hours. Students interested in taking more than 12 semester hours must make a formal application to the degree program online.

Coursework

There is a total of 32 semester hours of coursework required as a minimum. There are two options for the MS degree:

Option 1 is the standard physics MS with or without an MS thesis. Up to 8 semester hours of courses can be substituted with an MS thesis.

Option 2 is the MS with a specialization (up to 23 semester hours of courses) in applied physics, engineering physics, biophysics, chemical physics, material physics, mathematical physics, and computational physics.

Graduate students desiring the MS with thesis option should arrange a thesis with a faculty adviser. The student may choose a field of research from three possible areas as outlined under the PhD dissertation section. The thesis must demonstrate the individual's capacity to execute independent work based on original material. The thesis must be approved by the graduate committee. The thesis may be completed in one semester (e.g., summer semester) or in consecutive semesters. Students who have not completed their thesis after the required number of thesis credits (12 semester hours) must register for MS Thesis with the appropriate course number each subsequent semester until the thesis is approved by the graduate school and submitted electronically to Proquest.

Both options require a minimum of 32 semester hours of graduate credit. The 32 semester hours may include up to 9 semester hours of transfer credit as approved by the physics department's graduate committee and the graduate school.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Computational Coursework		
PHYS 7301	Classical Mechanics/Math Methods	4
PHYS 7305	Statistical Physics	4
PHYS 7321	Computational Physics	4
Theory Coursework		
PHYS 7302	Electromagnetic Theory	4
PHYS 7315	Quantum Theory 1	4
PHYS 7316	Quantum Theory 2	4

Options

- Coursework (p.)
- Thesis (p. 462)
- Thesis with specialization (p. 462)[1]

COURSEWORK OPTION

Note: In consultation with your faculty advisor you may choose an area of specialization from physics, engineering, chemistry, biology, mathematics, psychology, or computer science. Additional elective courses are listed in the PhD program.

Code	Title	Hours
Electives		
Complete 8 semester hours from the following:		8
PHYS 5111	Astrophysics and Cosmology	
PHYS 5113	Particle Physics	
PHYS 5116	Complex Networks and Applications	
PHYS 5260	Introduction to Nanoscience and Nanotechnology	
PHYS 5318	Principles of Experimental Physics	
PHYS 7322	Nonequilibrium Physics	
PHYS 7323	Elementary Particle Physics	
PHYS 7324	Condensed Matter Physics	
PHYS 7325	Quantum Field Theory 1	
PHYS 7731	Biological Physics 1	

THESIS

Code	Title	Hours
Thesis		
PHYS 7990	Thesis	1-4
Elective		
Complete 4 semester hours from the following:		4
PHYS 5111	Astrophysics and Cosmology	
PHYS 5113	Particle Physics	

THESIS WITH SPECIALIZATION[1]

Applied physics, engineering physics, biophysics, chemical physics, materials physics, mathematical physics, or computational physics.

Code	Title	Hours
Thesis		
PHYS 7990	Thesis	1-4
Specialization		
Complete coursework in consultation with faculty advisor.		8-12

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

[1] Note that the specialization will not appear on the degree diploma or on the official transcript but can be listed as the field of study on CVs and grant proposals.

Plan of Study

Year 1				
Fall	**Hours**		**Spring**	**Hours**
PHYS 7301		4	PHYS 7305	4
PHYS 7302		4	PHYS 7316	4
PHYS 7315		4	PHYS 7321	4
		12		12

Year 2	
Fall	**Hours**
Elective or thesis	4
Additonal elective	4
	8

Total Hours: 32

Nanomedicine, Graduate Certificate

The Graduate Certificate in Nanomedicine is designed for scientists, engineers, and physicians to develop competency and practical skills in the application of nanotechnology to problems in medicine. This program is appropriate for those working in or seeking careers in biotechnology, pharmaceutical, biomedical, or clinical fields. Program participants receive advanced training in the fundamental and applied aspects of nanomedicine, as well as nanomedicine commercialization from bench to bedside. The curriculum includes a variety of activities for scientific and professional development, including lectures, case studies, journal readings, term projects, and close interactions with distinguished faculty and experts drawn from academia, hospitals, industry, and government.

The certificate consists of five nanomedicine (NNMD) courses, totaling 12 semester-hour credits. This is a part-time, 12-credit graduate program that can be completed in as little as two semesters.

Program Requirements

Complete all requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
NNMD 5270	Introduction to Nanomedicine	3
NNMD 5272	Nanomedicine Seminar 1	1
NNMD 5274	Nanomedicine Seminar 2	1
NNMD 5470	Nano/Biomedical Commercialization: Concept to Market	3

Electives

Code	Title	Hours
Complete NNMD 5370 or choose 4SH of electives from the list.		4
Research Techniques		
NNMD 5370	Nanomedicine Research Techniques	
Or choose 4 semester hours of electives.		
BIOE 6100	Medical Physiology	
BIOL 5307	Biological Electron Microscopy	
BIOL 6381	Ethics in Biological Research	
BIOT 5145	Basic Biotechnology Lab Skills	
BIOT 5225	Managing and Leading a Biotechnology Company	
BIOT 5227	Launching Your Science: Biotechnology Entrepreneurship	
BIOT 5700	Molecular Interactions of Proteins in Biopharmaceutical Formulations	
BIOT 7245	Biotechnology Applications Laboratory	
CHEM 7247	Advances in Nanomaterials	
CHME 7350	Transport Phenomena	
PHSC 6212	Research Skills and Ethics	
PHSC 6216	Human Physiology and Pathophysiology	
PHSC 6290	Biophysical Methods in Drug Discovery	
PHYS 5260	Introduction to Nanoscience and Nanotechnology	
PHYS 7731	Biological Physics 1	
PMST 6252	Pharmacokinetics and Drug Metabolism	
PMST 6254	Advanced Drug Delivery Systems	
POLS 7333	Science, Technology, and Public Policy	

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

Psychology

Website (http://www.northeastern.edu/psychology/)

Peter Bex, PhD
Professor and Chair

617.373.3076
617.373.8714 (fax)

The doctoral program in the Department of Psychology offers a research-intensive environment within a supportive community of faculty and students. Its areas of research specialization include behavioral neuroscience, cognition/cognitive neuroscience, perception, and social/personality—with crosscutting themes in health, affective science, and life span development.

During the program, students complete a series of topical seminars and courses in quantitative analysis while gaining research skills through working closely with their advisors. They are also expected to develop their own research program, beginning with their master's thesis and culminating in their dissertation. Students' professional development

is supported by attending colloquia, serving as teaching assistants, and modest annual stipends for research/travel.

Programs

Doctor of Philosophy (PhD)

- Psychology (p. 464)

Psychology, PhD

The PhD program in the Department of Psychology covers a wide spectrum of contemporary behavioral science within a close-knit community of faculty and students. The program offers four overlapping areas of experimental emphasis: behavioral neuroscience, cognition, perception, and social/personality. The program does not offer training in clinical or counseling psychology. The objective of the PhD program is to prepare students to become experts in research and teaching in psychology. To accomplish this goal, the department takes a mentoring approach whereby the graduate students are apprentices in faculty laboratories, working closely with their faculty mentors throughout their time in the program. The basic apprenticeship relationship is supplemented by other activities, such as required courses (concentrated in the first and second years), advanced seminars and/or course work in this as well as other departments or universities, a colloquium series, assignments as teaching assistants, the master's project, and the dissertation and its oral defense. After the first year, the structure of the doctoral program, including course work, is flexible and assumes that the process of learning and scientific discovery must be individualized. Graduate students also have an opportunity to develop their teaching and research skills through close mentoring of undergraduate research assistants. The PhD program is a five-year, twelve-months-per-year program.

The dissertation committee must include at least three tenured or tenure-track faculty members from within the psychology department—two from the student's interest area and one from another area. The oral defense committee consists of the dissertation committee plus additional tenured and tenure-track faculty members from the psychology department.

Students who do not qualify for the doctoral degree, but who have completed required coursework with a cumulative GPA of 3.000 or better, may be eligible to receive a terminal MS Psychology *(p. 466) degree. Note that no students will be admitted directly into the Psychology program to pursue a master's degree.*

Program Requirements

Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

First-year paper
Master's proposal
Master's paper
Master's presentation
Annual review
Dissertation committee
Dissertation proposal
Dissertation
Dissertation defense
At least two assigned courses as teaching assistant

Core Requirements

All graduate courses within the Department of Psychology are graded S/U. A grade of S is required in each psychology department course.

Code	Title	Hours
Proseminar		
Complete 12 semester hours from the following:		12
PSYC 5100	Proseminar in Psycholinguistics	
PSYC 5110	Proseminar in Cognition	
PSYC 5120	Proseminar in Sensation	
PSYC 5130	Proseminar in Perception	
PSYC 5140	Proseminar in Biology of Behavior	
PSYC 5150	Proseminar in Clinical Neuroscience	
PSYC 5160	Proseminar in Personality	
PSYC 5170	Proseminar in Social Psychology	
Quantitative Methods		
PSYC 5180	Quantitative Methods 1	3
PSYC 5181	Quantitative Methods 2	3
Ethics		
PSYC 7302	Ethics and Professional Issues	3
Research		
PSYC 7301	Research Methodologies Psychology	3
Project		
Take the following (repeatable) course three times:		9
PSYC 8401	Research Project	
Thesis		
Take the following (repeatable) course twice:		6
PSYC 7990	Thesis	

Electives

Code	Title	Hours
Complete 11 semester hours from the following:		11
Note: Proseminars not taken to fulfill core requirements and courses outside the department may be taken if approved by faculty adviser and Director of Graduate Studies.		
PSYC 7200 to PSYC 7300		
PSYC 5100	Proseminar in Psycholinguistics	
PSYC 5110	Proseminar in Cognition	
PSYC 5120	Proseminar in Sensation	
PSYC 5130	Proseminar in Perception	
PSYC 5140	Proseminar in Biology of Behavior	
PSYC 5150	Proseminar in Clinical Neuroscience	
PSYC 5160	Proseminar in Personality	
PSYC 5170	Proseminar in Social Psychology	

Dissertation

Code	Title	Hours
PSYC 9990	Dissertation Term 1	
PSYC 9991	Dissertation Term 2	
Complete the following (repeatable) course until graduation:		
PSYC 9996	Dissertation Continuation	

Program Credit/GPA Requirements

50 total semester hours required
Minimum 3.000 GPA required

Plan of Study

Year 1

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
Complete 6 semester hours of the following:	6	Complete 6 semester hours of the following:	6	PSYC 8401	3
PSYC 5100		PSYC 5100		Elective	6
PSYC 5110		PSYC 5110			
PSYC 5120		PSYC 5120			
PSYC 5130		PSYC 5130			
PSYC 5140		PSYC 5140			
PSYC 5150		PSYC 5150			
PSYC 5160		PSYC 5160			
PSYC 5170		PSYC 5170			
Complete the following:	6	Complete the following:	6		
PSYC 5180		PSYC 5181			
PSYC 8400		PSYC 8400			
	12		12		9

Year 2

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PSYC 7990	3	Complete one of the following:	3	PSYC 7996	0
Elective	5	PSYC 7300			
		PSYC 7302			
		Complete the following:	3		
		PSYC 7990			
	8		6		0

Year 3

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PSYC 9990	0	Complete one of the following:	3	PSYC 9996	0
		PSYC 7300			
		PSYC 7302			
		Complete the following:	0		
		PSYC 9991			
	0		3		0

Year 4

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PSYC 9996	0	PSYC 9996	0	PSYC 9996	0
	0		0		0

Year 5

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PSYC 9996	0	PSYC 9996	0	PSYC 9996	0
	0		0		0

Total Hours: 50

Advanced Entry PhD Program Requirements

The PhD program in the Department of Psychology covers a wide spectrum of contemporary behavioral science within a close-knit community of faculty and students. Advanced Entry is for students who enter possessing a master's degree in psychology or another acceptable field. The program offers four overlapping areas of experimental emphasis: behavioral neuroscience, cognition, perception, and social/personality. The program does not offer training in clinical or counseling psychology. The objective of the PhD program is to prepare students to become experts in research and teaching in psychology. To accomplish this goal, the department takes a mentoring approach whereby the graduate students are apprentices in faculty laboratories, working closely with their faculty mentors throughout their time in the program. The basic apprenticeship relationship is supplemented by other activities, such as required courses (concentrated in the first and second years), advanced seminars and/or course work in this as well as other departments or universities, a colloquium series, assignments as teaching assistants, the master's project, and the dissertation and its oral defense. After the first year, the structure of the doctoral program, including course work, is flexible and assumes that the process of learning and scientific discovery must be individualized. Graduate students also have an opportunity to develop their teaching and research skills through close mentoring of undergraduate research assistants. The PhD program is a five-year, 12-months-per-year program.

For students who enter the program with a suitable master's degree, degree candidacy is established through completion of a set of requirements determined on an individual basis. An additional 20 semester hours beyond the master's degree are required for the PhD degree. The dissertation committee must include at least three tenured or tenure-track faculty members from within the psychology department—two from the student's interest area and one from another area. The oral defense committee consists of the dissertation committee plus additional tenured and tenure-track faculty members from the psychology department.

Complete all courses and requirements listed below unless otherwise indicated. Individual programs of study will be tailored to acknowledge students' previous coursework.

Milestones

Master's presentation
Annual review
Dissertation committee
Dissertation proposal
Dissertation
Dissertation defense
At least two assigned courses as teaching assistant

Core Requirements

A grade of S is required in each psychology department course.

Code	Title	Hours
Consult your faculty adviser and director of graduate studies for acceptable coursework.		10

Electives

Code	Title	Hours
Consult your faculty adviser and graduate director for acceptable electives.		10

Dissertation

Code	Title	Hours
PSYC 9990	Dissertation Term 1	
PSYC 9991	Dissertation Term 2	
Complete the following (repeatable) course until graduation:		
PSYC 9996	Dissertation Continuation	

Program Credit/GPA Requirements

20 total semester hours required
Minimum 3.000 GPA required

Note: The number of semester hours to complete this program may be more than 20. The number of semester hours and the specific required courses will be determined by a review of previous coursework by the graduate director and faculty adviser.

Psychology, MS

Overview

Please see PhD Psychology (p. 464) for further information about this program. No students will be admitted directly into this program to pursue a master's degree.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

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First-year paper Committee Master's proposal Master's
 paper Master's presentation
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Core Requirements

All graduate courses within the Department of Psychology are graded S/U. A grade of S is required in each psychology department course.

Code	Title	Hours
Proseminar		
Complete 12 semester hours from the following:		12
PSYC 5100	Proseminar in Psycholinguistics	
PSYC 5110	Proseminar in Cognition	
PSYC 5120	Proseminar in Sensation	
PSYC 5130	Proseminar in Perception	
PSYC 5140	Proseminar in Biology of Behavior	
PSYC 5150	Proseminar in Clinical Neuroscience	
PSYC 5160	Proseminar in Personality	
PSYC 5170	Proseminar in Social Psychology	
Quantitative Methods		
Complete 6 semester hours from the following:		6
PSYC 5180	Quantitative Methods 1	
PSYC 5181	Quantitative Methods 2	
Additional Coursework		
Choose 2 courses from the following list:		6
PSYC 5100	Proseminar in Psycholinguistics	
PSYC 5110	Proseminar in Cognition	
PSYC 5120	Proseminar in Sensation	
PSYC 5130	Proseminar in Perception	
PSYC 5140	Proseminar in Biology of Behavior	
PSYC 5160	Proseminar in Personality	
PSYC 5170	Proseminar in Social Psychology	
PSYC 7240	Seminar in Biology of Behavior	
PSYC 7250	Seminar in Clinical Neuroscience	
PSYC 7270	Seminar in Social Psychology	
PSYC 7300	Advanced Quantitative Analysis	
PSYC 7301	Research Methodologies Psychology	
PSYC 7302	Ethics and Professional Issues	
PSYC 8402	Special Topics in Psychology	
Thesis		
Complete the following (repeatable) course twice:		6
PSYC 7990	Thesis	

Program Credit/GPA Requirements

30 total semester hours required
Minimum 3.000 GPA required

Interdisciplinary

Programs

Doctor of Philosophy

- Network Science (p. 135)

Master of Science

- Applied Physics and Engineering (p. 178)
- Environmental Science and Policy (p. 446)

Graduate Certificate

- Bioinformatics and Cheminformatics (p. 471)
- Omics (p. 472)

Network Science, PhD

Website (http://www.networkscienceinstitute.org)

The PhD program in network science aims to enhance our understanding of networks arising from the interplay of human behavior, sociotechnical infrastructures, information diffusion, and biological agents. This is an intrinsically multidisciplinary activity, with members of the network science community representing a wide range of fields including computer science, information science, complexity, physics, sociology, communication, organizational behavior, political science, and epidemiology. This is an interdisciplinary doctoral program focused on training students in network science across several colleges—including the College of Social Sciences and Humanities, the College of Science, the Khoury College of Computer Sciences, and Bouvé College of Health Sciences—with several research areas, including computational sciences, information sciences, health and life sciences, social sciences, and theoretical physics. See other collaborating colleges' catalog sections for possible elective courses.

Coursework is dependent on a student's area of research and subject to prior approval by their faculty advisor. Required coursework includes 20 semester hours of core courses in network science, plus an additional 20 semester hours of courses relevant to the students' area of research.

A minimum of 40 credit hours of coursework is required, though the graduate program committee may recommend additional coursework based on student research interests.

Satisfactory progress in the program will be ongoing and formally evaluated at the end of both the first and second years of the program. Students are expected to maintain a cumulative GPA of 3.000 or better in all coursework. Students are not allowed to retake courses. A student who does not maintain the 3.000 GPA, or is not making satisfactory progress on their dissertation research, may be recommended for termination by the graduate program committee.

Each student will have one primary research advisor from the network science doctoral program faculty.

Students will be expected to select their research advisor by the end of the spring semester of their second year in the program.

The dissertation committee consists of at least four members: the dissertation advisor, one additional network science doctoral program faculty member, one member expert in the specific topic of research (can be from outside the university), and one additional tenured/tenure-track faculty member from the concentration department/conferring college. The dissertation advisor must be a full-time tenured or tenure-track member of the Northeastern University faculty. Students may repeat the comprehensive examination once if they are unsuccessful.

Degree Candidacy

A student is considered a PhD candidate upon completion of all required coursework with a minimum cumulative GPA of 3.000, satisfactory completion of the qualification exam, and satisfactory completion of the comprehensive exam.

Qualifying Examination

The qualification exam will be an oral examination of the material during the students' coursework. The exam will be an hour in length and consist of questions selected by network science faculty who comprise the qualifying examination and dissertation committee. Students will receive 50 to 80 potential questions, which they must be prepared to answer, one month before the exam. The exam will consist of a subset of these questions. The qualifying exam will be offered twice annually, in the fall and spring term. All students are required to initially sit for the exam in the fall, typically in their third year of the PhD program. Students who do not pass the qualifying exam on their first attempt are expected to retake the exam in the spring term. Students may sit for the qualifying exam no more than twice.

Students who fail to complete the qualifying examination but who have completed all the PhD program's required coursework with a cumulative GPA of 3.000 or better will be awarded a terminal Master of Science in Network Science degree. Note that no students will be admitted directly into the network science program for receipt of a master's degree.

Comprehensive Examination

Students must submit a written dissertation proposal to the Dissertation Committee. The proposal (with the aid and approval of their dissertation advisor) will outline a plan to carry out new and original research. The proposal should identify relevant literature, the research problem, the research plan, and the potential impact on the field. An oral presentation of the proposal will be made in an open forum before a public audience and the Dissertation Committee, followed by questions from non-committee members. The written proposal must be given to committee member at least two weeks prior to the oral presentation. After the presentation,the student will meet with the dissertation committee to address any concerns raised in either the written proposal or the presentation.The Comprehensive Exam must precede the final dissertation defense by at least one year.

Dissertation Defense

A PhD student must complete and defend a dissertation that involves original research in network science. The dissertation defense must adhere to Northeastern University academic policies.

Students who do not qualify for the doctoral degree, but who have completed required coursework with a cumulative GPA of 3.000 or better, may be eligible to receive a terminal MS Network Science (p. 523)*degree. Note that no students will be admitted directly into the Network Science program to pursue a master's degree.*

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review
Qualifying exam
Dissertation committee
Dissertation proposal
Dissertation defense

Core Requirements

Code	Title	Hours
PHYS 5116	Complex Networks and Applications	4
NETS 6116	Complex Networks and Applications 2	4
PHYS 7332	Network Science Data 2	4
or NETS 7332	Machine Learning with Graphs	
POLS 7334	Social Networks (NETS)	4
PHYS 7335	Dynamical Processes in Complex Networks	4

Specializations

Choose one of the following specializations or 20 semester hours of elective coursework from the electives course list:

- Computer Science (p.)
- Social Science (p.)
- Epidemiology (p. 136)
- Physics/Theory (p. 137)
- Math (p. 137)
- Coursework (p.)

COMPUTER SCIENCE

Code	Title	Hours
CS 5800	Algorithms	4
CS 6140	Machine Learning	4
or CS 6220	Data Mining Techniques	
Complete 12 semester hours of elective courses from the elective list below. Students who wish to take courses outside of the electives list below must do so in consultation with their adviser.		12

SOCIAL SCIENCE

Code	Title	Hours
NETS 7350	Bayesian and Network Statistics	4
NETS 7360	Research Design for Social Networks	4

Complete 12 semester hours of elective courses from the elective list below. Students who wish to take courses outside of the electives list below must do so in consultation with their adviser.		12

EPIDEMIOLOGY

Code	Title	Hours
PHTH 5202	Introduction to Epidemiology	3
PHTH 6202	Intermediate Epidemiology	3
Complete 14 semester hours of elective courses from the elective list below. Students who wish to take courses outside of the electives list below must do so in consultation with their adviser.		14

PHYSICS/THEORY

Code	Title	Hours
MATH 7233	Graph Theory	4
PHYS 7337	Statistical Physics of Complex Networks	4
Complete 12 semester hours of elective courses from the elective list below. Students who wish to take courses outside of the electives list below must do so in consultation with their adviser.		12

MATH

Code	Title	Hours
CS 5800	Algorithms	4
MATH 7233	Graph Theory	4
Complete 12 semester hours of elective courses from the elective list below. Students who wish to take courses outside of the electives list below must do so in consultation with their adviser.		12

COURSEWORK

Code	Title	Hours
Complete 20 semester hours of elective courses from the elective list below. Students who wish to take courses outside of the electives list below must do so in consultation with their adviser.		20

ELECTIVES LIST

Common electives include the following:

Code	Title	Hours
CS 5800	Algorithms	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	
CS 6220	Data Mining Techniques	
CS 7180	Special Topics in Artificial Intelligence	
CS 7260	Visualization for Network Science	
CS 7295	Special Topics in Data Visualization	
NETS 7341	Network Economics	
NETS 7350	Bayesian and Network Statistics	
NETS 7976	Directed Study	
NETS 7983	Topics	
MATH 7233	Graph Theory	
MATH 7243	Machine Learning and Statistical Learning Theory	
PHYS 7305	Statistical Physics	
PHYS 7321	Computational Physics	
PHYS 7337	Statistical Physics of Complex Networks	

Dissertation

Code	Title	Hours
NETS 9990	Dissertation Term 1	
NETS 9991	Dissertation Term 2	

Program Credit/GPA Requirements

40 total semester hours required
Minimum 3.000 GPA required

Plan of Study

Year 1

Fall	Hours	Spring	Hours
PHYS 5116	4	PHYS 7332	4
PHYS 7331 or INSH 5301 (If required, may be substituted with an elective)	4	NETS 6116	4
		POLS 7334	4
	8		12

Year 2

Fall	Hours	Spring	Hours
PHYS 7335	4	Two Elective Courses	8
Two Elective Courses	8		
	12		8

Year 3

Fall	Hours	Spring	Hours
NETS 9990	0	NETS 9991	0
	0		0

Year 4

Fall	Hours
NETS 9996	0
	0

Total Hours: 40

Applied Physics and Engineering, MS

The combined MS program in applied physics and engineering allows graduate students to receive training in one of three concentrations of the electrical and computer engineering department while also receiving fundamental graduate-level physics training that is relevant to that area.

Thesis Option

A student may complete an additional 8 semester hours of thesis. Students may register for an additional two semesters of thesis work, Thesis (EECE 7990) (4 semester hours) or Thesis (PHYS 7990) (4 semester hours), depending on the affiliation of the thesis advisor. A thesis committee is composed of an advisor and two faculty members from physics or electrical engineering.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Concentrations

Complete one of the following concentrations:

- Microsystems, Materials, and Devices (p. 178)
- Electromagnetics, Plasma, and Optics (p. 178)
- Analysis, Modeling, and Computation (p. 178)

MICROSYSTEMS, MATERIALS, AND DEVICES

Code	Title	Hours
Core Courses		
EECE 7201	Solid State Devices	4
PHYS 7324	Condensed Matter Physics	4
Engineering Course Work		
Complete 12 semester hours from the following:		12
EECE 5606	Micro- and Nanofabrication	
EECE 5680	Electric Drives	
EECE 7204	Applied Probability and Stochastic Processes	
EECE 7240	Analog Integrated Circuit Design	
EECE 7242	Integrated Circuits for Mixed Signals and Data Communication	
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)	
EECE 7245	Microwave Circuit Design for Wireless Communication	
EECE 7353	VLSI Design	
EECE 7398	Special Topics	
Physics Course Work		
Complete 12 semester hours from the following:		12
PHYS 5318	Principles of Experimental Physics	
PHYS 7301	Classical Mechanics/Math Methods	
PHYS 7302	Electromagnetic Theory	
PHYS 7305	Statistical Physics	
PHYS 7315	Quantum Theory 1	
PHYS 7316	Quantum Theory 2	
PHYS 7321	Computational Physics	
PHYS 7331	Network Science Data	
PHYS 7734	Topics: Condensed Matter Physics	

ELECTROMAGNETICS, PLASMA, AND OPTICS

Code	Title	Hours
Core Courses		
EECE 7203	Complex Variable Theory and Differential Equations	4
PHYS 7302	Electromagnetic Theory	4
Engineering Course Work		
Complete 12 semester hours from the following:		12
EECE 5698	Special Topics in Electrical and Computer Engineering (Subsurface Imaging)	
EECE 7105	Optics for Engineers	
EECE 7202	Electromagnetic Theory 1	
EECE 7245	Microwave Circuit Design for Wireless Communication	
EECE 7270	Electromagnetic Theory 2	
EECE 7271	Computational Methods in Electromagnetics	
EECE 7275	Antennas and Radiation	
EECE 7293	Modern Imaging	
Physics Course Work		
Complete 12 semester hours from the following:		12
PHYS 5318	Principles of Experimental Physics	
PHYS 7305	Statistical Physics	
PHYS 7315	Quantum Theory 1	
PHYS 7316	Quantum Theory 2	
PHYS 7321	Computational Physics	
PHYS 7324	Condensed Matter Physics	
PHYS 7731	Biological Physics 1	

ANALYSIS, MODELING, AND COMPUTATION

Code	Title	Hours
Core Courses		
EECE 7205	Fundamentals of Computer Engineering	4
PHYS 7321	Computational Physics	4
Engineering Course Work		
Complete 12 semester hours from the following:		12
EECE 5639	Computer Vision	
EECE 5640	High-Performance Computing	
EECE 5642	Data Visualization	
EECE 5643	Simulation and Performance Evaluation	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7205	Fundamentals of Computer Engineering	
EECE 7271	Computational Methods in Electromagnetics	
EECE 7352	Computer Architecture	
EECE 7353	VLSI Design	
EECE 7374	Fundamentals of Computer Networks	
Physics Course Work		
Complete 12 semester hours from the following:		12
PHYS 5116	Complex Networks and Applications	
PHYS 5318	Principles of Experimental Physics	
PHYS 7301	Classical Mechanics/Math Methods	
PHYS 7305	Statistical Physics	
PHYS 7331	Network Science Data	
PHYS 7335	Dynamical Processes in Complex Networks	

Thesis Option

Students may register for an additional two semesters of thesis work, Thesis (EECE 7990) or Thesis (PHYS 7990) , depending on the affiliation of the thesis advisor. Thesis credits cannot be substituted for any of the coursework listed above. This option requires a total of 40 semester hours for the master's degree.

Program Credit/GPA Requirements

32–40 total semester hours required
Minimum 3.000 GPA required

Environmental Science and Policy, MS

The Master of Science in Environmental Science and Policy program emphasizes a broadly interdisciplinary and synthetic approach that integrates knowledge in the environmental sciences (conservation biology, climate change, fisheries science, ecosystem function, biodiversity, restoration ecology) with the social sciences (policy, economics, sociology, political science, and development) and humanities (environmental history, philosophy, and ethics). The goal of the program is to equip professionals with substantive breadth in knowledge and skills at the intersection of environmental science and policy. The program focuses on training students to think critically about the underlying causes of environmental problems and understanding the reciprocal relationships between coupled human-natural ecosystems and the interconnections between social and technological innovations. The program explores practical approaches and potential solutions that decision makers need to evaluate in policy debates related to promoting environmental sustainability.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Seminars		
PPUA 6101	Environmental Science and Policy Seminar 1	4
ENVR 6102	Environmental Science and Policy Seminar 2	4
Skills Courses		
Complete 2 courses from the following. At least one course needs to be taken from the College of Science Skills Course List and one course from the College of Social Sciences and Humanities Skills Course List.		8
College of Science Skills Course List		
EEMB 5130	Ecological Dynamics	
ENVR 5150	Climate and Atmospheric Change	
EEMB 5522	Experimental Design Marine Ecology	
ENVR 5210	Environmental Planning	
ENVR 5240	Sedimentary Basin Analysis	
ENVR 5260	Geographical Information Systems	
ENVR 6500	Biostatistics	
College of Social Sciences and Humanities Skills Course List		
INSH 5301	Introduction to Computational Statistics	
INSH 6300	Research Methods in the Social Sciences	
INSH 7400	Quantitative Analysis	
LPSC 7311	Strategizing Public Policy	
PPUA 5260	Ecological Economics	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
PPUA 6212	Research Toolkit for Urban and Regional Policy: Project Management	
PPUA 6213	Research Toolkit for Urban and Regional Policy: Data Visualization	
PPUA 6216	Research Toolkit for Urban and Regional Policy: Grant Writing	
PPUA 6502	Economic Analysis for Policy and Planning	
PPUA 6505	Public Budgeting and Financial Management	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6509	Techniques of Program Evaluation	
PPUA 6525	Institutions and Public Policy	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	

Electives

Complete five courses from the following list. At least one course must be taken from the College of Science Elective Course List and one courses from the College of Social Sciences and Humanities Elective Course List. Any skills course not taken to fulfill the skills courses requirement can be taken as an elective. Students may petition to enroll in other relevant graduate courses offered by other schools at Northeastern University.

COLLEGE OF SCIENCE ELECTIVE LIST

Code	Title	Hours
EEMB 5130 - EEMB 8984		
ENVR 5115 - ENVR 6900		

COLLEGE OF SOCIAL SCIENCES AND HUMANITIES ELECTIVE LIST

Code	Title	Hours
INSH 5302	Information Design and Visual Analytics	
INTL 5100	Climate and Development	
LPSC 7311	Strategizing Public Policy	
LPSC 7312	Cities, Sustainability, and Climate Change	
PHTH 5214	Environmental Health	
PHTH 5230	Global Health	
PPUA 5225	The Open Classroom: Public Debates on Public Policy	
PPUA 5230	Housing Policy	
PPUA 5234	Land Use and Urban Growth Policy	
PPUA 5249	Sustainable Urban Coastal Policy	
PPUA 5260	Ecological Economics	
PPUA 5262	Big Data for Cities	
PPUA 5264	Energy Democracy and Climate Resilience: Technology, Policy, and Social Change	
PPUA 5266	Urban Theory and Science	
PPUA 5268	International Environmental Policy	
PPUA 5270	Food Systems and Public Policy	
PPUA 5390	Special Topics in Public Policy and Urban Affairs	
PPUA 6201	The 21st-Century City: Urban Opportunities and Challenges in a Global Context	
PPUA 6505	Public Budgeting and Financial Management	
PPUA 6506	Techniques of Policy Analysis	

PPUA 6522	Administrative Ethics and Public Management
PPUA 6551	Nonprofit Organizations and Social Change
PPUA 6552	The Nonprofit Sector in Civil Society and Public Affairs
PPUA 6553	Nonprofit Financial Resource Development
PPUA 6862	Internship with Research
PPUA 6966	Practicum
PPUA 7346	Resilient Cities
PPUA 7673	Capstone in Public Policy and Urban Affairs
SOCL 7267	Environment, Health, and Society
SOCL 7287	Social Movements in Health

Program Credit/GPA Requirements

36 total semester hours required
Minimum 3.000 GPA required

Bioinformatics and Cheminformatics, Graduate Certificate

The Certificate in Bioinformatics and Cheminformatics focuses on understanding a diverse set of data from biological systems to chemical informatics (or cheminformatics). Bioinformatics focuses on storing, indexing, searching, retrieving, and applying information about biologic molecules, such as genomics. Cheminformatics focuses on storing, indexing, searching, retrieving, and applying information about chemical compounds.

Program Requirements

The certificate program is comprised of one four-credit course, two three-credit courses, and one elective course.

Code	Title	Hours
Required Courses		
BIOL 6299	Molecular Cell Biology for Biotechnology	3
BINF 6400	Genomics in Bioinformatics	4
CHEM 6500	Cheminformatics	3
Elective		
Complete one of the following:		3-4
BIOE 5235	Biomedical Imaging	
BIOE 5420	Cellular Engineering	
BIOE 6100	Medical Physiology	
BIOL 5543	Stem Cells and Regeneration	
BIOL 5549	Inventions in Microbial Biotechnology	
BIOL 5569	Advanced Microbiology	
BIOL 5573	Medical Microbiology	
BIOL 5581	Biological Imaging	
BIOL 5583	Immunology	
BIOL 5585	Evolution	
BIOL 5587	Comparative Neurobiology	
BIOL 5591	Advanced Genomics	
BIOL 5593	Cell and Molecular Biology of Aging	
BIOL 5597	Immunotherapies of Cancer and Infectious Disease	
BIOL 6300	Biochemistry	
BIOL 6301	Molecular Cell Biology	
BIOL 6303	Neurobiology and Behavior	
BIOL 6399	Dynamics of Microbial Ecology	
BIOL 6407	Biochemistry for Molecular Biologists	
BIOT 5120	Foundations in Biotechnology	
BIOT 5225	Managing and Leading a Biotechnology Company	
BIOT 5226	Biotechnology Entrepreneurship	
BIOT 5227	Launching Your Science: Biotechnology Entrepreneurship	
BIOT 5560	Bioprocess Fundamentals	
BIOT 5631	Cell Culture Processes for Biopharmaceutical Production	
BIOT 5635	Downstream Processes for Biopharmaceutical Production	
BIOT 5640	Drug Product Processes for Biopharmaceuticals	
BIOT 5700	Molecular Interactions of Proteins in Biopharmaceutical Formulations	
BIOT 5810	Cutting-Edge Applications in Molecular Biotechnology	
BIOT 5850	Higher-Order Structure Analytics	
BIOT 7245	Biotechnology Applications Laboratory	
CHEM 5550	Introduction to Glycobiology and Glycoprotein Analysis	
CHEM 5616	Protein Mass Spectrometry	
CHEM 5617	Protein Mass Spectrometry Laboratory	
CHEM 5620	Protein Chemistry	
CHEM 5638	Molecular Modeling	
CHEM 7317	Analytical Biotechnology	
CS 5010	Programming Design Paradigm	
CS 5100	Foundations of Artificial Intelligence	
CS 5200	Database Management Systems	
CS 5400	Principles of Programming Language	
CS 5500	Foundations of Software Engineering	
CS 5600	Computer Systems	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 5800	Algorithms	
CS 6140	Machine Learning	
CS 6200	Information Retrieval	
DA 5020	Collecting, Storing, and Retrieving Data	
DA 5030	Introduction to Data Mining/Machine Learning	
HINF 5101	Introduction to Health Informatics and Health Information Systems	
HINF 5102	Data Management in Healthcare	
HINF 5105	The American Healthcare System	
HINF 5110	Global Health Information Management	
HINF 5200	Theoretical Foundations in Personal Health Informatics	
HINF 6220	Database Design, Access, Modeling, and Security	
INSH 5301	Introduction to Computational Statistics	

INSH 5302	Information Design and Visual Analytics
MATH 5131	Introduction to Mathematical Methods and Modeling
MATH 7203	Numerical Analysis 1
MATH 7205	Numerical Analysis 2
MATH 7233	Graph Theory
MATH 7241	Probability 1
MATH 7341	Probability 2
MATH 7342	Mathematical Statistics
MATH 7344	Regression, ANOVA, and Design
PHYS 7331	Network Science Data
PHYS 7332	Network Science Data 2

Program Credit/GPA Requirements

Minimum 13 semester hours

Minimum 3.000 GPA required

Omics, Graduate Certificate

Students will explore in detail the key genomic technologies and computational approaches that are driving advances in prognostics, diagnostics, and treatment, learning how scientists sequence, assemble, and analyze the function and structure of genomes. The certificate explores methods for determining traits and diseases by studying the larger population as well as how gene identification can help identify targets for therapeutic intervention. Students that are already in the field or have an interest will significantly benefit from a certificate like this.

Program Requirements

Requirements

Code	Title	Hours
Required Courses		
BINF 6400	Genomics in Bioinformatics	4
BINF 6410	Proteomics in Bioinformatics	4
BINF 6420	Omics in Bioinformatics	4
Elective		
Complete one of the following:		3-4
BIOE 5235	Biomedical Imaging	
BIOE 5420	Cellular Engineering	
BIOE 6100	Medical Physiology	
BIOL 5543	Stem Cells and Regeneration	
BIOL 5549	Inventions in Microbial Biotechnology	
BIOL 5569	Advanced Microbiology	
BIOL 5573	Medical Microbiology	
BIOL 5581	Biological Imaging	
BIOL 5583	Immunology	
BIOL 5585	Evolution	
BIOL 5587	Comparative Neurobiology	
BIOL 5591	Advanced Genomics	
BIOL 5593	Cell and Molecular Biology of Aging	
BIOL 5597	Immunotherapies of Cancer and Infectious Disease	
BIOL 6299	Molecular Cell Biology for Biotechnology	
BIOL 6300	Biochemistry	
BIOL 6301	Molecular Cell Biology	
BIOL 6303	Neurobiology and Behavior	
BIOL 6399	Dynamics of Microbial Ecology	
BIOL 6407	Biochemistry for Molecular Biologists	
BIOT 5120	Foundations in Biotechnology	
BIOT 5225	Managing and Leading a Biotechnology Company	
BIOT 5226	Biotechnology Entrepreneurship	
BIOT 5227	Launching Your Science: Biotechnology Entrepreneurship	
BIOT 5560	Bioprocess Fundamentals	
BIOT 5631	Cell Culture Processes for Biopharmaceutical Production	
BIOT 5635	Downstream Processes for Biopharmaceutical Production	
BIOT 5640	Drug Product Processes for Biopharmaceuticals	
BIOT 5700	Molecular Interactions of Proteins in Biopharmaceutical Formulations	
BIOT 5810	Cutting-Edge Applications in Molecular Biotechnology	
BIOT 5850	Higher-Order Structure Analytics	
BIOT 7245	Biotechnology Applications Laboratory	
CHEM 5550	Introduction to Glycobiology and Glycoprotein Analysis	
CHEM 5616	Protein Mass Spectrometry	
CHEM 5617	Protein Mass Spectrometry Laboratory	
CHEM 5620	Protein Chemistry	
CHEM 5638	Molecular Modeling	
CHEM 7317	Analytical Biotechnology	
CS 5010	Programming Design Paradigm	
CS 5100	Foundations of Artificial Intelligence	
CS 5200	Database Management Systems	
CS 5400	Principles of Programming Language	
CS 5500	Foundations of Software Engineering	
CS 5600	Computer Systems	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 5800	Algorithms	
CS 6140	Machine Learning	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
DA 5020	Collecting, Storing, and Retrieving Data	
DA 5030	Introduction to Data Mining/Machine Learning	
HINF 5101	Introduction to Health Informatics and Health Information Systems	
HINF 5102	Data Management in Healthcare	
HINF 5105	The American Healthcare System	
HINF 5110	Global Health Information Management	
HINF 5200	Theoretical Foundations in Personal Health Informatics	
HINF 6220	Database Design, Access, Modeling, and Security	
INSH 5301	Introduction to Computational Statistics	

INSH 5302	Information Design and Visual Analytics
MATH 5131	Introduction to Mathematical Methods and Modeling
MATH 7203	Numerical Analysis 1
MATH 7205	Numerical Analysis 2
MATH 7233	Graph Theory
MATH 7241	Probability 1
MATH 7341	Probability 2
MATH 7342	Mathematical Statistics
MATH 7344	Regression, ANOVA, and Design
PHYS 7331	Network Science Data
PHYS 7332	Network Science Data 2

Program Credit/GPA Requirements

15 total semester hours required

Minimum 3.000 GPA required

Graduate Certificate Programs

The College of Science is pleased to offer several graduate certificate programs for working professionals as well as postbaccalaureate students who want to build their knowledge in growing fields. Graduate certificates are offered in in biotechnology, bioinformatics, applied mathematics, and nanomedicine. These programs are ideal for people already in the field who want to enhance their career or people who are looking to make a change.

Program Requirements

Biology

- Bioinformatics (p. 434)

Chemistry and Chemical Biology

- Biodefense and Biosecurity (p. 441)
- Biopharmaceutical Analytical Sciences (p. 264)
- Biotechnology (p. 441)
- Biotechnology Enterprise (p. 441)
- Biotechnology Regulatory Science (p. 442)
- Experimental Biotechnology (p. 442)
- Manufacturing and Quality Operations in Biotechnology (p. 442)
- Molecular Biotechnology (p. 442)
- Pharmaceutical Technologies (p. 443)
- Process Science (p. 443)
- Vaccine Development (p. 443)

Mathematics

- Applied Mathematics (p. 456)

Physics

- Nanomedicine (p. 463)

College of Social Sciences and Humanities

Website (http://www.northeastern.edu/cssh/)

Uta G. Poiger, PhD, Dean
Thomas J. Vicino, PhD, Associate Dean, Graduate Studies

CSSH Graduate Office
180 Renaissance Park
617.373.5990
gradcssh@northeastern.edu

CSSH Graduate Programs General Regulations (p. 473)

Our Mission

The departments and programs of the College of Social Sciences and Humanities (CSSH)—with disciplines ranging from economics and history to English and international affairs, just to name a few—form an interdisciplinary collaborative of scholars with global perspectives. The CSSH mission is:

- To contribute to the experiential liberal arts education of all Northeastern students
- To produce cutting-edge knowledge about and solutions to the political and social problems of our contemporary world
- To foster ethical reasoning and critical thought, with attention to the enduring significance of history, literature, and culture

This mission, along with a strong international focus, gives CSSH a central role in fulfilling Northeastern's ambition of educating global citizens.

Graduate Programs in the College of Social Sciences and Humanities

Graduate education at Northeastern integrates the highest level of scholarship across disciplinary boundaries with significant research and experiential learning opportunities. This multidimensional learning environment offers students an opportunity to develop critical thinking and creative problem-solving skills while introducing them to new perspectives in their fields. CSSH supports 16 master's programs, 8 doctoral programs, and 12 graduate certificate programs. Some courses and degree programs are offered in an online or hybrid format that provides additional flexibility for learners. Graduate programs in CSSH provide fertile ground and resources for advanced study and research. CSSH faculty members' cutting-edge interdisciplinary work inspires the development of new programs, research fellowship opportunities, and mentoring relationships.

All CSSH master's programs offer an optional cooperative education experience (co-op) to eligible students. Cooperative education is central to both the Northeastern experience and to the CSSH experiential liberal arts framework. Northeastern's signature co-op ecosystem provides qualified master's students with up to six months of work experiences in businesses, nonprofits, and government agencies in Boston, across the United States, and around the world. Through the co-op experience and integrative cocurricular coursework, graduate students apply what they have learned across contexts, bringing knowledge and skills gained in community learning spaces back to our campus learning spaces.

Our doctoral, master's, and professional degree programs produce graduates who are well prepared for the diverse demands of careers in academia, industry, and the professions. Please visit the College of Social Sciences and Humanities (http://www.northeastern.edu/cssh/) website for additional information, including latest news and upcoming events.

General Regulations

- General Information (p. 474)
- Academic Appeals Procedures (p. 474)

- Regulations for All Students (p. 477)
- Doctor of Philosophy (PhD) (p. 478)
- Master's Degrees (MA, MPA, MPP, MS) (p. 479)

General Information

For information about other academic policies and procedures; student responsibilities; student academic and cocurricular life; faculty rights and responsibilities; or general personnel policies, benefits, and services, please refer to university policies (p. 23) and related procedural guides, as appropriate.

Student Classification

Regular student—Students who are admitted to a degree or certificate program.

Provisional student—Students whose academic records do not qualify them for acceptance as regular students. Provisional students must obtain a B (3.000) average in the first 12 semester hours of study or meet specifically delineated departmental requirements to qualify for full acceptance to a degree program. In keeping with university regulations (p. 10), international students cannot be admitted provisionally.

Special student—Nonmatriculated students who are enrolled in CSSH graduate courses on a part-time basis (fewer than 8 semester hours per semester). Special students may earn up to 12 semester hours over time. Special students who do not register for four consecutive semesters (excluding summer semester) may be subject to review and possible withdrawal by the college. Graduate certificates and degrees cannot be conferred upon students in special student status. In keeping with university regulations (p. 10), international students cannot be admitted as special students.

Doctoral degree candidate—Doctoral students who have completed departmental, college, and university requirements except for dissertation.

Student Status

For academic purposes, a graduate student is considered a full-time student if enrolled in a minimum of 8 semester hours of credit for the semester, with the following exceptions:

- Students who hold Stipended Graduate Assistantships (SGA) will be considered full-time if enrolled for a minimum of 6 semester hours of credit. However, some departments may require more credits for maintaining departmental progression standards.
- Students enrolled in Doctoral Research or full-time co-op are considered full-time.
- All graduate students who are formally registered in a continuation status, Dissertation, Dissertation Continuation, Doctoral Research, or Qualifying/Comprehensive Exam Preparation courses may be considered full-time. It is ordinarily assumed that such students will be in residence.
- Students in their last semester of coursework may be enrolled in fewer than 8 semester hours to complete degree requirements. *Note:* To be eligible for some types of financial aid, the minimum full-time load may be defined differently. For information, contact the Graduate Student Financial Services Office.

Continued registration in the College of Social Sciences and Humanities is contingent upon receiving all official transcripts and test scores within 30 days of matriculation. Please note that you may be asked to provide us with these if you did not include official copies in your application.

Grading System

The student's performance in graduate courses will be graded according to the following numerical equivalents in the Academic Catalog (p. 36).

Grading Policies

Grading policies applying to all students may be found in the Academic Catalog (p. 36).

In the College of Social Sciences and Humanities, not more than two courses or 6 semester hours of credit, whichever is greater, may be repeated to satisfy the requirements for the degree. Only such repeats will be counted in calculating the cumulative grade-point average (GPA). No grade changes are permitted after the end of the final examination period one calendar year from the semester in which the student registered for the course. This includes the clearance of incomplete grades (p. 36). In calculating the overall cumulative average, all graduate-level coursework completed at the time of clearance for graduation will be counted.

Students cannot elect a pass/fail grading scheme for College of Social Sciences and Humanities courses unless the course grading scheme is designated pass/fail.

Class Credits

All credits are entered as semester hours. Graduate office policy states that in calculating the overall GPA, all graduate-level coursework completed at the time of clearance for graduation will be counted unless otherwise designated at the time of registration or unless counted toward a previous degree.

Academic Appeals Procedures

Northeastern University affirms that it is essential to provide an appeals mechanism to students who believe that they have been erroneously, capriciously, or otherwise unfairly treated. Information about the university appeals process and procedures can be found in the Academic Catalog. (p. 23)

If a student feels that they have been the victim of harassment or of discrimination prohibited by law or by university policy, and that this constitutes a substantive basis for the appeal, they should consult with the Office for University Equity and Compliance (https://www.northeastern.edu/ouec/about/)as soon as they become aware of alleged prohibited harassment or discrimination, and they are not required to wait until a term grade or determination is received before seeking advice or redress. If the Office for University Equity and Compliance is advised of such alleged prohibited conduct as part of an academic appeal, the appeal shall first be pursued and investigated through the Office for University Equity and Compliance. Following a resolution of the harassment/discrimination issues, any remaining academic issues will be addressed, at the request of the student, according to the academic appeals procedures.

In cases that do not involve sexual harassment or discrimination, students may speak informally to their instructors or academic advisors about any determination or grade about which they have questions. If students choose to pursue an appeal, the College of Social Sciences and Humanities (CSSH) process is described in the appeals section that follows. The Graduate Academic Advisory Committee (GAAC), which is

comprised of an elected body of full-time CSSH faculty, serves as the Academic Appeals Committee for the CSSH.

Graduate Academic Advisory Committee

The GAAC shall be responsible for ensuring that the graduate curriculum of the college promotes the college's and university's evolving intellectual and pedagogical aims. The GAAC acts on all matters relating to the academic life of graduate students in the college in accordance with guidelines approved by the college and the GAAC. The responsibilities of the GAAC are:

a. Oversight over the quality and scope of the college's graduate curricula, including recommendations for changes to the general program of the college, approval of graduate degree and certificate programs, and review of proposed changes to those programs.

b. Review of student appeals on decisions concerning grades, academic dismissals, academic probation, change in requirements, permission to resume studies, academic warning, and repeating of courses. The GAAC shall adhere to all policies and procedures adopted by the faculty of the college and the Faculty Senate.

In addition, the GAAC shall adhere to policies and procedures issued by the Office of the Provost. Actions on graduate matters taken by the GAAC shall constitute the recommendations by the faculty on these matters. The GAAC shall make recommendations on behalf of the faculty directly to the dean (or the dean's designee). If the dean supports them, the recommendations shall, as needed, then be sent to the university Graduate Council for consideration. The GAAC's and dean's actions shall be reported periodically to the units involved and to the college council for informational purposes.

The GAAC is charged with review of student appeals on decisions concerning grades, academic probation, change in requirements, permission to resume studies, academic warning, and repeating of courses. Members of the GAAC from the student's own unit are recused from the appeal process. Graduate students may request permission to present their appeals in person. If a student believes that all pertinent information has not been presented, the student may request that the GAAC reconsider its decision. If the GAAC reaffirms its action, and the student is still not satisfied, an appeal for review may be made through the university's Academic Appeals Resolution Committee. The appeals procedure is described in the Academic Catalog (p. 23).

Grade Appeals

If a graduate student wishes to dispute a grade in a course taught by a member of the CSSH faculty, the first step is for the student to discuss their concerns with the faculty member who taught the course to see if it is possible to reach agreement on the issue(s). If the student is not able to resolve the issues with the faculty member who taught the course, the student should work with the department/program director to attempt a department-level resolution.

If these informal attempts to resolve the issue fail, the student can enter the formal procedure at the college level.

The student should meet with the associate dean for graduate studies who will attempt to resolve the issue by working with the instructor and the department/program. Contact the Graduate Office at gradcssh@northeastern.edu to schedule the meeting. If it is not possible for the associate dean to resolve the issue with the department/program, the associate dean will determine whether or not there is just cause to convene the GAAC. In the event of an alleged violation of the Student Code of Conduct, the associate dean will first seek a determination of the violation from the Office of Student Conduct and Conflict Resolution (http://www.northeastern.edu/osccr/).

The decision to convene the GAAC will be based upon the following:

- The student attempted to resolve the complaint with the professor and the department/program.
- The complaint is substantive in nature (adjudication could affect a student's course grade and/or academic record).
- The complaint has been brought forward in a timely manner.
  - The statement must be submitted no later than 28 calendar days from the day when the academic determination is made available to the student.
  - If a student wishes to dispute a grade in his or her final term, this must be done within 28 calendar days of the degree conferral date.

FORMAL COMPLAINT

If the associate dean determines the appeal should be brought to the GAAC, the student must provide a formal written complaint to the associate dean within one week of the student's meeting with the associate dean.

- The written complaint should provide a detailed timeline as well as all available evidence supporting the student's complaint.
  - It is the student's responsibility to make their case. Students may submit any evidence such as emails, quizzes, examinations, etc.
- Once the associate dean receives a formal written complaint, the associate dean will provide a copy of the complaint to the faculty member and to the department/program director and convene a meeting of the GAAC.
- If the student fails to provide a well-reasoned written summary of the case, then the matter will be considered closed at the college level.
- The associate dean will make a good-faith effort to identify a date and time for the meeting within 35 calendar days of the student's original submission of his or her statement.

APPEALS MEETING

- The GAAC serves as the Academic Appeals Committee for the CSSH.
- The GAAC is convened in order to determine whether a fair and due process was used to determine the student's grade.
- The role of the committee is to conduct a review when a grade appeal is filed by a student regarding one of the following reasons:
  - Concern that the course grading policy was not applied consistently to all students within a class and/or section.
  - Concern that the instructor's method of assigning grades differed from the method outlined in the instructor's course syllabus.
  - Concern that the instructor failed to provide a clear policy on how grades would be assigned.

The student and the faculty member have the right to attend and present their case orally to the GAAC. The faculty member and the student aren't required to attend; however, it is usually quite helpful to make an oral presentation and answer any questions that the GAAC may have. If the complainant indicates that they will present their case in person and then fails to attend the scheduled hearing, the case will be dismissed. The complainant and the faculty member both have the right to testify privately and separately before the committee. Lawyers are not permitted in these proceedings. Generally, the faculty member and complainant are each given a 15-minute period to present their case.

The student usually presents their complaint to the committee first. This is followed by a brief Q&A of the student by the GAAC. The GAAC may ask the complainant any questions they have based upon either the

written statement submitted by the complainant or the complainant's oral presentation. The faculty member then presents their case, which is followed by a brief Q&A of the faculty member. After both the complainant and faculty member have addressed the GAAC, the GAAC then reviews the evidence, summarizes the case, and makes a recommendation to the associate dean concerning the resolution of the complaint.

If the GAAC believes it cannot resolve any issues without additional information, the GAAC may request any information needed from either the complainant, faculty member, or department/program. This information must be provided to the GAAC within one week of the meeting. If the requested information is not provided in the required time frame, then the GAAC may weigh this failure in making its final determination regarding the original complaint.

COMMITTEE PROCESS

- All decisions of the GAAC will be made based on a simple majority (51 percent) vote.
- Members of the GAAC from the student's own unit are recused from the appeal process.
- The associate dean is chair of the GAAC and only votes when there is a tie.
- The student bringing the complaint to the GAAC carries the burden of proof based on the weight of the evidence in demonstrating that the grade is incorrect or unjustified.
- If the GAAC decides that the grading process was unfair, the GAAC can request that the instructor changes the student's grade.
  - If an acceptable agreement involves a change of grade, the instructor is responsible for submitting a change of grade to the Office of the University Registrar in a timely manner following notification of the GAAC's decision.
- The student shall be notified within three business days of a decision being reached.

If the student is not satisfied with the GAAC's disposition of the matter, or if the grade appeal is not resolved within 35 calendar days after the written statement is submitted to the college, the student may further pursue the matter by requesting in writing that the university convene an Academic Appeals Resolution Committee to review the issue. This must be submitted within 10 calendar days of the notification from the college. This committee has been designated as the final authority on these matters. Students may obtain information on this process by contacting the Office of the Provost.

Academic Dismissal Appeal

If a student wishes to dispute an academic dismissal, the first step is to consult the graduate director about appealing to the department/program. If and when all departmental appeals are exhausted, the student can enter the formal procedure at the college level.

The student will meet with the associate dean for graduate studies who will attempt to resolve the issue by working with the department/program. Contact the Graduate Office at gradcssh@northeastern.edu to schedule the meeting. If it is not possible for the associate dean to resolve the issue with the department/program, the associate dean will determine if the complaint is substantive and there is just cause to convene the GAAC.

FORMAL COMPLAINT

The student must provide a formal written complaint to the associate dean within one week of the student's meeting with the associate dean. The statement must be submitted no later than 28 calendar days from the day when the academic determination is made available to the student. The written complaint should provide a detailed timeline as well as all available evidence supporting the student's complaint. Once the associate dean receives a formal written complaint, the associate dean will provide a copy of the complaint to the department/program director and convene a meeting of the GAAC. If the student fails to provide a thoughtful and well-reasoned written summary of the case, then the matter will be considered closed at the college level. In the event of an alleged violation of the Student Code of Conduct, the associate dean will first seek a determination of the violation from the Office of Student Conduct and Conflict Resolution (http://www.northeastern.edu/osccr/).

The associate dean will make a good-faith effort to identify a date and time for the meeting within 35 calendar days of the student's original submission of his or her statement.

APPEALS MEETING

- The GAAC serves as the Academic Appeals Committee for the CSSH.
- The GAAC is convened in order to determine whether a fair and due process was used.

The student has the right to attend and present their case orally to the committee. The student isn't required to attend; however, it is usually quite helpful to make an oral presentation and answer any questions that the GAAC may have. If the complainant indicates that they will present their case in person and then fails to attend the scheduled hearing, the case will be dismissed. Lawyers are not permitted in these proceedings.

The student usually presents their complaint to the GAAC first. This is followed by a brief Q&A of the student by the GAAC. The GAAC may ask the complainant questions based upon either the written case submitted by the complainant or the complainant's oral presentation. The GAAC then reviews the evidence, summarizes the case, and makes a recommendation to the associate dean concerning the resolution of the complaint.

If the GAAC believes it cannot resolve any issues without additional information, the GAAC may request any information needed from either the complainant or department/program. This information must be provided to the GAAC within one week of the meeting. If the needed information is not provided in the time frame required, then the GAAC may weigh this failure in making its final determination regarding the original complaint.

COMMITTEE PROCESS

- All decisions of the GAAC will be made based on a simple majority (51 percent) vote.
- Members of the GAAC from the student's own unit are recused from the appeal process.
- The associate dean is chair of the GAAC and only votes when there is a tie.
- The student bringing the complaint to the GAAC carries the burden of proof based on the weight of the evidence in demonstrating that the dismissal is incorrect or unjustified.
- If the GAAC decides that the academic dismissal should be revoked, the GAAC can request that the department reinstate the student immediately.

If the student is not satisfied with the GAAC's disposition of the matter, or if the dismissal appeal is not resolved within 35 calendar days after the written statement is submitted to the college, the student may further pursue the matter by requesting in writing that the university convene an Academic Appeals Resolution Committee to review the issue. This must be submitted within 10 calendar days of the notification from the college. This committee has been designated as the final authority on these

matters. Students may obtain information on this process by contacting the Office of the Provost.

Regulations for All Students

Registration

Students must register via the myNortheastern portal or the Student Hub. Procedures to do so are available on the registrar's website. Consult the Office of the University Registrar's Academic Calendar (https://registrar.northeastern.edu/group/calendar/) for important registration dates.

Students are encouraged to obtain advisor approval of course selections each semester. This approval is required for all assistantship recipients and by some departments for all students. Students should check with individual departments for specific guidelines.

Students are expected to only complete the courses and semester hours required for the degree or certificate. Any courses taken outside of those requirements must be approved by the director of the graduate program.

Transfer Credit

For general regulations concerning transfer credit in Northeastern's graduate degree programs, please visit Regulations Applying to All Degree Programs (p. 9).

Degree students may petition to transfer credit through their departments to the College of Social Sciences and Humanities (CSSH) Graduate Office by completing the Transfer Credit form on the Office of the University Registrar's website. An official transcript must be attached to the petition.

Awards

Only those students who are registered in degree programs are eligible for awards. Award recipients will receive an official award letter from the CSSH Graduate Office. Please pay attention to this letter as it is an official contract that should be read carefully. In order to maintain awards, students must be making satisfactory progress toward their degrees. Please refer to the Satisfactory Academic Progress section below for more information.

Students receiving a Stipended Graduate Assistantship (SGA) must be in full-time status and be registered for a minimum of 6 semester hours. The standard duration of the SGA funding window is five years beginning from the time of admission and is not changed based on the source of funding or if the stipend is declined in any given semester(s). The health plan fee (NUSHP) is covered by the SGA award whereas the University Health and Counseling Services fee is not. Students on an SGA must be available to come to campus during normal business hours and are expected to spend 20 hours per week supporting their assignment. Unsatisfactory progress in either your graduate program or your performance in assistantship-related duties or any deviation from the above may result in the early termination of your assistantship. Near the end of each funded term, student performance will be evaluated by their assignment supervisor and that evaluation will be filed with the CSSH Graduate Office.

CSSH Dean's Scholarship and Excellence Fellowship recipients must be in full-time status and be registered for a minimum of 8 semester hours.

Withdrawal from Courses

To withdraw from a course, a student must drop the course via their myNortheastern portal account or the Student Hub within the deadlines as established by the Office of the University Registrar. Consult the Academic Calendar (https://registrar.northeastern.edu/group/calendar/) for more information.

Satisfactory Academic Progress

Satisfactory academic progress means satisfying requirements in the graduate program's general regulations and in the regulations specified by each department.

The college sets minimum standards for all students to fulfill, including:

- Maintaining the graduation requirement of a cumulative grade-point average (GPA) of 3.000 (3.500 for doctoral programs) in their coursework
- Timely completion of coursework
- Timely completion of comprehensive/qualifying examinations

Departments and programs may have additional requirements that exceed those of the college. These requirements can be found in the Academic Catalog and department guides. Failure to maintain satisfactory academic progress may result in academic probation or dismissal from the program.

Receipt of financial support administered by the college is contingent on satisfactory academic progress toward the degree and on meeting department-specific guidelines. The college requires that all students receiving awards will generally have two semesters to reach a 3.000 GPA. Students whose cumulative GPA is below 3.000 (3.500 for doctoral programs) will be reviewed by their departments and by the CSSH Graduate Office and may have their funding terminated on recommendation of their department or by decision of the college in consultation with their department. In addition, continued funding for SGAs is contingent on satisfactorily carrying out duties as assigned.

Students enrolled in a program offering a cooperative (co-op) education or internship option must be approved to participate. A minimum GPA of 3.000 is required at the time the co-op job or internship begins. Some departments may require a higher minimum GPA for co-op. Please refer to the Academic Catalog for program-specific information.

Leave of Absence

Full-time students who will not be involved in any academic endeavor for a period of time are required to petition via the Request for Leave of Absence form on the myNortheastern portal. The CSSH Graduate Office will not accept retroactive leave requests. Please note that if a student is requesting a leave for medical reasons (p. 32), a Medical Leave of Absence form must be completed. Students should contact University Health and Counseling Services.

Leaves of absence generally are not approved for more than one calendar year at a time. Further, a leave of absence is generally not appropriate for an international student on a student visa, unless the student is leaving the United States. The student must consult with an international student advisor at the Office of Global Services.

Leaves of absence are not appropriate for master's or doctoral students who are working on a thesis or dissertation but are away from the Northeastern campus.

Except in the case of medical leaves, being on an approved leave of absence does not extend the amount of time allowed for degree completion or the makeup of incomplete grades.

Time Limitations

Graduate course credits earned in the program of graduate study or accepted by transfer are valid for a maximum of seven years.

If students wish to apply for an extension of the university's seven-year time limit, they must submit a petition to their department of study. The petition must include a detailed plan for the completion of all remaining degree requirements. In the case of master's time-limit extension requests for coursework, the department must certify that the content of each of the courses has not changed since the time the student completed the course. If deemed appropriate, the department will recommend the approval of an extension to the college. The associate dean has final approval of time-limit extensions.

Application for the Diploma

Application for the diploma is made by applying to graduate. More information is available on the Commencement website (https://www.northeastern.edu/commencement/). Even though all other degree requirements may have been met, the application to graduate must be completed in order to assure that the degree will be conferred on the appropriate graduation date. It is the responsibility of the student to make sure that degree requirements have been met. Once degree requirements have been met, the student will be cleared for commencement. Please note that there are no honors distinctions awarded at the graduate level.

Changes in Requirements

The continuing development of the college may result in regular revision of curricula. When curriculum changes are made, students are allowed to complete the degree requirements of the program when they matriculated. If a student wishes to complete the degree requirements of the new curriculum, the student may request this in writing to the CSSH Graduate Office via gradcssh@northeastern.edu.

Doctor of Philosophy

The Doctor of Philosophy degree is awarded to candidates who give evidence of high scholastic attainment and research ability in their major field. Specific degree requirements are administered by a committee in charge of the degree program. It is the responsibility of the chair of this committee to certify to the college the completion of each requirement for each candidate. Note that advanced standing is determined at the time of admission by the graduate program director.

Continuity of Registration

Students are expected to maintain satisfactory progress toward their intended degree. All students must register as approved by their advisors or the departmental graduate program directors. After establishing degree candidacy, registration must be continuous until graduation requirements are complete unless a leave of absence is allowed by and recommended by the departmental graduate committee and approved by the college. For each of the first two semesters that a doctoral candidate has established candidacy, the student must register for Doctoral Dissertation. For each semester beyond the two Dissertation registrations, the student must register for Doctoral Dissertation Continuation until the dissertation is approved by the college and submitted to ProQuest. During the terms when a student is registered for Doctoral Dissertation or Dissertation Continuation, coursework is not permitted as the course requirements for the degree have already been met. If the academic program requires enrollment in seminars or courses in addition to Dissertation or Dissertation Continuation, the graduate program director will make a recommendation to the college. Approval of the college must happen prior to registration. Students must be registered for Dissertation or Dissertation Continuation during the semester in which they take the final oral examination (including the full summer semester if that is when defense occurs). Any student who does not attend Northeastern University for a period of one year may be required to apply for readmission.

Awards

Funding eligibility is contingent upon making satisfactory progress. See Regulations for All Students (p. 477) for more information.

Course Requirements

Course requirements in each doctoral program are specified by the committee in charge of the doctoral program and departmental regulations. These are detailed in the academic catalog for the student's term of entry.

GPA Requirements

For all CSSH doctoral degree programs, the minimum cumulative GPA is 3.500. To qualify for the degree, the minimum cumulative GPA must be obtained. This average will be calculated each semester according to the grading system noted in the academic catalog and will exclude any transfer credits or repeated courses. Individual programs may have additional GPA requirements. These can be found in the academic catalog or program policies and procedure documents. A student who does not make satisfactory progress toward degree requirements, as specified by the individual department, may be placed on academic probation or dismissed from the program. A student cannot begin working on exam requirements with a GPA that is below the program minimum.

Annual Student Progress Review

All PhD degree students are required to meet with their faculty advisor for an annual student progress review. The reviews will be submitted to the departmental graduate committee, which will determine whether satisfactory progress is being made and students are eligible to proceed to complete their graduate work. The CSSH Graduate Office will receive a copy of each student's review.

Residence Requirement

All PhD students must spend the equivalent of at least one academic year in residence at the university as a full-time graduate student. The departmental graduate committee specifies the method by which the residence requirement is satisfied. Residency is required of all students receiving a stipended graduate assistantship.

Qualifying Examinations

In programs where comprehensive or qualifying exams are required, students must complete these requirements within the time limit set by the program.

Dissertation Proposal

All CSSH doctoral programs require an approved prospectus or successful proposal defense for candidacy.

Doctoral Degree Candidacy

PhD degree candidacy is established when students have completed all departmental requirements for candidacy. These requirements vary by department and include completing the minimum number of graduate semester hours required of doctoral students by the department (this may include an earned master's degree accepted by the department) and passing a qualifying examination and/or a comprehensive examination. All CSSH doctoral programs require an approved prospectus or successful proposal defense for candidacy. Once students reach doctoral degree candidacy they will be certified, in writing,

by the college. Registration in coursework is not permitted once a student reaches candidacy.

Doctoral Dissertation

Each doctoral student must complete a dissertation that embodies the results of extended research and makes an original contribution to the field. This work should give evidence of the candidate's ability to carry out independent investigation and interpret in a logical manner the results of the research. The method of approval of the dissertation is established by the departmental graduate committee. No dissertation committee shall have fewer than three faculty members, two of whom shall be from Northeastern University. The chair of the dissertation committee will be a full-time tenured or tenure-track member of the faculty of Northeastern University and will hold an appropriate doctorate. A research faculty member may chair a dissertation committee if the faculty member holds an appropriate doctorate and has received the approval to do so from the tenured and tenure-track faculty members of the unit(s) in which their appointment resides.

Final Oral Examination

The final oral examination will be on the subject matter of the doctoral dissertation and on important developments in the field of the dissertation. Other fields may be included if recommended by the examining committee. This examination will be taken after completion of all other degree requirements and must be held at least four weeks prior to the commencement at which the degree is to be awarded. All internal and external committee members are expected to participate in the defense. The college must be notified of all scheduled defenses and expects that the defense will be publicly advertised for at least two weeks prior to the scheduled date. Some programs may require up to 30 days' notice.

- Upon successful defense of the dissertation, the student must have a dissertation approval record signed by the members of the dissertation committee and the department chair. Contact the CSSH Graduate Office (gradcssh@northeastern.edu) for the approval form template.
- The student must have the dissertation approval record approved by a representative from the CSSH Graduate Office.
- The student must submit an electronic copy of the dissertation to ProQuest, following the directions outlined at the University Library website.

Master's Degrees

Academic Requirements

A candidate for the master's degree must complete a minimum of 30 semester hours of graduate-level coursework and additional requirements as determined by the department in which the student is registered.

To qualify for the degree, a minimum cumulative average of 3.000, equivalent to a grade of B, must be obtained. This average will be calculated each semester according to the grading system noted on the Office of the University Registrar's website and will exclude any transfer credits or repeated courses. A student who does not make satisfactory progress toward degree requirements, as specified by the individual department, may be dismissed from the program.

Continuity of Registration

Students are expected to maintain satisfactory progress toward their intended degrees. All students must be registered in the last semester of their program. Any student who does not attend Northeastern University for a period of one year will be required to apply for readmission.

Comprehensive Examination

Some programs require a final written or oral comprehensive examination. This examination will be given by the department concerned at least two weeks before the commencement at which the degree is expected. Students should check with individual departments for specific guidelines.

Thesis

Some programs require or offer Master's Thesis. Theses should demonstrate the individual's capacity to execute independent work based on original material. Registration for XXXX 7990 Thesis is required. In cases in which a grade is required, theses must receive a grade of B (3.000) or better to be accepted. Students who have not completed their thesis after having registered for the specified number of thesis credits must register for XXXX 7996 Master's Thesis Continuation in the subsequent semester. Master's Thesis Continuation will carry no credit but will be recorded on the student transcript with the appropriate grade (S or U). Master's Thesis Continuation is not repeatable.

- Upon successful defense of the thesis, the student must have a thesis approval record signed by the members of the thesis committee. Visit *Thesis and Dissertation Formatting Guidelines* for the approval form template and additional guidance.
- The student must have the thesis approval record approved by a representative from the CSSH Graduate Office.
- The student must submit an electronic copy of the thesis to ProQuest, following the directions outlined on the University Library website.

School of Criminology and Criminal Justice

Website (http://www.northeastern.edu/cssh/sccj/)

Amy Farrell, PhD
Professor and Director

Kevin Drakulich, PhD
Associate Professor and Associate Director

617.373.3327
617.373.8723 (fax)
sccj@northeastern.edu

CSSH Graduate Programs General Regulations (p. 473)

The School of Criminology and Criminal Justice prepares students for meaningful careers in criminology, justice policy, the law, criminal justice, and related fields, including professional research careers. We do this by applying multidisciplinary social science tools that predict and explain crime, as well as deepening the understanding of policies that improve our systems of justice. Our approach is experiential, and our methods for teaching are rooted in knowledge creation as a top-tier research program. Our goal is to create ethical problem solvers who are prepared to tackle important crime and justice issues facing society. Our educational goals for students include a commitment to identify and address the role of systemic racism and intersecting dimensions of oppression in the development and application of justice system policies and practices, crime and justice theory, and research.

The school offers a Master of Science degree in criminology and criminal justice and a PhD degree in criminology and justice policy. In addition, the

school offers a JD/MS in criminology and criminal justice program and a JD/PhD in criminology and justice policy in conjunction with the School of Law.

Programs

Doctor of Philosophy (PhD)

- Criminology and Justice Policy (p. 480)

Master of Science (MS)

- Criminology and Criminal Justice (p. 481)

Dual Degrees

- Law, JD / Criminology and Justice Policy, PhD (p. 482)
- Law, JD / Criminology and Criminal Justice, MS (p. 482)

Criminology and Justice Policy, PhD

The doctoral program in criminology and justice policy at the School of Criminology and Criminal Justice at Northeastern University seeks to prepare students for professional and research careers in criminal justice, criminology, and related fields by applying multidisciplinary and comparative social science to understand, predict, and explain crime and contribute to the development of public policy within urban communities. Using an active-learning approach, the school seeks to develop its students intellectually and ethically, while providing them with a keen appreciation for the complexities of crime and public and private efforts to make communities safer and to ensure justice.

The program is full time and is small and student centered. Students may enter the program with either a bachelor's degree or a master's degree. It is expected that students will be able to complete the program in four to five years, and students entering with a master's degree will be able to complete the program in three to five years.

Year one in the doctoral program offers students an opportunity to obtain a broad foundational knowledge in the discipline: one semester on theories of criminal justice process, two semesters of criminological theory, two semesters of statistics, and one semester of advanced research methods. To ensure that all students have mastered the foundational material emphasized across the required courses for the PhD program and can successfully integrate theory, research, and policy, all PhD students take a “foundations” qualifying examination at the end of their first year in the doctoral program.

After demonstrating mastery of the foundational knowledge in year one, students devote themselves to a more specific area of research in years two and three. Students demonstrate this commitment through the second and third qualifying examinations: an area exam and a publishable paper.

Following successful completion of the three qualifying examinations, and required and elective course work, the students proceed to a formal dissertation proposal defense.

Doctoral Degree Candidacy

A student achieves candidacy when they have successfully completed all course work (54 semester hours for students entering with a bachelor's degree or 42 semester hours for students entering with advanced standing), passed all three qualifying examinations, and deposited the final version of their dissertation proposal (approved by their full committee) with the school’s graduate program office. Candidacy is certified, in writing, by the college.

Program Requirements

Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review
Three qualifying examinations—foundations exam, area exam, and publishable paper
Dissertation committee
Dissertation proposal
PhD candidacy
Dissertation defense

Core Requirements

Code	Title	Hours
Pro-Seminar		
CRIM 7001	PhD Pro-Seminar in Criminology and Justice Policy 1	0
CRIM 7002	PhD Pro-Seminar in Criminology and Justice Policy 2	0
Criminal Justice Process		
CRIM 7203	Theories of Criminal Justice Process	4
Criminological Theory		
CRIM 7710	Criminology and Public Policy 1	4
CRIM 7711	Criminology and Public Policy 2	4
Analysis & Methods		
CRIM 7713	Advanced Research and Evaluation Methods	4
INSH 7400	Quantitative Analysis	4
INSH 7500	Advanced Quantitative Analysis	4
Practicum		
CRIM 7706	Practicum in Writing and Publishing	2
CRIM 7700	Practicum in Teaching	0

Electives

Code	Title	Hours
Complete 28 semester hours in the following ranges. Courses in additional disciplines with PhD program director approval.		28
CRIM 5900 to CRIM 7989		
POLS 5900 to POLS 7999		
PPUA 5900 to PPUA 7999		
SOCL 5900 to SOCL 7999		

Dissertation

Code	Title	Hours
Exam Preparation		
Students register for CRIM 8960 when they have completed required coursework but are still taking qualifying exams, and for CRIM 8986 when they have passed qualifying exams and are working on proposals.		
CRIM 8960	Exam Preparation—Doctoral	
CRIM 8986	Research	
Dissertation		
CRIM 9990	Dissertation Term 1	
CRIM 9991	Dissertation Term 2	
Dissertation Continuation		

Following completion of CRIM 9990 and CRIM 9991, registration in the following class is required in each subsequent semester (including the summer if the dissertation is submitted in summer) until the dissertation is completed:

CRIM 9996	Dissertation Continuation

Program Credit/GPA Requirements

54 total semester hours required
Minimum 3.500 GPA required

Advanced Entry PhD Program Requirements
Advanced Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review
Three qualifying examinations—foundations exam, area exam, and publishable paper
Dissertation committee
Dissertation proposal
Candidacy achieved
Dissertation defense

Core Requirements

Code	Title	Hours
Pro-Seminar		
CRIM 7001	PhD Pro-Seminar in Criminology and Justice Policy 1	0
CRIM 7002	PhD Pro-Seminar in Criminology and Justice Policy 2	0
Criminal Justice Process		
CRIM 7203	Theories of Criminal Justice Process	4
Criminological Theory		
CRIM 7710	Criminology and Public Policy 1	4
CRIM 7711	Criminology and Public Policy 2	4
Analysis & Methods		
CRIM 7713	Advanced Research and Evaluation Methods	4
INSH 7400	Quantitative Analysis	4
INSH 7500	Advanced Quantitative Analysis	4
Practicum		
CRIM 7706	Practicum in Writing and Publishing	2
CRIM 7700	Practicum in Teaching	0

Electives

Code	Title	Hours
Complete 16 semester hours in the following range.		16
CRIM 5900 to CRIM 7999		
POLS 5900 to POLS 7999		
PPUA 5900 to PPUA 7999		
SOCL 5900 to SOCL 7999		

Dissertation

Code	Title	Hours
Exam Preparation		
Students register for CRIM 8960 when they have completed required coursework but are still taking qualifying exams, and for CRIM 8986 when they have passed qualifying exams and are working on proposals.		
CRIM 8960	Exam Preparation—Doctoral	
CRIM 8986	Research (Exam Preparation)	
Dissertation		
CRIM 9990	Dissertation Term 1	
CRIM 9991	Dissertation Term 2	
Dissertation Continuation		
Following completion of CRIM 9990 and CRIM 9991, registration in the following class is required in each semester (including the summer if the dissertation is submitted in summer) until the dissertation is completed:		
CRIM 9996	Dissertation Continuation	

Program Credit/GPA Requirements

42 total semester hours required
Minimum 3.500 GPA required

Criminology and Criminal Justice, MS

The master's program in criminology and criminal justice at Northeastern University concentrates both on the problem of crime as a form of deviant behavior and on the criminal justice and private security systems that deal with it. The program emphasizes a systems approach to criminal justice, stressing policy development and analysis, as well as the impact these policies have on the individuals and organizations charged with delivering justice in a fair and equitable manner. In concept and scope, the MS degree encompasses such related disciplines as law, sociology, political science, psychology, criminology, and public administration.

The master's program is comprised of required courses encompassing both substantive and technical skills. Additionally, students choose elective courses from offerings within the graduate program in criminal justice or in other graduate programs in the College of Social Sciences and Humanities. The course offerings afford students the flexibility to customize their own programs, which may include an internship, directed study, or master's thesis.

For students interested in criminal justice in an increasingly digital world, the Master of Science in Criminology and Criminal Justice with a Concentration in Cybersecurity offers a strong criminal justice foundation coupled with the conceptual and practical skills that enables them to contribute to ensuring the reliability and security of cyberspace. Successful students will learn the principles, practices, and responsibilities of criminal justice professionals alongside the fundamental knowledge of computer science skills necessary for practical applications in the field. The concentration in cybersecurity provides criminal justice students an opportunity to learn how social behavior, policy, and legal rules can affect cybersecurity and the tools of information technology.

Faculty members in the graduate program represent several different academic disciplines, and teaching activities vary in nature depending on the instructors' specific objectives. The faculty's specialized interests help make possible a broad range of program offerings, including courses

on the criminal justice process, victimology, security management, criminal law, juvenile justice, law and psychology, and terrorism.

The master's program offers an optional cooperative education experience (co-op) to eligible students. Students extend the two-semester program to 18 months through a co-op work experience and its associated 2-credit experiential integration course. Cooperative education is central to both the Northeastern experience and to the College of Social Sciences and Humanities experiential liberal arts framework. Northeastern's signature co-op ecosystem provides qualified master's students with six-month work experiences in businesses, nonprofits, and government agencies in Boston and across the United States. Graduate students take their work from campus learning spaces, apply their knowledge outside of the classroom, and then bring knowledge and skills gained in community learning spaces back to our campus learning spaces during the cocurricular experiential integration course.

Briefly stated, the graduate program endeavors to:

- Assist in developing criminal justice and private security leaders capable of assuming responsibility for policy planning and administration
- Offer students an opportunity to acquire the necessary skills and knowledge to conduct applied research while assisting them in developing the ability to apply this research in a variety of criminal justice settings
- Provide an opportunity for a solid educational foundation for those who wish to pursue more advanced graduate study beyond the Master of Science degree

Graduate study in criminology and criminal justice may be pursued on either a full- or part-time basis. All candidates for the Master of Science in Criminology and Criminal Justice degree must successfully complete a minimum of 32 semester hours of credit in course work.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Required Core		
CRIM 6200	Criminology	4
CRIM 6202	The Criminal Justice Process	4
Research and Statistics		
INSH 6300	Research Methods in the Social Sciences	4
INSH 6500	Statistical Analysis	4

Electives

Code	Title	Hours
Complete 16 semester hours in the following range.		16
CRIM 5000 to CRIM 7999		
INSH 5000 to INSH 7999		
POLS 5000 to POLS 7999		
PPUA 5000 to PPUA 7999		
SOCL 5000 to SOCL 7999		

Optional Concentration in Cybersecurity

Students adding a concentration in cybersecurity must use 12 semester hours of their elective credits to complete the following courses:

Code	Title	Hours
Required		
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	4
Choose two courses from the following:		8
CRIM 6262	Evidence-Based Crime Policy	
CY 5040	Introduction to Cyberspace Programming 2 Instructor Approval	
CY 5200	Security Risk Management and Assessment Instructor Approval	
CY 5210	Information System Forensics Instructor Approval	
CY 5250	Decision Making for Critical Infrastructure	

Optional Co-op Experience

Code	Title	Hours
Requires two consecutive semesters of the following:		2
CRIM 6964 and INSH 6864	Co-op Work Experience and Experiential Integration	

Program Credit/GPA Requirements

32 total semester hours required (34 with optional co-op)
Minimum 3.000 GPA required

Law, JD / Criminology and Justice Policy, PhD

The JD/PhD program will expand the knowledge base and career options of students. The disciplines of criminology and justice policy and law share common interests in identifying opportunities to create conditions for justice, equality, and societal well-being. The dual degree will provide students with a comprehensive interdisciplinary understanding of what influences criminal justice problems and the sociopolitical, legal, and economic context in which they are found. Solving problems requires interdisciplinary knowledge and an analytical and practical skill set that includes interprofessional problem solving.

Up to 16 credits of coursework in the dual-degree program can be counted toward both the JD degree and the PhD degree. Of these 16 credits, no more than 12 credits of non–law courses can count toward the JD degree.

Students will take law courses during semesters spent in the law school. Students will take criminology courses during semesters spent in SCCJ. Please consult the School of Law (https://www.northeastern.edu/law/) for more information about JD requirements. Additionally, please consult SCCJ (https://cssh.northeastern.edu/sccj/) for more information about PhD requirements.

All JD students, including FlexJD students, are ordinarily eligible to apply into dual degree pathways.

Law, JD / Criminology and Criminal Justice, MS

The JD/MS program will expand the knowledge base and career options of students. The disciplines of criminal justice and law share common interests in identifying opportunities to create the conditions for justice,

social equality, and societal well-being. The dual degree is designed to provide students with a comprehensive interdisciplinary understanding of what influences criminal justice problems and the social, political, legal, economic context in which they are found. Solving these problems requires interdisciplinary knowledge and an analytical and practical skill set that includes interprofessional problem solving.

Up to 16 credits of coursework in the dual-degree program can be counted toward both the JD degree and the MS degree. Of these 16 credits, no more than 12 credits of non–law courses can count toward the JD degree.

Students will take law courses during semesters spent in the School of Law. Students will take criminology courses during semesters spent in in the School of Criminology and Criminal Justice. Please consult the School of Law for more information about JD requirements. Additionally, please consult SCCJ for more information about MS requirements.

All JD students, including FlexJD students, are ordinarily eligible to apply into dual degree pathways.

Economics

Website (http://www.northeastern.edu/cssh/economics/)

Robert Triest, PhD
Professor and Chair

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617.373.3640 (fax)
econ@northeastern.edu (gradecon@northeastern.edu)

Graduate Programs Contacts (https://cssh.northeastern.edu/economics/graduate/)

CSSH Graduate Programs General Regulations (p. 473)

The Department of Economics offers both a Master of Science and a PhD in Applied Economics. The most distinctive feature of these programs is their emphasis on applied economics, coupled with attention to providing a solid grounding in microeconomic and macroeconomic theory, and econometrics. Students come from all over the world, and the curriculum is designed with this in mind, striving for balance in coverage of economies that are rich and poor, large and small, mixed and market. This gives a unique flavor to the course of study, making it well-suited to the analysis of the emerging global economy of the 21st century.

The Master of Science program is in applied economic policy analysis, with broad specialization areas. The program is large enough to support a full slate of core and area courses each year, yet small enough to maintain a sense of community among the students.

The program is especially appropriate for those who wish to work in or return to positions in government, teaching, finance, or industry, while providing a rigorous basis for those who want to continue their studies to the doctoral level.

Our signature co-op program offers qualified MS students the opportunity to apply for paid work positions as practicing economists for up to six months as part of their academic program. This paid work experience enhances our MS degree and its emphasis on application. Students have an opportunity to learn how to apply their knowledge, to solve problems, and to make a difference in the world before they graduate. Our graduates either find full-time work in their area of specialty or go on to earn additional graduate degrees. All of our graduates find jobs after completing our program.

Master of Science students may choose to pursue a concentration in data science. The concentration strategically combines econometrics and machine-learning techniques to analyze and predict outcomes with big data. Students in Seattle are required to select this concentration.

Our master's program-specific learning courses also feature "tracks." Along with the core MS classes, these tracks help our students prepare for different career paths. The Department of Economics currently offers three tracks (https://cssh.northeastern.edu/economics/graduate/ma/):

- policy
- quantitative analysis
- academic

The PhD program is small and focused, and we welcome applications from those with a bachelor's or master's degree who have had prior training in macroeconomic and microeconomic theory and possess strong quantitative skills. Students take coursework in industrial organization, competition policy, and regulatory and labor economics. Health economics or development economics are additional areas that may be integrated into the primary fields noted above.

Programs

Doctor of Philosophy (PhD)

- Economics (p. 483)

Master of Science (MS)

- Economics (p. 486)

Economics, PhD

The PhD program in economics is small and focused, specializing in ***industrial organization, competition policy, and regulatory economics*** and ***labor economics*****.**

Timeline

The PhD program for each student has two phases: the coursework phase followed by the dissertation phase. The coursework phase consists of required coursework and field courses, as well as taking and passing the three qualifying examinations.

A student moves into the dissertation phase upon successful completion of required coursework and upon passing the qualifying examinations. In the dissertation phase the student must prepare a dissertation proposal and present and defend the dissertation proposal before the student's Proposal Review Committee. A student who successfully defends the dissertation proposal achieves candidacy. At the end of the dissertation phase, the student must defend their completed dissertation.

Coursework

Students entering the doctoral program with a bachelor's degree will take four master's-level core classes (16 semester hours), three doctoral-level core classes (12 semester hours), two classes in each of two doctoral fields (16 semester hours), and one elective (4 semester hours), for a total program requirement of 48 semester hours. Students entering the doctoral program with a master's degree will take three doctoral-level core classes (12 semester hours), two classes in each of two doctoral fields (16 semester hours), and one elective (4 semester hours), for a total program requirement of 32 semester hours. If the master's degree is not

in economics, additional coursework may be required in order to meet course prerequisites.

Core courses at the master's and doctoral level are focused on developing an advanced theoretical and quantitative foundation (macroeconomic theory, microeconomic theory, and applied econometrics). The remainder of the coursework is focused on the sophisticated application of analytical tools in the chosen field of concentration.

PhD students are expected to take three classes per semester as necessary to meet the degree's coursework requirements in the minimum number of semesters.

Field Coursework and Grade Requirement

Students must take four field courses, and they are strongly encouraged to take as many field courses as possible. Students should plan to take the two labor and two industrial organization courses, even if they arrange to do a field in development or health economics. Students interested in customizing their fieldwork should consult the PhD Program Guidelines on the website.

To maintain satisfactory standing in the PhD program, students must earn a grade of B or higher in at least four field courses. Students who do not earn a B in at least four field courses will be offered one opportunity to meet the grade standard. Consult PhD Program Guidelines on the website for further details.

Examinations

Three Qualifying Examinations—Macroeconomics, Microeconomics, and Econometrics

Three qualifying examinations are required upon completion of Macroeconomics 2, Microeconomics 2, and Econometrics 2. Students must receive a minimum grade of B– in the associated theory class to sit for its exam. Students are given a maximum of two attempts to pass each exam to continue in the program. Failure to sit for an exam at the appropriate time without prior consent of the graduate program director will result in an automatic fail on that exam.

Proposal Review

Students must complete the proposal review within two years of finishing their coursework; however, the department expects that a doctoral candidate's **dissertation committee** will be formed and the dissertation proposal presented within one year of reaching degree candidacy, which is normally by the end of the student's third year.

A **dissertation proposal** states the question or hypothesis, reviews the relevant literature, and explains how the proposed work will contribute to that literature and general understanding. The proposal sets forth data sources, models, and econometric issues in sufficient detail so that any faculty member not in the field will be able to assess its merits. Normally, the proposal should not exceed 30 double-spaced pages. The proposal is first approved by the dissertation committee and then presented at an open seminar.

Consult PhD Program Guidelines on the website for further details.

Doctoral Degree Candidacy

Upon successful completion of the proposal review, the student becomes a degree candidate. Candidacy may make the student eligible for a higher stipend and is an essential step in making satisfactory progress. Degree candidacy must be achieved within two years of completion of required coursework.

DISSERTATION

Students must complete their dissertation defense within five years of finishing their coursework, and postponing the proposal review does not alter the total time that students may use to complete their PhD. Under extenuating circumstances, a student may request an extension of this time frame from the Graduate Office.

One month in advance of the prospective date of the defense, the completed dissertation that is to be defended must be circulated to the committee members. At that time, all members of the committee must sign off on their agreement that the dissertation is ready for defense. Each student will have a dissertation committee chaired by a faculty member with an appointment in the economics department and at least two other members. Committees may have two co-chairs. Committees should not have more than four members (except at interim stages if faculty are leaving the committee). Committees may include members outside the economics department, but at least two committee members must have an appointment in the economics department. The composition of the committee should be set before the proposal review and again, if changes occur, before the dissertation defense. Committee compositions must be approved by the graduate program director and department chair.

The dissertation defense normally takes place during the student's fifth year. Those who have not defended by the end of their fifth year must submit a status report and timetable for approval by their dissertation adviser and the PhD program director. Consult PhD Program Guidelines on the website for further details

WRITING THE DOCTORAL DISSERTATION

Writing the dissertation entails working with the principal adviser and other committee members until it is determined that a dissertation is complete and the candidate is ready to present and defend the work at an open seminar. Candidates must arrange a date and time for the defense at least three weeks in advance. Students must familiarize themselves with the Guide to the Preparation of Theses and Dissertations (https://cssh.northeastern.edu/resources/theses-and-dissertations/). The guide provides links to formatting tips, sample introductory pages, sample approval record, and deadlines. In addition, a checklist is provided to ensure students have fulfilled the required steps in the commencement clearance process.

Milestones

Maintaining satisfactory academic progress during doctoral candidacy requires the following:

PHD ANNUAL STUDENT PROGRESS REVIEW

Each PhD student will have an annual review of their progress toward the degree. Receipt of financial support administered by the graduate school is contingent upon satisfactory academic progress toward the degree and satisfactory performance in assigned duties. See the CSSH Graduate Programs General Regulations (p. 473) for further details.

FIELD WORKSHOP PARTICIPATION

All PhD students registered for Doctoral Dissertation or Continuation who are in residence are expected to regularly attend a field seminar in industrial organization or labor. These seminars meet roughly every week, and their purpose is to assist students in choosing and evaluating dissertation topics as well as advancing and completing their dissertation. All doctoral candidates will be expected to present their research at various stages of writing their dissertation.

SEMINAR SERIES PARTICIPATION

All PhD students registered for Doctoral Dissertation or Continuation who are in residence are expected to regularly attend academic seminars

by speakers invited to campus through the Department of Economics Seminar Series. Participation in these seminars is an important component of doctoral training and is intended to expose students to current research in their field while helping to develop and hone their own presentation skills.

PRACTICAL EXPERIENCE IN APPLIED ECONOMICS PROGRAM

Participation in at least one semester of the Practical Experience in Applied Economics program is required of all students who have reached doctoral candidacy. The program is offered in the spring semester every other year. In this program, a variety of prominent practitioners working in consulting and government agencies in the fields of industrial organization and labor will describe their practical experience applying economics to a variety of consulting and policy problems, including antitrust, regulation, labor market policy, education, and health policy. This is a participatory class that will require advanced reading and preparation of questions for the practitioners in addition to other assignments.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Three qualifying examinations—microeconomics, macroeconomics, and econometrics
Annual review
Meet minimum 3.000 grade requirement in at least four field classes to attain doctoral degree candidacy
Dissertation committee
Dissertation proposal
Dissertation defense
Field workshop participation throughout program (and required following completion of coursework)
Economics Seminar Series participation throughout program

Core Requirements

Code	Title	Hours
Quantitative		
ECON 6105	Advanced Mathematics and Statistics for Economists	4
ECON 6140	Advanced Applied Econometrics	4
ECON 7740	Applied Econometrics 2	4
Theory		
ECON 6110	Advanced Microeconomic Theory	4
ECON 6120	Advanced Macroeconomic Theory	4
ECON 7710	Microeconomic Theory 2	4
ECON 7720	Macroeconomic Theory 2	4
Field		
To maintain satisfactory standing in the PhD program, students must earn a grade of B or higher in at least four field courses.		
Labor Economics Field		
ECON 7763	Labor Market Analysis	4
ECON 7764	Topics in Labor Economics	4
Industrial Organization Field		
ECON 7771	Framework of Industrial Organization	4
ECON 7772	Public Policy Toward Business	4

Elective

Code	Title	Hours
Complete 4 semester hours from the following:		4
ECON 5200 to ECON 5299		
ECON 7200 to ECON 7299		
ECON 7976	Directed Study	

Dissertation

Code	Title	Hours
Proposal		
ECON 9986	Research	
Dissertation		
Registration in the following courses are required in the fall and spring semesters following achievement of doctoral candidacy:		
ECON 9990	Dissertation Term 1	
ECON 9991	Dissertation Term 2	
Following completion of ECON 9990 and ECON 9991, registration in the following class is required in each semester (including the summer if the dissertation is submitted in summer) until the dissertation is completed:		
ECON 9996	Dissertation Continuation	

Program Credit/GPA Requirements

48 total semester hours required
Minimum 3.500 GPA required

Advanced Entry PhD Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Three qualifying examinations—microeconomics, macroeconomics, and econometrics|
PhD annual student progress review
Meet minimum 3.000 grade requirement in at least four field classes to attain doctoral degree candidacy
Dissertation committee
Dissertation proposal
Dissertation defense
Field workshop participation throughout program (and required following completion of coursework)
Economics Seminar Series participation throughout program

Core Requirements

Code	Title	Hours
Quantitative		
ECON 7740	Applied Econometrics 2	4
Theory		
ECON 7710	Microeconomic Theory 2	4
ECON 7720	Macroeconomic Theory 2	4
Field		
Labor Economics Field		
ECON 7763	Labor Market Analysis	4
ECON 7764	Topics in Labor Economics	4
Industrial Organization Field		

ECON 7771	Framework of Industrial Organization	4
ECON 7772	Public Policy Toward Business	4

Elective

Code	Title	Hours
Complete 4 semester hours from the following:		4
ECON 7200 to ECON 7299		
ECON 7976	Directed Study	

Dissertation

Code	Title	Hours
Proposal		
ECON 9986	Research	
Dissertation		
Registration in the following class is required in the fall and spring semesters following achievement of doctoral candidacy:		
ECON 9990	Dissertation Term 1	
ECON 9991	Dissertation Term 2	
Following completion of ECON 9990 and ECON 9991, registration in the following class is required in each semester (including the summer if the dissertation is submitted in summer) until the dissertation is completed:		
ECON 9996	Dissertation Continuation	

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.500 GPA required

Economics, MS

The Master of Science program focuses on applied economic policy analysis, with broad specialization areas. The program is large enough to support a full slate of core and area courses each year, yet small enough to maintain a sense of community among the students. The program is especially appropriate for those who wish to work in or return to positions in government, teaching, finance, or industry, while providing a rigorous basis for those who want to continue their studies to the doctoral level.

The Master of Science in Economics offers the opportunity for master's students to apply for paid work positions through Northeastern's world-famous co-op program. Qualified and approved master's students can participate in co-op as practicing economists for up to six months as part of their academic program (note that a minimum GPA of 3.35 is required in order to apply). This paid work experience enhances the degree and its emphasis on application. Students have an opportunity to learn how to apply their knowledge, to solve problems, and to make a difference in the world before they graduate. Our graduates either find full-time work in their area of specialty or go on to earn additional graduate degrees. All of our graduates find jobs after completing our program. For more information, please visit the Master of Science in Economics (https://cssh.northeastern.edu/economics/program/ms-graduate-program/) website.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Quantitative		
ECON 5105	Math and Statistics for Economists	4
or ECON 6105	Advanced Mathematics and Statistics for Economists	
ECON 5140	Applied Econometrics	4
or ECON 6140	Advanced Applied Econometrics	
Theory		
ECON 5110	Microeconomic Theory	4
or ECON 6110	Advanced Microeconomic Theory	
ECON 5120	Macroeconomic Theory	4
or ECON 6120	Advanced Macroeconomic Theory	

Electives

With prior approval from the graduate program director, the following courses may substitute for electives: Thesis (ECON 7990) or Internship In Economics (ECON 8550). Additionally, a student may select a maximum of eight graduate semester hours offered by other departments.

Code	Title	Hours
Complete 16 Semester Hours from the following range (excluding any class taken to fulfill core requirements above):		16
ECON 5200 to ECON 7772		

Concentration in Data Science for Economics

The concentration may be taken in place of the elective section. Seattle students are required to complete the concentration.

Code	Title	Hours
Required		
CS 5800	Algorithms	4
DS 5110	Introduction to Data Management and Processing	4
Select 4 SH from the following courses:		**4**
DS 5220	Supervised Machine Learning and Learning Theory	
DS 5230	Unsupervised Machine Learning and Data Mining	
DS 5500	Capstone: Applications in Data Science	
Economics Elective		
Complete 4 semester hours from the following range:		4
ECON 5200 to ECON 7772		

Optional Co-op Experience

Code	Title	Hours
Requires two consecutive semesters of Co-op Work Experience and Experiential Integration:		
ECON 6964 and INSH 6864	Co-op Work Experience and Experiential Integration	

Program Credit/GPA Requirements

32 semester hours required (34 with optional co-op)
Minimum 3.000 GPA required

English

Website (https://cssh.northeastern.edu/english/experiential-academics/majors-minors-grad-programs/#Graduate)

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CSSH Graduate Programs General Regulations (p. 473)

The graduate program in English is grounded in the study of British and American literature through the most current modes of humanistic inquiry and in the disciplines of writing and rhetoric. Both in coursework and through the NULab for Texts, Maps, and Networks (https://web.northeastern.edu/nulab/), the graduate program in English also offers training in the digital humanities. Altogether, our degree programs provide a challenging, flexible, and wide-ranging education in English studies today.

Programs

Doctor of Philosophy (PhD)

- English (p. 487)

Master of Arts (MA)

- English (p. 488)

Graduate Certificate

- Digital Humanities (p. 489)

English, PhD

The PhD program seeks to train students to be productive scholars and teachers in the fields of both literary studies and rhetoric and composition. In course work, students read and analyze the important texts, current issues, and critical methodologies of the discipline. Drawing on the breadth of this preparation, students demonstrate their ability to recognize and produce scholarly arguments in designing the three comprehensive field papers in areas of scholarly interest and competence corresponding to recognized and emerging fields of study. Finally, the dissertation offers students an opportunity to design a focused research project in consultation with a dissertation advisor. Throughout the program, faculty works closely with doctoral students to develop their scholarly and professional identities in preparation for careers.

Academic Standing/Progress

To be considered in good academic standing, PhD students must be making progress toward their degree requirements, including maintaining a 3.500 minimum cumulative grade-point average (GPA) and completing the comprehensive examination within one year of finishing coursework.

Doctoral Degree Candidacy

Students entering with a relevant BA must complete 48 semester hours; students entering with a relevant MA must complete 24 semester hours. All students must complete the language requirement, pass the comprehensive examination, and submit their approved prospectus within six months after completing the comprehensive examination to reach candidacy.

General Regulations

Program requirements are described in the CSSH Graduate Programs General Regulations (p. 473) and the Graduate Program in English PhD Guide (https://cssh.northeastern.edu/english/resources/resources-for-current-grad-students/). Both documents are updated annually.

Program Requirements

Bachelor's Degree Entrance

Milestones

Annual progress review
Reading proficiency in two languages other than English
Comprehensive exam
Dissertation committee
Dissertation prospectus
Doctoral degree candidacy
Public prospectus/dissertation work-in-progress presentation
Dissertation defense

Core Requirements

Code	Title	Hours
Proseminar		
ENGL 5103	Proseminar	4
Theories and Methods		
Complete 4 semester hours from the following:		4
ENGL 7351	Topics in Literary Study (selected topics only)	
ENGL 7358	Topics in Literature and other Disciplines (selected topics only)	
ENGL 7370	Introduction to Digital Humanities	
ENGL 7380	Topics in Digital Humanities	
WMNS 6100	Theorizing Gender and Sexuality	
WMNS 7976	Directed Study (GCWS Consortium, selected topics only)	
Writing and Rhetoric		
Complete 4 semester hours from the following (if completing 12 semester hours of Literary Period requirements).		4-8
Complete 8 semester hours of the following (if completing 8 hours of Literary Period requirements).		
ENGL 7360	Topics in Rhetoric	
ENGL 7392	Writing and the Teaching of Writing	
ENGL 7395	Topics in Writing	
Literary Periods		
Complete 8 semester hours from TWO of the following Literary Periods (if completing 8 semester hours of Writing and Rhetoric requirements), or complete 12 semester hours from THREE of the following Literary Periods (if completing 4 semester hours of Writing and Rhetoric requirements):		
Literature Pre-1700		
ENGL 7281	Topics in Medieval Literature	
ENGL 7282	Topics in Renaissance Literature	
Literature 1700–1900		
ENGL 7214	Topics in 19th-Century American Literature	
ENGL 7284	Topics in 18th-Century Literature	
ENGL 7351	Topics in Literary Study (selected topics only)	
Literature Post-1900		

ENGL 7244	African-American Novel
ENGL 7351	Topics in Literary Study (selected topics only)

Electives

Code	Title	Hours
Complete 24 semester hours of ENGL courses.		24

Dissertation

Code	Title	Hours
Exam Preparation		
ENGL 8960	Exam Preparation—Doctoral (Only needed for PhD students who have completed coursework but have yet to complete the comprehensive exams. Repeatable.)	
Research		
ENGL 9986	Research (To be completed during the proposal/prospectus phase prior to reaching candidacy.)	
Dissertation		
ENGL 9990	Dissertation Term 1	
ENGL 9991	Dissertation Term 2	
Dissertation Continuation		
Following completion of ENGL 9990 and ENGL 9991, registration in the following class is required in each fall and spring semester for all students and each summer semester for those within funding until the dissertation is completed (students outside of funding must also register in the summer semester if it is their terminal term):		
ENGL 9996	Dissertation Continuation	

Program Credit/GPA Requirements

48 total semester hours required
Minimum 3.500 GPA required

Advanced Entry PhD Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual progress review
Reading proficiency in two languages other than English
Comprehensive exam
Dissertation committee
Dissertation prospectus
Doctoral degree candidacy
Public prospectus/dissertation work-in-progress presentation
Dissertation defense

Core Requirements

Code	Title	Hours
Proseminar		
ENGL 5103	Proseminar	4

Electives

Code	Title	Hours
Complete 20 semester hours of ENGL courses.		20

Dissertation

Code	Title	Hours
Exam Preparation		
ENGL 8960	Exam Preparation—Doctoral (Only needed for PhD students who have completed coursework but have yet to complete the comprehensive exams. Repeatable.)	
Research		
ENGL 9986	Research (To be completed during the proposal/prospectus phase prior to reaching candidacy.)	
Dissertation		
ENGL 9990	Dissertation Term 1	
ENGL 9991	Dissertation Term 2	
Dissertation Continuation		
Following completion of ENGL 9990 and ENGL 9991, registration in the following class is required in each fall and spring semester for all students and each summer semester for those within funding until the dissertation is completed (students outside of funding must also register in the summer semester if it is their terminal term):		
ENGL 9996	Dissertation Continuation	

Program Credit/GPA Requirements

24 total semester hours required
Minimum 3.500 GPA required

English, MA

The Master of Arts degree launches students into the study of literature, writing, and rhetoric at the graduate level. The program offers one and a half to two years of intensive study in the major fields of British and American literature, covering the debates and approaches that animate the discipline of English. Our MA graduates are fully prepared to proceed to study at the doctoral level, and their training in critical thinking, language skills, and cultural history has also proven to be fruitful preparation for a range of careers outside of academia.

The master's program offers an optional cooperative education experience (co-op) to eligible students. Cooperative education is central to both the Northeastern experience and the College of Social Sciences and Humanities experiential liberal arts framework. Northeastern's signature co-op ecosystem provides qualified master's students with six-month work experiences in businesses, nonprofits, and government agencies in Boston and across the United States. Graduate students take their work from campus learning spaces, apply their knowledge outside of the classroom, and then bring knowledge and skills gained in community learning spaces back to our campus learning spaces during the cocurricular experiential integration course.

Academic Standing/Progress

To be considered in good academic standing, MA students must be making progress toward their degree requirements, including maintaining a 3.000 minimum cumulative grade-point average (GPA).

General Regulations

Program requirements are described in the CSSH Graduate Programs General Regulations (p. 473) and the Graduate Program in English MA Guide (https://cssh.northeastern.edu/english/resources/resources-for-current-grad-students/). Both documents are updated annually.

Program Requirements

Milestones

Annual progress review
Reading proficiency in a language other than English

Core Requirements

Code	Title	Hours
Proseminar		
ENGL 5103	Proseminar	4
Theories and Methods		
Complete 4 semester hours from the following:		4
ENGL 7351	Topics in Literary Study (selected topics only)	
ENGL 7358	Topics in Literature and other Disciplines (selected topics only)	
ENGL 7370	Introduction to Digital Humanities	
ENGL 7380	Topics in Digital Humanities	
WMNS 6100	Theorizing Gender and Sexuality	
WMNS 7976	Directed Study (GCWS Consortium, selected topics only)	
Writing and Rhetoric		
Complete 4 semester hours from the following (if completing 12 semester hours of literary period requirements); or complete 8 semester hours from the following (if completing 8 semester hours of literary period requirements):		4-8
ENGL 7360	Topics in Rhetoric	
ENGL 7392	Writing and the Teaching of Writing	
ENGL 7395	Topics in Writing	
Literary Periods		
Complete 8 semester hours from two of the following literary periods (if completing 8 semester hours of writing and rhetoric requirements); or complete 12 semester hours from three of the following literary periods (if completing 4 semester hours of writing and rhetoric requirements):		8-12
Literature Pre-1700		
ENGL 7281	Topics in Medieval Literature	
ENGL 7282	Topics in Renaissance Literature	
ENGL 7358	Topics in Literature and other Disciplines (selected topics only)	
Literature 1700–1900		
ENGL 7214	Topics in 19th-Century American Literature	
ENGL 7284	Topics in 18th-Century Literature	
ENGL 7351	Topics in Literary Study (selected topics only)	
Literature Post-1900		
ENGL 7244	African-American Novel	
ENGL 7351	Topics in Literary Study (selected topics only)	
ENGL 7358	Topics in Literature and other Disciplines (selected topics only)	

Electives

Code	Title	Hours
Complete 8 semester hours of ENGL courses. Students with a minimum GPA of 3.500 may pursue a master's thesis project (ENGL 7990) for elective credit.		8

Optional Co-op Experience

Code	Title	Hours
Requires two consecutive semesters of Co-op Work Experience and Experiential Integration:		2
ENGL 6964 and INSH 6864	Co-op Work Experience and Experiential Integration	

Program Credit/GPA Requirements

32 total semester hours required (34 with optional co-op)
Minimum 3.000 GPA required

Digital Humanities, Graduate Certificate

CSSH Graduate Programs General Regulations (https://www.northeastern.edu/cssh/graduate/current_students/)

The Graduate Certificate in Digital Humanities allows students to pursue an organized course of study in digital humanities with the interdisciplinary faculty of the NULab for Texts, Maps, and Networks (http://www.northeastern.edu/nulab/) while completing requirements for their degrees in existing Northeastern University doctoral and master's programs. *This is not a stand-alone certificate*; rather, it will be completed by students in the course of their existing program of study.

Digital humanities (DH) is an emerging field of research that is interdisciplinary in scope and collaborative in nature. The field is developing in relation to new digital technologies that have changed the objects of study, methods, and opportunities for research and teaching in existing humanities fields. Digitized texts are now read and accessed in new ways; digitized corpora of texts make possible new modes of quantitative and qualitative analysis (including "distant reading," text mining, mapping, and network analysis); born digital objects constitute new primary sources in need of humanistic theorization, approaches, and critical vocabularies; and modes of encoding, aggregating, and connecting texts enable the creation of new archival resources that are changing our understanding of the archive itself as well revealing new historical, literary, and cultural patterns.

The field is new and developing rapidly and many students are eager for training in this area—both because DH is at the cutting edge of disciplinary work and because it offers new opportunities for employment within the academy and outside of it.

Academic Standing/Progress

Students in the program are monitored for academic progress. Those students whose GPA falls below a 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to a 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

Final Project

The student will complete a final independent DH research project located in the student's home program (such as a thesis, or a portion thereof) or participation in a collaborative DH project with substantial student participation. The final project will be overseen by the NULab faculty members teaching the NULab Project Seminar during its

development; NULab workshop instructors will advise students on their projects and help students get guidance from other faculty as appropriate. Final projects will be submitted with three components: the project itself, a written project description of about 2,000 words, and a presentation to the NULab community. The DH certificate committee will formally approve all final projects.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Topics/Readings/Methods		
ENGL 7370	Introduction to Digital Humanities (Introduction to Digital Humanities)	4
or HIST 7370	Texts, Maps, and Networks: Readings and Methods for Digital History	
Lab Project Seminar		
Complete the following (repeatable) 2-credit course two times:		4
INSH 7910	NULab Project Seminar	

Elective

Code	Title	Hours
Complete 4 semester hours from the following:		4
ARTG 5100	Information Design Studio 1: Principles	
ARTG 5120	Research Methods for Design	
CS 6120	Natural Language Processing	
CS 7250	Information Visualization: Theory and Applications	
CS 7260	Visualization for Network Science	
CS 7290	Special Topics in Data Science	
ENGL 7380	Topics in Digital Humanities	
INSH 5301	Introduction to Computational Statistics	
INSH 5302	Information Design and Visual Analytics	
INSH 6406	Analyzing Complex Digitized Data	
JRNL 6340	Fundamentals of Digital Journalism	
JRNL 6341	Telling Your Story with Data	
JRNL 6355	Seminar in Investigative Reporting	
HIST 7219	Topics in Cultural History (selected topics only)	
POLS 7334	Social Networks	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	

Program Credit/GPA Requirements

Minimum 12 total semester hours required
Minimum 3.000 GPA required

History

Website (https://www.northeastern.edu/cssh/history/graduate/programs/)

Timothy Brown, PhD

Professor and Chair

617.373.2662
617.373.3661 (fax)
gradhistory@northeastern.edu

CSSH Graduate Programs General Regulations (p. 473)

Graduate work in history focuses on global and world history, which study the interactions among geographical regions and historical processes around the globe. Students at both the master's and doctoral levels concentrate their work on the history of regions or peoples in Africa, Asia, Europe, Latin America, or the United States, with attention to the intersections and connections between national, regional, and global developments. The Department of History also offers a master's degree with a concentration in public history that emphasizes the study of topics such as material culture, historical exhibits and museums, historical agencies, and archival administration. Recent doctoral students have been the recipients of major fellowships for conducting dissertation research abroad, including Fulbright, Fulbright-Hays, Social Science Research Council, and Chateaubriand fellowships.

Programs

Doctor of Philosophy (PhD)

- History (p. 490)

Master of Arts (MA)

- History (p. 492)

Graduate Certificate

- Public History (p. 492)

History, PhD

The PhD program, with a focus on global, transnational, and comparative history, seeks to train research historians who plan to teach at the college and university level. Systematic training in theory and methodology and preparation for college teaching are distinctive features of the Northeastern program.

Academic Standing/Progress

Students are required to maintain an overall GPA of at least 3.500. In addition, the PhD annual review is based on a report by the student's advisor with attention to:

1. Success in setting up a doctoral committee
2. Passing the departmental language examination in the language of their field
3. Successful performance of teaching assistant duties
4. Successful completion of courses in the tiered system (i.e., the required course sequence)
5. Successful completion, where appropriate, of other required activities, including construction of the comprehensive examination list and the dissertation proposal and scheduling of comprehensive examinations

Doctoral Degree Candidacy

Students entering without an MA in history must complete 45 semester hours of coursework; pass the qualifying examination; and successfully defend a dissertation proposal by the end of the third year in the program. Students entering with an MA in history must complete 37 semester hours of coursework; pass the qualifying examination; and successfully defend a dissertation proposal by the end of the third year

in the program. Upon completion of these requirements, students will be deemed PhD degree candidates by the college.

Program Requirements

Milestones

Qualifying examination
Annual review
Language
PhD candidacy
Dissertation committee
Dissertation proposal
Dissertation defense

Core Requirements

Code	Title	Hours
Theory and Methodology		
A grade of B or higher is required:		
HIST 5101	Theory and Methodology 1	4
HIST 5102	Theory and Methodology 2	4
Digital History		
HIST 7370	Texts, Maps, and Networks: Readings and Methods for Digital History	4
Readings or Directed Study		
Complete 20 semester hours in either Readings or Directed Study:		20
HIST 8982	Readings	
or HIST 7976	Directed Study	
Research Seminar		
HIST 7314	Research Seminar in World History	4
Practicum		
HIST 8409	Practicum in Teaching	1

Electives

Code	Title	Hours
Complete 8 semester hours from the following range:		8
HIST 7200 to HIST 7702		

Dissertation

Code	Title	Hours
Exam Preparation		
Only needed for PhD students who have completed all coursework but have not yet passed the comprehensive exam:		
HIST 8960	Exam Preparation—Doctoral	
Dissertation		
HIST 9990	Dissertation Term 1	
HIST 9991	Dissertation Term 2	
Dissertation Continuation		
Following completion of two semesters of HIST 9990, registration in the following class is required in each semester (excluding summers) until the dissertation is completed:		
HIST 9996	Dissertation Continuation	

Program Credit/GPA Requirements

45 total semester hours required
Minimum 3.500 GPA required

Advanced Entry PhD Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Qualifying examination
Annual review
Language
PhD Candidacy
Dissertation committee
Dissertation proposal
Dissertation defense

Core Requirements

Code	Title	Hours
Theory and Methodology		
A grade of B or higher is required:		
HIST 5101	Theory and Methodology 1	4
HIST 5102	Theory and Methodology 2	4
Digital History		
HIST 7370	Texts, Maps, and Networks: Readings and Methods for Digital History	4
Readings or Directed Study		
Complete 12 semester hours of either Readings or Directed Study:		12
HIST 8982	Readings	
or HIST 7976	Directed Study	
Research Seminar		
HIST 7314	Research Seminar in World History	4
Practicum		
HIST 8409	Practicum in Teaching	1

Electives

Code	Title	Hours
Complete 8 semester hours from the following range:		8
HIST 7200 to HIST 7702		

Dissertation

Code	Title	Hours
Exam Preparation		
Only needed for PhD students who have completed all coursework but have yet to pass the comprehensive exam. Not repeatable.		
HIST 8960	Exam Preparation—Doctoral	
Dissertation		
HIST 9990	Dissertation Term 1	
HIST 9991	Dissertation Term 2	
Dissertation Continuation		
Following completion of two semesters of HIST 9990, registration in the following class is required in each semester (excluding summers) until the dissertation is completed:		
HIST 9996	Dissertation Continuation	

Program Credit/GPA Requirements

37 total semester hours required
Minimum 3.500 GPA required

History, MA

CSSH Graduate Programs General Regulations (p. 473)

The Master of Arts in History offers two concentrations: public history and world history.

Public history encompasses the practice of history outside the academy in museums, state and local historical societies, archives, the National Park Service, and more. Public history includes the study of such topics as material culture, historical exhibits and museums, historical agencies, archival administration, and how difficult issues including slavery and site of violence are presented to the public.

World history focuses on the history of regions or peoples in Africa, Europe, Latin America, Asia, or the United States, with attention to the intersections and connections between national, regional, and global developments.

The master's program offers an optional cooperative education experience ("co-op") to eligible students. Cooperative education is central to both the Northeastern experience and to the College of Social Sciences and Humanities experiential liberal arts framework. Northeastern's signature co-op ecosystem provides qualified master's students with six-month work experiences as practicing public historians. Graduate students take their work from campus learning spaces, apply their knowledge outside of the classroom, and then bring knowledge and skills gained in community learning spaces back to our campus learning spaces during the cocurricular experiential integration course.

Academic Standing/Progress

Students are expected to maintain a 3.000 grade-point average (GPA). Should the GPA drop below 3.000, the student will be placed on academic probation and allowed one more semester to bring their GPA to the 3.000 level. If the student is not able to meet this requirement by the end of the following semester, the student may be asked to leave the program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

The Master of Arts in History offers two concentrations: world history (p. 492) and public history (p. 492). The program requires a concentration. Please consult with a Department of History graduate program director for additional details.

Concentration in World History

CORE REQUIREMENTS

Code	Title	Hours
Theory and Methodology		
A grade of B or higher is required:		
HIST 5101	Theory and Methodology 1	4
HIST 5102	Theory and Methodology 2	4
Research Seminar		
HIST 7301 to HIST 7325		4

ELECTIVES

Code	Title	Hours
Complete 20 semester hours from the following:		20
HIST 5101 to HIST 5295		
HIST 7205 to HIST 7218		
HIST 7220 to HIST 7297		

Concentration in Public History

CORE REQUIREMENTS

Code	Title	Hours
Theory and Methodology		
A grade of B or higher is required:		
HIST 5101	Theory and Methodology 1	4
Public History		
HIST 5237	Issues and Methods in Public History	4
Digital History		
HIST 7370	Texts, Maps, and Networks: Readings and Methods for Digital History	4
Fieldwork		
Complete the following (repeatable) course twice:		4
HIST 8410	Fieldwork in History 1	
Research Seminar		
Complete 4 semester hours from the following:		4
HIST 7301 to HIST 7325		
HIST 5000 to 5900		

ELECTIVES

Code	Title	Hours
Complete 12 semester hours from the following:		12
HIST 5238 to HIST 5248		
HIST 5295 to HIST 6966		
HIST 7201 to HIST 7297		

Optional Co-op Experience

Code	Title	Hours
Requires two consecutive semesters of Co-op Work Experience and Experiential Integration. Each of the following courses must be taken twice.		2
HIST 6964 and INSH 6864	Co-op Work Experience and Experiential Integration	

Program Credit/GPA Requirements

32 total semester hours required (34 with optional co-op)
Minimum 3.000 GPA required

Public History, Graduate Certificate

The Graduate Certificate in Public History allows students to pursue an organized course of study in public history while completing requirements for their degrees in existing doctoral and master's programs. Students have an opportunity to gain a knowledge of core methods and issues in the field of public history and are enabled to use public history approaches in their own research and work.

Public history is a well-established field of practice that marries academic research and methods to public applications and collaborations. Public historians typically work in museums, archives, historical societies, documentary film production, and social activism, though training in public history is useful to a wide variety of humanistic, social science, and legal fields.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Issues and Methods		
HIST 5237	Issues and Methods in Public History	4
Fieldwork		
Complete the following (repeatable) course twice:		4
HIST 8410	Fieldwork in History 1	

Elective

Code	Title	Hours
Complete one of the following:		4
HIST 5238	Managing Nonprofit Organizations	
HIST 5241	Exhibits and Museums	
HIST 7219	Topics in Cultural History	
HIST 7250	Topics in Public History (Sites of Violence and Public Memory)	
HIST 7250	Topics in Public History (Public History and Slavery)	

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

Political Science

Website (https://www.northeastern.edu/cssh/polisci/)

Costas Panagopoulos, PhD
Professor and Chair
c.panagopoulos@northeastern.edu (c.panagopoulos@northeastern.edu)

Program Directors and Staff Members (https://cssh.northeastern.edu/polisci/staff-and-department-leadership/)

CSSH Graduate Programs General Regulations (p. 473)

Graduate training in political science prepares students to analyze important issues in world affairs and succeed in a wide array of careers—from government and academia to the nonprofit and private sectors. Graduate programs in political science, public policy, public administration, security and resilience studies, and international affairs at Northeastern explore the theory and practice of politics, public policy, and public management in the United States and throughout the world. In teaching and research, faculty members in the department cover a broad range of topics and issues in the field of political science. Core areas of inquiry within our department include national and international security, international and U.S. public policy, resilience, network science, European studies, Middle East studies, and democratization and development.

Programs

Doctor of Philosophy (PhD)

- Political Science (p. 493)

Master of Arts (MA)

- Political Science (p. 495)

Master of Science (MS)

- Security and Resilience Studies (p. 498)

Graduate Certificate

- Security and Resilience Studies (p. 500)

Political Science, PhD

The Doctor of Philosophy in Political Science is grounded in the core fields of the discipline—American government and politics, comparative politics, international relations, and public policy. Students identify a primary and secondary field as areas of emphasis. The curriculum introduces students to the core fields and also seeks to develop their research skills through a series of methods courses. Students may develop a traditional, academic focus in one of the fields, or they may combine it with public policy to highlight a policy orientation. The program focuses on preparing students to be academic scholars and teachers as well as practitioners in research and public service. The PhD degree includes completion of required courses, passing a written and oral comprehensive examination, and the successful defense of the dissertation before a faculty committee.

Credit Requirements and Advanced Standing

Students entering with a bachelor's degree must complete 56 semester hours. Students currently in the MA or MPA program and accepted into the PhD program before completing the MA or MPA must complete 56 semester hours as well as all curriculum requirements of the PhD program.

Students entering with a master's degree may receive advanced standing for relevant prior coursework but must complete a minimum of 40 semester hours. Students entering with a Northeastern MA in political science or international affairs must complete a minimum of 24 semester hours while also satisfying all PhD course requirements. Master's-level coursework that results in advanced standing is evaluated by the graduate program director to determine its applicability to the PhD curriculum.

Doctoral Degree Candidacy

Doctoral degree candidacy is attained after successfully completing all coursework, the comprehensive examination, and the dissertation proposal defense.

Academic Standing/Progress

All doctoral students must maintain an overall cumulative grade-point average (GPA) of 3.500 while making progress toward the degree requirements. Students who fall below any applicable standard for two consecutive semesters are subject to dismissal from the graduate program. Additionally, receipt of financial support administered by the department, college, or university is contingent on satisfactory academic progress toward the degree and specific guidelines as published in the terms of award. Students who have ungraded courses or courses graded as incomplete risk no longer being eligible for financial aid awards.

Language Proficiency

Students who conduct research in a language other than English must demonstrate proficiency as necessary for completion of the dissertation. Language courses do not count as electives.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review
Comprehensive examination
Dissertation committee
Dissertation proposal
Dissertation proposal oral defense
Language (as determined by committee)
PhD candidacy
Dissertation defense

Core Requirements

Code	Title	Hours
Seminars		
Complete 12 semester hours from the following (complete both field seminars in the two areas in which you wish to take the comprehensive exams):		12
POLS 7204	Seminar in Public Policy	
POLS 7205	Seminar in American Government and Politics	
POLS 7206	Seminar in Comparative Politics	
POLS 7207	Seminar in International Relations	
Inquiry and Design		
INSH 6300	Research Methods in the Social Sciences	4
Quantitative Techniques		
INSH 6500	Statistical Analysis	4
INSH 7400	Quantitative Analysis	4
Advanced methods courses from other disciplines may be chosen in consultation with your faculty advisor.		

Electives

Courses from other disciplines may be chosen in consultation with your faculty advisor.

Code	Title	Hours
Complete 32 semester hours in the following:		32
POLS 7200 to POLS 7990		

Dissertation

Code	Title	Hours
Exam Preparation		
POLS 8960	Exam Preparation—Doctoral (Only required for PhD students who have completed coursework but have yet to complete the comprehensive exam. Required for students who must maintain full-time status while completing thesis or comprehensive exam.)	
Research		
POLS 9986	Research (To be completed during the proposal/prospectus phase prior to reaching candidacy.)	
Dissertation		
POLS 9990	Dissertation Term 1	
POLS 9991	Dissertation Term 2	
Dissertation Continuation		

Following completion of POLS 9990 and POLS 9991, registration in the following class is required in each semester (including the summer if the dissertation is submitted in the summer) until the dissertation is completed:

POLS 9996	Dissertation Continuation	

Program Credit/GPA Requirements

56 total semester hours required
Minimum 3.500 GPA required

Advanced Entry PhD Program Requirements

Complete all courses and requirements listed below.

Milestones

Annual review
Comprehensive examination
Dissertation committee
Dissertation proposal
Dissertation proposal oral defense
Language (as determined by committee)
PhD candidacy
Dissertation defense

Core Requirements

Consult the graduate program director regarding which major-required courses apply to your individual plan of study.

Code	Title	Hours
Seminar		
Complete 12 semester hours from the following: [1]		12
POLS 7204	Seminar in Public Policy	
POLS 7205	Seminar in American Government and Politics	
POLS 7206	Seminar in Comparative Politics	
POLS 7207	Seminar in International Relations	
Inquiry and Design		
INSH 6300	Research Methods in the Social Sciences	4
Quantitative Techniques		
INSH 6500	Statistical Analysis	4
or INSH 7400	Quantitative Analysis	
INSH 7500	Advanced Quantitative Analysis	4
Advanced methods courses from other disciplines may be chosen in consultation with your faculty adviser.		

Electives

Code	Title	Hours
Complete 0-16 semester hours in the following. Courses from other disciplines may be chosen in consultation with your faculty adviser.		0-16
POLS 7200 to POLS 7990		

Dissertation

Code	Title	Hours
Exam Preparation		
POLS 8960	Exam Preparation—Doctoral (Only required for PhD students who have completed coursework but have yet to complete the comprehensive exam.)	0

Research		
POLS 9986	Research (To be completed during the proposal/prospectus phase prior to reaching candidacy.)	0
Dissertation		
POLS 9990	Dissertation Term 1	
POLS 9991	Dissertation Term 2	
Dissertation Continuation		
Following completion of POLS 9990 and POLS 9991, registration in the following class is required in each semester (including the summer if the dissertation is submitted in summer) until the dissertation is completed:		
POLS 9996	Dissertation Continuation	

Program Credit/GPA Requirements

24-40 total semester hours required
Minimum 3.500 GPA required

[1] You must complete both field seminars in the two areas you wish to take the comprehensive exams in.

Political Science, MA

Graduate Studies in Political Science
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gradpolisci@northeastern.edu

CSSH Graduate Programs General Regulations (p. 473)

The Master of Arts program focuses on the core scholarly areas of political science. Students specialize in one of five concentration areas: American government and politics, comparative government and politics, international relations, public policy, and security studies. Courses in the MA program serve as a foundation for work in a doctoral program or as preparation for careers in government, nonprofit organizations, or related work in the private sector.

To earn the Master of Arts in Political Science degree at Northeastern, you must successfully complete 32 semester hours (typically eight courses) of credit. Full-time students can expect to complete the degree within two academic years. Course work consists of 4 semester hours in a required statistics course, 12 semester hours within a chosen concentration, and 16 semester hours of electives (including the experiential education requirement). To see the full breakdown, click the Program Requirements tab above.

Academic Standing/Progress

Satisfactory progress in the MA program includes maintaining a grade-point average (GPA) of 3.000 overall as well as in the student's concentration area. A final cumulative GPA of at least 3.000 in all course work is required to qualify for the Master of Arts degree. Any course in which a student earns lower than a C grade cannot be used to fulfill concentration area requirements. A student who fails to make satisfactory progress is placed on academic probation, which is a warning that the student may not be allowed to continue in the graduate program unless the deficiency is addressed.

Experiential Learning Requirement

In addition to in-class course work, students are required to complete an experiential education component that advances their learning, research, and/or career objectives. Experiential education offers MA students a direct experience with focused reflection relevant to their academic studies. For students with research interests, the experience focuses on related activities, such as primary source analysis and data gathering. For other students, the experience involves engagement with areas of practice and policy, such as an internship. Students register for the relevant course with a minimum of 4 semester hours and maximum of 8 semester hours to satisfy the experiential education requirement.

An optional cooperative education experience (co-op) can also satisfy the experiential education requirement. Cooperative education is central to both the Northeastern experience and to the College of Social Sciences and Humanities Experiential Liberal Arts framework. Northeastern's signature co-op ecosystem provides qualified master's students with six-month work experiences in businesses, nonprofits, and government agencies in Boston and across the United States. Graduate students take their work from campus learning spaces, apply their knowledge outside of the classroom, and then bring knowledge and skills gained in community learning spaces back to our campus learning spaces during the cocurricular experiential integration course.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirement

Code	Title	Hours
Methods Course		
Complete 4 SH from the list below.		4
CS 6220	Data Mining Techniques	
INSH 6300	Research Methods in the Social Sciences	
INSH 6500	Statistical Analysis	
PHYS 7331	Network Science Data	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	

Concentrations

- American Government (p. 495)
- International Relations (p. 496)
- Comparative Politics (p. 496)
- Public Policy (p. 496)
- Security Studies (p. 496)

AMERICAN GOVERNMENT CONCENTRATION

Code	Title	Hours
Seminar		
POLS 7205	Seminar in American Government and Politics	4
American Government Courses		
Complete 8 semester hours from the following:		8
POLS 7257	The U.S. Judicial Process	
POLS 7341	Security and Resilience Policy	
PPUA 5232	Immigration and Urban America	
PPUA 5233	Contemporary Community Development	
PPUA 5234	Land Use and Urban Growth Policy	
PPUA 5240	Health Policy and Politics	
PPUA 5245	Education Policy in the United States	
PPUA 5270	Food Systems and Public Policy	

PPUA 6220	How Healthcare Works: Business and Policy Innovations
PPUA 6502	Economic Analysis for Policy and Planning
PPUA 6505	Public Budgeting and Financial Management
PPUA 6522	Administrative Ethics and Public Management
PPUA 6530	State and Local Public Finance
PPUA 6551	Nonprofit Organizations and Social Change
PPUA 6552	The Nonprofit Sector in Civil Society and Public Affairs

INTERNATIONAL RELATIONS CONCENTRATION

Code	Title	Hours
Seminar		
POLS 7207	Seminar in International Relations	4
International Relations Courses		
Complete 8 semester hours from the following:		8
POLS 7341	Security and Resilience Policy	
POLS 7343	Counterterrorism	
POLS 7344	Hard Power, Soft Power, and Smart Power	
POLS 7369	International Security	
POLS 7370	Europe and European Union Governance	
POLS 7387	Global Governance	
POLS 7441	Cyberconflict	
PPUA 7243	International Development Administration and Planning	

COMPARATIVE POLITICS CONCENTRATION

Code	Title	Hours
Seminar		
POLS 7206	Seminar in Comparative Politics	4
Comparative Politics Courses		
Complete 8 semester hours from the following:		8
POLS 7325	Contemporary Issues in Third World Development	
POLS 7333	Science, Technology, and Public Policy	
POLS 7346	Resilient Cities	
or PPUA 7346	Resilient Cities	
POLS 7362	Nationalism	
POLS 7366	Genocide in a Comparative Perspective	
POLS 7370	Europe and European Union Governance	
POLS 7376	Government and Politics of the Middle East	
PPUA 5240	Health Policy and Politics	
PPUA 5266	Urban Theory and Science	
PPUA 5268	International Environmental Policy	
PPUA 5270	Food Systems and Public Policy	
PPUA 7243	International Development Administration and Planning	

PUBLIC POLICY CONCENTRATION

Code	Title	Hours
Seminar		
POLS 7204	Seminar in Public Policy	4
or PPUA 6506	Techniques of Policy Analysis	
Public Policy Courses		
Complete 8 semester hours from the following:		8
POLS 7333	Science, Technology, and Public Policy	
POLS 7341	Security and Resilience Policy	
POLS 7362	Nationalism	
PPUA 5240	Health Policy and Politics	
PPUA 5245	Education Policy in the United States	
PPUA 6500	Principles of Public Administration	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6507	Institutional Leadership and the Public Manager	
PPUA 6509	Techniques of Program Evaluation	
PPUA 6552	The Nonprofit Sector in Civil Society and Public Affairs	

SECURITY STUDIES CONCENTRATION

Code	Title	Hours
Seminar		
Security Studies Courses		
POLS 7341	Security and Resilience Policy	4
Complete 8 semester hours from the following:		8
POLS 7207	Seminar in International Relations	
POLS 7343 to POLS 7346		
POLS 7366	Genocide in a Comparative Perspective	
POLS 7369	International Security	
POLS 7370	Europe and European Union Governance	
POLS 7376	Government and Politics of the Middle East	
POLS 7387	Global Governance	

Electives

Code	Title	Hours
Complete 12 semester hours in the following range:		12
POLS 5408 to POLS 7976		

Experiential Learning Component [1]

Code	Title	Hours
Complete 4 semester hours from the following:		4
POLS 7980	Capstone Project	
POLS 7976	Directed Study	
POLS 7990	Thesis	
POLS 8407	Internship	

Optional Co-op Experience

Code	Title	Hours
Complete two consecutive semesters of Co-op Work Experience and Experiential Integration: Each of the following courses must be taken twice.		2
POLS 6964 and INSH 6864	Co-op Work Experience and Experiential Integration	

Program Credit/GPA Requirements

32 total semester hours required (34 with optional co-op)
Minimum 3.000 GPA required

[1] Students who decide to fulfill the Experiential Learning Requirement with the optional Co-op, will enroll in one additional elective course and graduate with 34 semester hours instead of 32.

Public Administration, MPA

Website (https://publicaffairs.northeastern.edu/master-of-public-administration/)

CSSH Graduate Programs General Regulations (https://www.northeastern.edu/cssh/graduate/current_students/)

The Master of Public Administration (MPA) is the management and leadership degree for those seeking to serve the public good. The program seeks to equip its students with skills in policy analysis, program evaluation, research methods, and written and verbal communications.

Students have an opportunity to develop competencies in budgeting and human resources, organizational management and leadership, and the interplay between ethics and accountability in a diverse society.

Throughout the degree program, students gain career-oriented experience through internships, small group projects, and other interactions with professionals in the field. These experiences are designed to enable the Northeastern MPA graduate to move into a wide array of public and nonprofit sector positions at the local, state, national, and international levels. The Northeastern University MPA program is nationally accredited by NASPAA.

Mission Statement

The mission of the MPA program at Northeastern University is to serve the needs of the public affairs community, including students, working professionals, faculty, and researchers, by providing a practice-oriented and research-based graduate educational experience. The faculty pledges the best instruction available in a set of courses designed to integrate theoretical foundations with practical skills. The MPA program is designed to prepare students to be effective in a dynamic and increasingly diverse professional environment. We also commit ourselves to assisting students in every possible way to secure internships, postgraduate employment, and overall career advancement. Students, in turn, are expected to meet high levels of academic excellence combined with ethical and professional integrity. Committed to the ideals of public service and advancing the public interest, we seek students who share the same enthusiasm.

The MPA program requires all students to pursue an internship experience and offers an optional cooperative education experience (co-op) to eligible students. Cooperative education is central to both the Northeastern experience and to the experiential liberal arts framework of the College of Social Sciences and Humanities. Northeastern's signature co-op ecosystem provides qualified master's students with six-month work experiences in businesses, nonprofits, and government agencies in Boston and across the United States.

Healthcare Management and Policy Concentration

This graduate concentration is available to students in the Master's of Public Administration (MPA) program in the School of Public Policy and Urban Affairs. It is designed to enable students in the MPA program to develop a deeper understanding of the contemporary healthcare sector, including the intricacies of U.S. health policy, and competencies in healthcare management. The concentration is comprised of three courses, one from each of three focus areas, and an elective.

Please review the tuition and fees (https://studentfinance.northeastern.edu/billing-payments/tuition-and-fees/) page as credit costs differ depending on the college the course is located in.

Academic Standing/Progress

Students in the program are monitored for academic progress. Those students whose cumulative grade-point average (GPA) falls below 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A cumulative 3.000 GPA is required for the core requirements.

Code	Title	Hours
Quantitative Techniques		
INSH 6500	Statistical Analysis	4
Analysis		
PPUA 6506	Techniques of Policy Analysis	4
PPUA 6502	Economic Analysis for Policy and Planning	4
Administration and Management		
PPUA 6500	Principles of Public Administration	4
PPUA 6505	Public Budgeting and Financial Management	4
PPUA 6507	Institutional Leadership and the Public Manager	4
Capstone		
PPUA 7673	Capstone in Public Policy and Urban Affairs	4

Internship Requirement

An approved internship or waiver is required.

Code	Title	Hours
Internship Waived		
Electives		
Complete 12 semester hours from the course list.		12
Internship Completed Not for Course Credit		
PPUA 6861	Internship	0
Electives		
Complete 12 semester hours from the course list.		12

Concentration Option

A concentration is not required. Students may complete electives (from the elective list below) in lieu of a concentration.

HEALTHCARE MANAGEMENT AND POLICY CONCENTRATION

Code	Title	Hours
Health Management		
Complete one of the following:		3-4

HRMG 6220	Health Organization Management	
PPUA 6220	How Healthcare Works: Business and Policy Innovations	
STRT 6220	Strategic Management for Healthcare Organizations	
Health Policy		
Complete one of the following:		3-4
PHTH 5212	Public Health Administration and Policy	
PHTH 5234	Economic Perspectives on Health Policy	
PPUA 5240	Health Policy and Politics	
Electives		
Health Elective		
Complete one of the following:		3
PHTH 5120	Race, Ethnicity, and Health in the United States	
PHTH 5212	Public Health Administration and Policy	
PHTH 5214	Environmental Health	
PHTH 5222	Health Advocacy	
PHTH 5230	Global Health	
PHTH 6200	Principles and History of Urban Health	
PHTH 6204	Society, Behavior, and Health	
General Elective		
Complete an additional course from the Health Elective list above or one of the following:		2-3
PPUA 6212	Research Toolkit for Urban and Regional Policy: Project Management	
PPUA 6213	Research Toolkit for Urban and Regional Policy: Data Visualization	
PPUA 6216	Research Toolkit for Urban and Regional Policy: Grant Writing	

Electives

Code	Title	Hours
LPSC 5000 to LPSC 7999		
PPUA 5000 to PPUA 7999		
CRIM 5000 to CRIM 7999 (by advisement only)		
ECON 5000 to ECON 7999 (by advisement only)		
ENGL 5000 to ENGL 7999 (by advisement only)		
HIST 5000 to HIST 7999 (by advisement only)		
POLS 5000 to POLS 7999 (by advisement only)		
SOCL 5000 to SOCL 7999 (by advisement only)		

Optional Co-op Experience

Code	Title	Hours
Requires two consecutive semesters of Co-op Work Experience and Experiential Integration:		2
PPUA 6964 and INSH 6864	Co-op Work Experience and Experiential Integration	

Program Credit/GPA Requirements

40 total semester hours required (42 with optional co-op)
Minimum 3.000 GPA

Security and Resilience Studies, MS

Security and resilience studies is an emerging field of inquiry that focuses on how global, national, and subnational actors manage a range of chronic transnational challenges—such as terrorism, organized crime, weapons proliferation, cyberattacks, bioterrorism, climate change and catastrophic disasters, migration, and radicalization—that can be destabilizing to societies. It explores how strategic doctrines, organization processes, bureaucratic behaviors, and security tools and tactics are adapting to these challenges by placing greater emphasis on resilience. Resilience is a concept rooted in multiple disciplines that is gaining widespread currency at the community, societal, and global levels given the prevalence of human-made and naturally occurring threats that do not lend themselves to preventive and protective measures. Strategies for dealing with these threats emphasize measures that mitigate, respond to, recover from, and adapt to risk in order to safeguard essential functions and societal values. Many of these measures involve the role of technologies, system design, and engineering as well as policy, regulatory, and governance issues. Students at Northeastern who enroll in the Master of Science in Security and Resilience Studies have an opportunity to become prepared to inform and support domestic and international efforts to deal with the major sources of turbulence in the 21st century.

The master's program offers an optional cooperative education experience (co-op) to eligible students. Cooperative education is central to both the Northeastern experience and to the College of Social Sciences and Humanities experiential liberal arts framework. Northeastern's signature co-op ecosystem provides qualified master's students with six-month work experiences in businesses, nonprofits, and government agencies in Boston and across the United States. Graduate students take their work from campus learning spaces, apply their knowledge outside of the classroom, and then bring knowledge and skills gained in community learning spaces back to our campus learning spaces during the cocurricular experiential integration course.

To earn the Master of Science in Security and Resilience Studies degree at Northeastern, you must successfully complete 32 semester hours (34 semester hours with co-op). Full-time students can expect to complete the degree within one calendar year. This program can be completed either at Northeastern University's Boston campus or online. Cost per semester hour may vary between colleges. See Tuition and Fees (p. 18) for more information.

Academic Standing/Progress

Satisfactory progress in the MS program includes maintaining a minimum grade-point average of 3.000.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Required Core Courses		
POLS 7341	Security and Resilience Policy [1]	4
Research Method		
INSH 6300	Research Methods in the Social Sciences	4
or INSH 6500	Statistical Analysis	
or PPUA 5263	Geographic Information Systems for Urban and Regional Policy	

Core Elective Courses		
Complete 8 semester hours from the following:		8
CRIM 6200	Criminology [1]	
CY 5010	Foundations of Information Assurance [1]	
POLS 7343	Counterterrorism	
POLS 7346	Resilient Cities	
or PPUA 7346	Resilient Cities	
POLS 7369	International Security	
or POLS 5408	International Security	
POLS 7441	Cyberconflict	
PPUA 5390	Special Topics in Public Policy and Urban Affairs [1]	

Capstone

Code	Title	Hours
Choose one of the following options in consultation with faculty advisor and program director:		4
POLS 7980	Capstone Project [1]	
or PPUA 7673	Capstone in Public Policy and Urban Affairs	

Electives

Electives are organized by themes to allow students to think thematically.

Code	Title	Hours
Complete 12 semester hours from any combination of the following elective themes:		12

- Administration, Management, and Policy (p. 499)
- Counterterrorism and Conflict Studies (p. 499)
- Cybersecurity Policy (p. 499)
- Resilient Cities (p. 499)
- Criminal Justice (p.)

ADMINISTRATION, MANAGEMENT, AND POLICY

Code	Title	Hours
CRIM 6202	The Criminal Justice Process	
POLS 7387	Global Governance	
POLS 7704	Critical Infrastructure Resilience [1]	
PPUA 6502	Economic Analysis for Policy and Planning	
PPUA 6503	Managing People in Public and Nonprofit Sectors [1]	
PPUA 6505	Public Budgeting and Financial Management [1]	
PPUA 6506	Techniques of Policy Analysis [1]	
PPUA 6507	Institutional Leadership and the Public Manager [1]	

COUNTERTERRORISM AND CONFLICT STUDIES

Code	Title	Hours
CRIM 7201	Global Criminology	
or CRIM 5201	Global Criminology	
POLS 7343	Counterterrorism	
POLS 7344	Hard Power, Soft Power, and Smart Power	
POLS 7366	Genocide in a Comparative Perspective	
POLS 7369	International Security	
or POLS 5408	International Security	

CYBERSECURITY POLICY

Code	Title	Hours
CY 5001	Cyberspace Technology and Applications	
CY 5010	Foundations of Information Assurance	
CY 5200	Security Risk Management and Assessment	
CY 5210	Information System Forensics	
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
CY 5250	Decision Making for Critical Infrastructure	
PHIL 5005	Information Ethics	
PHIL 5010	AI Ethics	
POLS 7441	Cyberconflict [1]	

RESILIENT CITIES

Code	Title	Hours
CRIM 6200	Criminology	
CRIM 6262	Evidence-Based Crime Policy	
CRIM 6270	Crime and Community Context	
CRIM 7316	Advanced Topics in Methods	
LPSC 7312	Cities, Sustainability, and Climate Change	
POLS 7346	Resilient Cities	
or PPUA 7346	Resilient Cities	
POLS 7704	Critical Infrastructure Resilience [1]	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5262	Big Data for Cities [1]	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
PPUA 5266	Urban Theory and Science	
PPUA 6201	The 21st-Century City: Urban Opportunities and Challenges in a Global Context	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	

CRIMINAL JUSTICE

Code	Title	Hours
CRIM 6200	Criminology [1]	
CRIM 6202	The Criminal Justice Process	
CRIM 6262	Evidence-Based Crime Policy	
CRIM 7201	Global Criminology	
or CRIM 5201	Global Criminology	
CRIM 7316	Advanced Topics in Methods	

Optional Co-op Experience

Code	Title	Hours
Requires two consecutive semesters of Co-op Work Experience and Experiential Integration:		2

POLS 6964 and INSH 6864	Co-op Work Experience and Experiential Integration

Program Credit/GPA Requirements

32 total semester hours (34 with optional co-op) required
Minimum 3.000 GPA required

[1] Occasional online offering

Security and Resilience Studies, Graduate Certificate

The goal of the Graduate Certificate in Security and Resilience Studies is to prepare students to manage contemporary transnational risks by offering them an opportunity to gain a comprehensive understanding of the principles and policies for security and resilience of critical systems. This goal is achieved by:

- Passing a core course in security and resilience policy that introduces students to a comprehensive approach to managing transnational risks
- Passing recommended foundation courses for cyberspace policy, security administration, and counterterrorism specializations that provide a broad perspective on transnational threats and the means states use to address them
- Learning how to work with others in groups and exercise leadership in teams by completing group assignments and projects

The certificate requires students to take three courses for a total of 12 semester hours. This program can be completed at Northeastern University's Boston campus or online.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirement

Code	Title	Hours
POLS 7341	Security and Resilience Policy	4

Electives

Code	Title	Hours
Complete 8 semester hours from the following:		8
CRIM 6200	Criminology	
POLS 7343	Counterterrorism	
POLS 7346	Resilient Cities	
POLS 7369	International Security	
or POLS 5408	International Security	
POLS 7441	Cyberconflict	
PPUA 5390	Special Topics in Public Policy and Urban Affairs	

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

School of Public Policy and Urban Affairs

Website (http://www.northeastern.edu/cssh/policyschool/)

Jennie Stephens, PhD
Director, School of Public Policy and Urban Affairs
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The School of Public Policy and Urban Affairs is nationally and internationally recognized for excellence and innovation in policy-oriented education, applied research, and engagement. Our mission is to educate professional master's and doctoral students who are sought after as policy analysts, program evaluators,and leaders of nonprofit, public, private sector, and academic institutions; to create and disseminate policy-relevant knowledge and analytical methods of value to policymakers and the public; and to serve the broader community through policy analysis and technical assistance.

The school is committed to excellence in research and education on pressing and emerging policy issues of the day—public health, climate change, environmental challenges, the court and justice systems, and creating sustainable and resilient cities that provide economic opportunity for their residents. We define our approach as locally informed and internationally relevant. Our hallmark is to engage students in building the world that they would like to live in through experiential learning opportunities and applied research.

Programs

Doctor of Philosophy (PhD)

- Public Policy (p. 500)

Master of Arts (MA)

- International Affairs (p. 503)

Master of Public Administration (MPA)

- Public Administration (p. 497)

Master of Public Policy (MPP)

- Public Policy (p. 506)

Master of Science (MS)

- Engineering and Public Policy (p. 160)
- Environmental Science and Policy (p. 446)
- Urban Informatics (p. 510)
- Urban Planning and Policy (p. 62)

Dual Degree

- Law, JD / Public Policy, MPP (p. 514)

Graduate Certificates

- Nonprofit Sector, Philanthropy, and Social Change (p. 515)
- Public Policy Analysis (p. 515)
- Sustainability and Climate Change Policy (p. 516)
- Urban Analytics
- Urban Studies (p. 517)

Public Policy, PhD

Website (https://cssh.northeastern.edu/policyschool/)

CSSH Graduate Programs General Regulations (p. 473)

The PhD in Public Policy is an interdisciplinary program that combines social science and legal theoretical perspectives with quantitative

and qualitative research methodologies. The faculty in the School of Public Policy and Urban Affairs support students' research and dissertations in three broad areas of inquiry—urban policy and regional policy, sustainability and resilience, and health management and policy. Students work with faculty advisors to formulate a plan of study within their field of concentration by choosing from graduate programs offered in the School of Public Policy and Urban Affairs, the College of Social Sciences and Humanities, and in other colleges and schools at Northeastern. Students study a common body of knowledge in core courses in policy theory, research methods, and statistics, followed by courses in each student's respective concentration. The school's research centers and faculty research projects provide opportunities for students to develop insight, experience, and synergies to help with their own research goals. The college and school offer a high level of support allowing all students to be devoted full-time to their studies and research. The program is full time and in residence only.

Doctoral Degree Candidacy

Complete all required coursework with a minimum 3.500 grade-point average (GPA), pass the comprehensive examinations, and defend a dissertation proposal. Students entering without a JD or master's degree must complete 55 semester hours. Students entering with a JD or master's degree must complete 47 semester hours.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Comprehensive examination
Seminars
Annual review
PhD candidacy
Dissertation committee
Dissertation proposal
Dissertation defense

Core Requirements

A grade of B+ or higher is required in each course.

Code	Title	Hours
Seminar		
POLS 7204	Seminar in Public Policy	4
PPUA 7976	Directed Study	1-4
Research and Statistical Methods		
INSH 6300	Research Methods in the Social Sciences	4
INSH 6302	Qualitative Methods	4
INSH 7400	Quantitative Analysis	4
Advanced Methods		
Complete one of the following. An additional concentration elective may be taken in lieu of the advanced methods elective:		4
INSH 7500	Advanced Quantitative Analysis	
or INSH 7600	Advanced Methodological and Quantitative Techniques	

Experiential Research Residency

A PhD research residency or waiver is required.

Code	Title	Hours
PPUA 9980	Experiential PhD Research Residency	0

Concentrations

Complete one of the following concentrations:

- Sustainability and Resilience (p. 501)
- Health Policy and Management (p. 501)
- Urban and Regional Policy (p. 502)

SUSTAINABILITY AND RESILIENCE

Code	Title	Hours
Seminar		
PPUA 7511	Sustainability and Resilience Research Seminar	2
Law Requirement		
LW 7329	Environmental Law	3
Electives		
Complete 24 semester hours from the following:		24
CIVE 7110	Critical Infrastructure Resilience	
LPSC 7312	Cities, Sustainability, and Climate Change	
POLS 7333	Science, Technology, and Public Policy	
POLS 7341	Security and Resilience Policy	
POLS 7704	Critical Infrastructure Resilience	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	
PPUA 7346	Resilient Cities	
PPUA 7976	Directed Study	
SOCL 7267	Environment, Health, and Society	

HEALTH POLICY AND MANAGEMENT

Code	Title	Hours
Seminar		
PPUA 6220	How Healthcare Works: Business and Policy Innovations	4
Health Organization		
HRMG 6220	Health Organization Management	3
Business Elective		
Complete 3 semester hours from the following:		3
FINA 6220	Healthcare Finance	
SCHM 6223	Managing Healthcare Supply Chain Operations	
STRT 6220	Strategic Management for Healthcare Organizations	
Law Requirement		
LW 7335	Health Law	3
Electives		
Complete a minimum of 18 semester hours from the following:		18
ECON 7200	Topics in Applied Economics	
PPUA 5240	Health Policy and Politics	
PPUA 6509	Techniques of Program Evaluation	
PPUA 7243	International Development Administration and Planning	
SOCL 7267	Environment, Health, and Society	

SOCL 7287	Social Movements in Health
PHTH 6000–9999 (public health elective, by advisement)	

URBAN AND REGIONAL POLICY

Code	Title	Hours
Seminar		
PPUA 7521	Seminar in Urban Theory	4
Law Requirement		
Consult an advisor when selecting courses.		3
LW 6000–9999		
Electives		
Complete 24 semester hours from the following:		24
ARCH 5210	Environmental Systems	
CRIM 6270	Crime and Community Context	
CRIM 7316	Advanced Topics in Methods	
ECON 7240	Workshop in Applied Econometrics	
ECON 7250	International Economic Development	
ECON 7260	Urban Economic Systems	
ECON 7261	Urban Economic Development	
ECON 7262	Regional Economic Theory	
ECON 7266	Economics of Government	
ECON 7270	Economics of Law and Regulation	
ECON 7740	Applied Econometrics 2	
ECON 7763	Labor Market Analysis	
POLS 7325	Contemporary Issues in Third World Development	
POLS 7334	Social Networks	
PPUA 6201	The 21st-Century City: Urban Opportunities and Challenges in a Global Context	
PPUA 6509	Techniques of Program Evaluation	
PPUA 6525	Institutions and Public Policy	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	
PPUA 7976	Directed Study	
SOCL 7221	Globalization, Development, and Social Justice	
SOCL 7227	Race and Ethnic Relations	
SOCL 7268	Globalization and the City	

Exam and Dissertation

Code	Title	Hours
Exam Prep		
Only needed for PhD students who have completed all coursework but have not yet passed the comprehensive exam/proposal defense. Repeatable.		
PPUA 8960	Exam Preparation—Doctoral	0
PPUA 9984	Research	1-4
Dissertation		
PPUA 9990	Dissertation Term 1	
PPUA 9991	Dissertation Term 2	
Dissertation Continuation		

Following completion of two semesters of dissertation (PPUA 9990 and PPUA 9991), registration in the following class is required in each semester (including summer if the dissertation is submitted in summer) until the dissertation is completed:

PPUA 9996	Dissertation Continuation

Program Credit/GPA Requirements

55 total semester hours required
Minimum 3.500 GPA required

Advanced Entry PhD Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Comprehensive examination
Seminars
Annual review
PhD candidacy
Dissertation committee
Dissertation proposal
Dissertation defense

Core Requirements

A grade of B+ or higher is required in each course.

Code	Title	Hours
Seminar		
POLS 7204	Seminar in Public Policy	4
PPUA 7976	Directed Study	1-4
Research and Statistical Methods		
INSH 6300	Research Methods in the Social Sciences	4
INSH 6302	Qualitative Methods	4
INSH 7400	Quantitative Analysis	4
Advanced Methods		
Complete one of the following. An additional concentration elective may be taken in lieu of the advanced methods elective:		4
INSH 7500	Advanced Quantitative Analysis	
or INSH 7600	Advanced Methodological and Quantitative Techniques	

Experiential Research Residency

A PhD research residency or waiver is required.

Code	Title	Hours
PPUA 9980	Experiential PhD Research Residency	0

Concentrations

Complete one of the following concentrations:

- Sustainability and Resilience (p. 501)
- Health Policy and Management (p. 501)
- Urban and Regional Policy (p. 502)

SUSTAINABILITY AND RESILIENCE

Code	Title	Hours
Seminar		
PPUA 7511	Sustainability and Resilience Research Seminar	2
Law Requirement		
LW 7329	Environmental Law	
Electives		
Complete 16 semester hours from the following:		16
CIVE 7110	Critical Infrastructure Resilience	
LPSC 7312	Cities, Sustainability, and Climate Change	
POLS 7333	Science, Technology, and Public Policy	
POLS 7341	Security and Resilience Policy	
POLS 7704	Critical Infrastructure Resilience	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	
PPUA 7346	Resilient Cities	
PPUA 7976	Directed Study	
SOCL 7267	Environment, Health, and Society	

HEALTH POLICY AND MANAGEMENT

Code	Title	Hours
Seminar		
PPUA 6220	How Healthcare Works: Business and Policy Innovations	4
Health Organization		
HRMG 6220	Health Organization Management	3
Business Elective		
Complete 3 semester hours from the following:		3
FINA 6220	Healthcare Finance	
SCHM 6223	Managing Healthcare Supply Chain Operations	
STRT 6220	Strategic Management for Healthcare Organizations	
Law Requirement		
LW 7335	Health Law	3
Electives		
Complete a minimum of 10 semester hours from the following:		10
ECON 7200	Topics in Applied Economics	
PPUA 5240	Health Policy and Politics	
PPUA 6509	Techniques of Program Evaluation	
PPUA 7243	International Development Administration and Planning	
SOCL 7267	Environment, Health, and Society	
SOCL 7287	Social Movements in Health	
PHTH 6000 to PHTH 9999 (public health elective, by advisement)		

URBAN AND REGIONAL POLICY

Code	Title	Hours
Seminar		
PPUA 7521	Seminar in Urban Theory	4
Law Requirement		
Consult an advisor when selecting courses.		3
LW 6000 to LW 9999		
Electives		
Complete 16 semester hours from the following:		16
ARCH 5210	Environmental Systems	
CRIM 6270	Crime and Community Context	
CRIM 7316	Advanced Topics in Methods	
ECON 7240	Workshop in Applied Econometrics	
ECON 7250	International Economic Development	
ECON 7260	Urban Economic Systems	
ECON 7261	Urban Economic Development	
ECON 7262	Regional Economic Theory	
ECON 7266	Economics of Government	
ECON 7270	Economics of Law and Regulation	
ECON 7740	Applied Econometrics 2	
ECON 7763	Labor Market Analysis	
POLS 7325	Contemporary Issues in Third World Development	
POLS 7334	Social Networks javascript:void(0)	
PPUA 6201	The 21st-Century City: Urban Opportunities and Challenges in a Global Context	
PPUA 6509	Techniques of Program Evaluation	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	
PPUA 7976	Directed Study	
SOCL 7221	Globalization, Development, and Social Justice	
SOCL 7227	Race and Ethnic Relations	
SOCL 7268	Globalization and the City	

Exam and Dissertation

Code	Title	Hours
Exam Prep		
Only required for students who have completed PhD coursework but have yet to complete the comprehensive exam/proposal defense. Repeatable.		
PPUA 8960	Exam Preparation—Doctoral	0
PPUA 9984	Research	1-4
Dissertation		
PPUA 9990	Dissertation Term 1	
PPUA 9991	Dissertation Term 2	
Dissertation Continuation		
Following completion of PPUA 9990 and PPUA 9991, registration in the following class is required in each semester (including summer if the dissertation is submitted in summer) until the dissertation is completed:		
PPUA 9996	Dissertation Continuation	

Program Credit/GPA Requirements

47 total semester hours required
Minimum 3.500 GPA required

International Affairs, MA

School of Public Policy and Urban Affairs (https://cssh.northeastern.edu/policyschool/)

We live in an increasingly interconnected global environment where people, goods, ideas, and conflicts traverse borders with rising frequency. Leaders in the activist, policy, and academic spheres must learn not only how to critically analyze these phenomena but also to envisage harnessing their constructive potential. The Master of Arts in International Affairs is an interdisciplinary graduate program dedicated to preparing tomorrow's global citizens.

A holistic approach to enhancing our understanding of the world must span the limits of any one academic field and embrace cross-disciplinary analytical competencies. Spanning several social sciences and humanities, our courses are taught by leading scholars who research democratization, gender, globalization, ethnic conflict and cooperation, human rights and international law, international relations, social activism, social justice, and many other topics. Through its core courses, its two thematic emphases—globalization, development, and social justice and international public policy—as well as global, policy, and methodological electives, this graduate program allows students to pursue a variety of themes.

The master's program offers an optional cooperative education experience ("co-op") to eligible students. Cooperative education is central to both the Northeastern experience and to the College of Social Sciences and Humanities experiential liberal arts framework. Northeastern's signature co-op ecosystem provides qualified master's students with six-month work experiences in businesses, nonprofits, and government agencies in Boston and across the United States. Graduate students take their work from campus learning spaces, apply their knowledge outside of the classroom, and then bring knowledge and skills gained in community learning spaces back to our campus learning spaces during the cocurricular experiential integration course.

Please review the tuition and fee (https://studentfinance.northeastern.edu/billing-payments/tuition-and-fees/) page as credit costs differ depending on the College in which the course is located.

Sustainability and Climate Change Policy Concentration

This graduate concentration is available to students in the Master of International Affairs (MIAF) program in the College of Social Sciences and Humanities. It is designed to enable MIAF students to develop deeper insights into the policy dimensions of these intertwined but conceptually distinct realms of inquiry and action, and in both domestic and international domains. The concentration is comprised of three courses.

CSSH Graduate Programs General Regulations (http://www.northeastern.edu/cssh/graduate/current_students/)

Academic Standing/Progress

Students in the program are monitored for academic progress. Those students whose grade-point average (GPA) falls below a 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to a 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Political Economy		
Complete 8 semester hours from the following:		8
POLS 7387	Global Governance	
PPUA 5268	International Environmental Policy	
SOCL 7221	Globalization, Development, and Social Justice	
Social Science Methods		
Complete 4 semester hours from the following:		4
ECON 5110	Microeconomic Theory	
ECON 5120	Macroeconomic Theory	
ECON 7251	International Finance	
INSH 6300	Research Methods in the Social Sciences	
INSH 6500	Statistical Analysis	
INSH 6302	Qualitative Methods	
Public Policy		
Complete 4 semester hours from the following:		4
PPUA 6502	Economic Analysis for Policy and Planning	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6507	Institutional Leadership and the Public Manager	
PPUA 6509	Techniques of Program Evaluation	
PPUA 6551	Nonprofit Organizations and Social Change	
PPUA 6553	Nonprofit Financial Resource Development	

Concentration Option or Elective Option

SUSTAINABILITY AND CLIMATE CHANGE POLICY CONCENTRATION

Code	Title	Hours
Complete 12 semester hours from the following course list:		12
ENVR 6150	Food Security and Sustainability	
LPSC 7312	Cities, Sustainability, and Climate Change	
INTL 5100	Climate and Development	
PPUA 5260	Ecological Economics	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5264	Energy Democracy and Climate Resilience: Technology, Policy, and Social Change	
PPUA 5268	International Environmental Policy	
PPUA 5270	Food Systems and Public Policy	
PPUA 6101	Environmental Science and Policy Seminar 1	
Complete 8 semester hours of elective courses from the list below:		8

ELECTIVES OPTION

Selected in consultation with faculty advisor.

Code	Title	Hours
Complete 20 semester hours from the following list of courses:		20
INTL 7990	Thesis	
LPSC 5000 to LPSC 7999		
PPUA 5000 to PPUA 7999		
CRIM 5000 to CRIM 7999 (by advisement only)		

ECON 5000 to ECON 7999 (by advisement only)	
ENGL 5000 to ENGL 7999 (by advisement only)	
HIST 5000 to HIST 7999 (by advisement only)	
POLS 5000 to POLS 7999 (by advisement only)	
SOCL 5000 to SOCL 7999 (by advisement only)	

Optional Co-op Experience

Code	Title	Hours
Requires two consecutive semesters of Co-op Work Experience and Experiential Integration. Each of the following courses must be taken twice.		2
PPUA 6964 and INSH 6864	Co-op Work Experience and Experiential Integration	

Program Credit/GPA Requirements

36 total semester hours required (38 with optional co-op)
Minimum 3.000 GPA required

Public Administration, MPA

Website (https://publicaffairs.northeastern.edu/master-of-public-administration/)

CSSH Graduate Programs General Regulations (https://www.northeastern.edu/cssh/graduate/current_students/)

The Master of Public Administration (MPA) is the management and leadership degree for those seeking to serve the public good. The program seeks to equip its students with skills in policy analysis, program evaluation, research methods, and written and verbal communications.

Students have an opportunity to develop competencies in budgeting and human resources, organizational management and leadership, and the interplay between ethics and accountability in a diverse society.

Throughout the degree program, students gain career-oriented experience through internships, small group projects, and other interactions with professionals in the field. These experiences are designed to enable the Northeastern MPA graduate to move into a wide array of public and nonprofit sector positions at the local, state, national, and international levels. The Northeastern University MPA program is nationally accredited by NASPAA.

Mission Statement

The mission of the MPA program at Northeastern University is to serve the needs of the public affairs community, including students, working professionals, faculty, and researchers, by providing a practice-oriented and research-based graduate educational experience. The faculty pledges the best instruction available in a set of courses designed to integrate theoretical foundations with practical skills. The MPA program is designed to prepare students to be effective in a dynamic and increasingly diverse professional environment. We also commit ourselves to assisting students in every possible way to secure internships, postgraduate employment, and overall career advancement. Students, in turn, are expected to meet high levels of academic excellence combined with ethical and professional integrity. Committed to the ideals of public service and advancing the public interest, we seek students who share the same enthusiasm.

The MPA program requires all students to pursue an internship experience and offers an optional cooperative education experience (co-op) to eligible students. Cooperative education is central to both the Northeastern experience and to the experiential liberal arts framework of the College of Social Sciences and Humanities. Northeastern's signature co-op ecosystem provides qualified master's students with six-month work experiences in businesses, nonprofits, and government agencies in Boston and across the United States.

Healthcare Management and Policy Concentration

This graduate concentration is available to students in the Master's of Public Administration (MPA) program in the School of Public Policy and Urban Affairs. It is designed to enable students in the MPA program to develop a deeper understanding of the contemporary healthcare sector, including the intricacies of U.S. health policy, and competencies in healthcare management. The concentration is comprised of three courses, one from each of three focus areas, and an elective.

Please review the tuition and fees (https://studentfinance.northeastern.edu/billing-payments/tuition-and-fees/) page as credit costs differ depending on the college the course is located in.

Academic Standing/Progress

Students in the program are monitored for academic progress. Those students whose cumulative grade-point average (GPA) falls below 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A cumulative 3.000 GPA is required for the core requirements.

Code	Title	Hours
Quantitative Techniques		
INSH 6500	Statistical Analysis	4
Analysis		
PPUA 6506	Techniques of Policy Analysis	4
PPUA 6502	Economic Analysis for Policy and Planning	4
Administration and Management		
PPUA 6500	Principles of Public Administration	4
PPUA 6505	Public Budgeting and Financial Management	4
PPUA 6507	Institutional Leadership and the Public Manager	4
Capstone		
PPUA 7673	Capstone in Public Policy and Urban Affairs	4

Internship Requirement

An approved internship or waiver is required.

Code	Title	Hours
Internship Waived		
Electives		
Complete 12 semester hours from the course list.		12
Internship Completed Not for Course Credit		
PPUA 6861	Internship	0

Electives	
Complete 12 semester hours from the course list.	12

Concentration Option

A concentration is not required. Students may complete electives (from the elective list below) in lieu of a concentration.

HEALTHCARE MANAGEMENT AND POLICY CONCENTRATION

Code	Title	Hours
Health Management		
Complete one of the following:		3-4
HRMG 6220	Health Organization Management	
PPUA 6220	How Healthcare Works: Business and Policy Innovations	
STRT 6220	Strategic Management for Healthcare Organizations	
Health Policy		
Complete one of the following:		3-4
PHTH 5212	Public Health Administration and Policy	
PHTH 5234	Economic Perspectives on Health Policy	
PPUA 5240	Health Policy and Politics	
Electives		
Health Elective		
Complete one of the following:		3
PHTH 5120	Race, Ethnicity, and Health in the United States	
PHTH 5212	Public Health Administration and Policy	
PHTH 5214	Environmental Health	
PHTH 5222	Health Advocacy	
PHTH 5230	Global Health	
PHTH 6200	Principles and History of Urban Health	
PHTH 6204	Society, Behavior, and Health	
General Elective		
Complete an additional course from the Health Elective list above or one of the following:		2-3
PPUA 6212	Research Toolkit for Urban and Regional Policy: Project Management	
PPUA 6213	Research Toolkit for Urban and Regional Policy: Data Visualization	
PPUA 6216	Research Toolkit for Urban and Regional Policy: Grant Writing	

Electives

Code	Title	Hours
LPSC 5000 to LPSC 7999		
PPUA 5000 to PPUA 7999		
CRIM 5000 to CRIM 7999 (by advisement only)		
ECON 5000 to ECON 7999 (by advisement only)		
ENGL 5000 to ENGL 7999 (by advisement only)		
HIST 5000 to HIST 7999 (by advisement only)		
POLS 5000 to POLS 7999 (by advisement only)		
SOCL 5000 to SOCL 7999 (by advisement only)		

Optional Co-op Experience

Code	Title	Hours
Requires two consecutive semesters of Co-op Work Experience and Experiential Integration:		2
PPUA 6964 and INSH 6864	Co-op Work Experience and Experiential Integration	

Program Credit/GPA Requirements

40 total semester hours required (42 with optional co-op)
Minimum 3.000 GPA

Public Policy, MPP

School of Public Policy and Urban Affairs (https://cssh.northeastern.edu/policyschool/)

CSSH Graduate Programs General Regulations (http://www.northeastern.edu/cssh/gradaute/current_students/)

The Master of Public Policy (MPP) is the recognized industry standard for those seeking careers in public policy analysis and design. The MPP degree emphasizes the analysis of data and other relevant information to enable graduates to assess public problems, develop appropriate policy responses, and evaluate program effectiveness. MPP graduates enter careers as policy analysts, researchers, consultants, program evaluators, and policymakers in a broad range of public and nonprofit settings, ranging from the local to the international, and in the private sector. At Northeastern, the MPP joins the nationally accredited Master of Public Administration (MPA) as well as our Master of Science in Urban Planning and Policy (MUPP), Master of Science in Urban Informatics, Master of Science in Environmental Science and Policy, and Master of Arts in International Affairs. As such, MPP students are part of a larger School of Public Policy and Urban Affairs community of great intellectual and policy area diversity.

The MPP programs require all students to engage in an internship experience and offer an optional cooperative education experience (co-op) to eligible students. Cooperative education is central to both the Northeastern experience and to the experiential liberal arts framework of the College of Social Sciences and Humanities. Northeastern's signature co-op ecosystem provides qualified master's students with six-month work experiences in businesses, nonprofits, and government agencies in Boston and across the United States.

Healthcare Management and Policy Concentration

This graduate concentration is available to students in the Master of Public Policy (MPP) program in the School of Public Policy and Urban Affairs. It is designed to enable students in the MPP program to develop a deeper understanding of the contemporary healthcare sector, including the intricacies of U.S. health policy, and competencies in healthcare management. The concentration is comprised of three courses, one from each of three focus areas, and an elective.

Sustainability and Climate Change Policy Concentration

This graduate concentration is available to students in the Master of Public Policy (MPP) program in the College of Social Sciences and Humanities. It is designed to enable MPP students to develop deeper insights into the policy dimensions of these intertwined but conceptually distinct realms of inquiry and action, in both domestic and international domains. The concentration is comprised of three courses.

Please review the tuition and fees (https://studentfinance.northeastern.edu/billing-payments/tuition-and-

fees/) page as credit costs differ depending on the college the course is located in.

Academic Standing/Progress

Students in the program are monitored for academic progress. Those students whose grade-point average (GPA) falls below a 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to a 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Methods, Statistics, and Applications Core		
PPUA 6509	Techniques of Program Evaluation	4
or PPUA 6506	Techniques of Policy Analysis	
INSH 6300	Research Methods in the Social Sciences	4
INSH 6500	Statistical Analysis	4
Policy Frameworks and Practice Core		
PPUA 6502	Economic Analysis for Policy and Planning	4
LPSC 7311	Strategizing Public Policy	4
PPUA 7673	Capstone in Public Policy and Urban Affairs	4
Methods and Statistics Elective		
Complete 4 semester hours from the following:		4
INSH 7400	Quantitative Analysis	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5262	Big Data for Cities	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	

Internship Requirement

An approved internship or waiver is required.

Code	Title	Hours
Noncredit Internship		
PPUA 6861	Internship	0

Concentration Options

A concentration is not required. Students may complete electives (from the elective list below) in lieu of a concentration.

HEALTHCARE MANAGEMENT AND POLICY CONCENTRATION

Code	Title	Hours
Health Management		
Complete one of the following:		3-4
HRMG 6220	Health Organization Management	
PPUA 6220	How Healthcare Works: Business and Policy Innovations	
STRT 6220	Strategic Management for Healthcare Organizations	
Health Policy		
Complete one of the following:		3-4
PHTH 5212	Public Health Administration and Policy	
PHTH 5234	Economic Perspectives on Health Policy	
PPUA 5240	Health Policy and Politics	
Electives		
Health Elective		
Complete one of the following:		3
PHTH 5120	Race, Ethnicity, and Health in the United States	
PHTH 5212	Public Health Administration and Policy	
PHTH 5214	Environmental Health	
PHTH 5222	Health Advocacy	
PHTH 5230	Global Health	
PHTH 6200	Principles and History of Urban Health	
PHTH 6204	Society, Behavior, and Health	
General Elective		
Complete an additional course from the Health Elective list above or one of the following:		2-3
PPUA 6212	Research Toolkit for Urban and Regional Policy: Project Management	
PPUA 6213	Research Toolkit for Urban and Regional Policy: Data Visualization	
PPUA 6216	Research Toolkit for Urban and Regional Policy: Grant Writing	
PHTH 6224	Social Epidemiology	

SUSTAINABILITY AND CLIMATE CHANGE POLICY CONCENTRATION

Code	Title	Hours
Complete 12 semester hours from the following:		12
ENVR 6150	Food Security and Sustainability	
LPSC 7312	Cities, Sustainability, and Climate Change	
PPUA 5100	Climate and Development	
PPUA 5260	Ecological Economics	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5264	Energy Democracy and Climate Resilience: Technology, Policy, and Social Change	
PPUA 5268	International Environmental Policy	
PPUA 5270	Food Systems and Public Policy	
PPUA 6101	Environmental Science and Policy Seminar 1	

Electives

Code	Title	Hours
Complete 12 semester hours from the following:		12
LPSC 5000 to LPSC 7999		
PPUA 5000 to PPUA 7999		
CRIM 5000 to CRIM 7999 (by advisement only)		
ECON 5000 to ECON 7999 (by advisement only)		
ENGL 5000 to ENGL 7999 (by advisement only)		
HIST 5000 to HIST 7999 (by advisement only)		
POLS 5000 to POLS 7999 (by advisement only)		
SOCL 5000 to SOCL 7999 (by advisement only)		

Optional Co-op Experience

Code	Title	Hours
Requires two consecutive semesters of Co-op Work Experience and Experiential Integration:		2
PPUA 6964 and INSH 6864	Co-op Work Experience and Experiential Integration	

Program Credit/GPA Requirements

40 total semester hours required (42 with optional co-op)
Minimum 3.000 GPA required

Engineering and Public Policy, MS

For program contact information, please visit this website (https://cee.northeastern.edu/academics/graduate-studies/ms-cepp/).

The purpose of this degree is to provide students with a background in engineering with the tools necessary to conduct robust policy analysis. It includes required core courses from the Department of Civil and Environmental Engineering and the School of Public Policy and Urban Affairs, complemented by electives in engineering and public policy, which can be met by two courses and a master's report (recommended), or by one course and a thesis, or by three courses. A minimum of 16 semester hours must be taken in the College of Engineering.

Degree Requirements	With Report	With Thesis	Coursework Only
Required core courses	20 SH	20 SH	20 SH
Other electives	8 SH	4 SH	12 SH
Master of Science report/ thesis	4 SH	8 SH	
Minimum semester hours required	32 SH	32 SH	32 SH

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty adviser regarding these options (p. 251).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Engineering and Public Policy with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Engineering and Public Policy in addition to earning a Graduate Certificate in Engineering Leadership. Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16 semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour degree and certificate will require 20 hours of adviser-approved technical courses.

Engineering Leadership (p. 245)

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Sustainable Engineering and Systems Modeling

Code	Title	Hours
Complete 12 semester hours from the following:		12
CIVE 5261	Dynamic Modeling for Environmental Investment and Policymaking	
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure	
CIVE 5363	Climate Science, Engineering Adaptation, and Policy	
CIVE 6777	Climate Hazards and Resilient Cities Abroad	
CIVE 6778	Climate Adaptation and Policy Abroad	
CIVE 7100	Time Series and Geospatial Data Sciences	
CIVE 7110	Critical Infrastructure Resilience	
CIVE 7272	Air Quality Management	
ENGR 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage	
ENSY 5100	Hydropower	
IE 5500	Systems Engineering in Public Programs	
IE 5640	Data Mining for Engineering Applications	
IE 6200	Engineering Probability and Statistics	
IE 7280	Statistical Methods in Engineering	
ME 5645	Environmental Issues in Manufacturing and Product Use	
SBSY 5200	Sustainable Engineering Systems for Buildings	

Public Policy and Analysis

Code	Title	Hours
Complete 8 semester hours from the following:		8
ECON 7266	Economics of Government	
INSH 5301	Introduction to Computational Statistics	
INSH 6300	Research Methods in the Social Sciences	
INSH 6500	Statistical Analysis	
LPSC 7311	Strategizing Public Policy	
PPUA 5260	Ecological Economics	
PPUA 6212	Research Toolkit for Urban and Regional Policy: Project Management	
PPUA 6213	Research Toolkit for Urban and Regional Policy: Data Visualization	
PPUA 6502	Economic Analysis for Policy and Planning	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6509	Techniques of Program Evaluation	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete 12 semester hours from the Elective Course List below.		12

REPORT OPTION

Code	Title	Hours
CIVE 8674	Master's Report	4
Complete 8 semester hours from the Elective Course List below.		8

THESIS OPTION

Code	Title	Hours
CIVE 7990	Thesis	8
Complete 4 semester hours from the Elective Course List below.		4

ELECTIVE COURSE LIST

Code	Title	Hours
CIVE 5271	Solid and Hazardous Waste Management	
CIVE 5280	Remote Sensing of the Environment	
CIVE 5281	Coastal Dynamics and Design	
CIVE 5300 and CIVE 5301	Environmental Sampling and Analysis and Lab for CIVE 5300	
CIVE 7150	Data-Driven Decision Support for Civil and Environmental Engineering	
CIVE 7230	Legal Aspects of Civil Engineering	
CIVE 7252	Water Engineering: Planning, Design, and Management	
CIVE 7261	Surface Water Quality Modeling	
EMGT 6225	Economic Decision Making	
ENVR 5210	Environmental Planning	
ENVR 5260	Geographical Information Systems	
LPSC 7312	Cities, Sustainability, and Climate Change	
PHTH 5214	Environmental Health	
PHTH 5230	Global Health	
PPUA 5262	Big Data for Cities	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
PPUA 5264	Energy Democracy and Climate Resilience: Technology, Policy, and Social Change	
PPUA 5270	Food Systems and Public Policy	
PPUA 6101	Environmental Science and Policy Seminar 1	

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

Environmental Science and Policy, MS

The Master of Science in Environmental Science and Policy program emphasizes a broadly interdisciplinary and synthetic approach that integrates knowledge in the environmental sciences (conservation biology, climate change, fisheries science, ecosystem function, biodiversity, restoration ecology) with the social sciences (policy, economics, sociology, political science, and development) and humanities (environmental history, philosophy, and ethics). The goal of the program is to equip professionals with substantive breadth in knowledge and skills at the intersection of environmental science and policy. The program focuses on training students to think critically about the underlying causes of environmental problems and understanding the reciprocal relationships between coupled human-natural ecosystems and the interconnections between social and technological innovations. The program explores practical approaches and potential solutions that decision makers need to evaluate in policy debates related to promoting environmental sustainability.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Seminars		
PPUA 6101	Environmental Science and Policy Seminar 1	4
ENVR 6102	Environmental Science and Policy Seminar 2	4
Skills Courses		
Complete 2 courses from the following. At least one course needs to be taken from the College of Science Skills Course List and one course from the College of Social Sciences and Humanities Skills Course List.		8
College of Science Skills Course List		
EEMB 5130	Ecological Dynamics	
ENVR 5150	Climate and Atmospheric Change	
EEMB 5522	Experimental Design Marine Ecology	
ENVR 5210	Environmental Planning	
ENVR 5240	Sedimentary Basin Analysis	
ENVR 5260	Geographical Information Systems	
ENVR 6500	Biostatistics	
College of Social Sciences and Humanities Skills Course List		
INSH 5301	Introduction to Computational Statistics	
INSH 6300	Research Methods in the Social Sciences	
INSH 7400	Quantitative Analysis	
LPSC 7311	Strategizing Public Policy	
PPUA 5260	Ecological Economics	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
PPUA 6212	Research Toolkit for Urban and Regional Policy: Project Management	
PPUA 6213	Research Toolkit for Urban and Regional Policy: Data Visualization	
PPUA 6216	Research Toolkit for Urban and Regional Policy: Grant Writing	
PPUA 6502	Economic Analysis for Policy and Planning	
PPUA 6505	Public Budgeting and Financial Management	

PPUA 6506	Techniques of Policy Analysis
PPUA 6509	Techniques of Program Evaluation
PPUA 6525	Institutions and Public Policy
PPUA 7237	Advanced Spatial Analysis of Urban Systems

Electives

Complete five courses from the following list. At least one course must be taken from the College of Science Elective Course List and one courses from the College of Social Sciences and Humanities Elective Course List. Any skills course not taken to fulfill the skills courses requirement can be taken as an elective. Students may petition to enroll in other relevant graduate courses offered by other schools at Northeastern University.

COLLEGE OF SCIENCE ELECTIVE LIST

Code	Title	Hours
EEMB 5130 - EEMB 8984		
ENVR 5115 - ENVR 6900		

COLLEGE OF SOCIAL SCIENCES AND HUMANITIES ELECTIVE LIST

Code	Title	Hours
INSH 5302	Information Design and Visual Analytics	
INTL 5100	Climate and Development	
LPSC 7311	Strategizing Public Policy	
LPSC 7312	Cities, Sustainability, and Climate Change	
PHTH 5214	Environmental Health	
PHTH 5230	Global Health	
PPUA 5225	The Open Classroom: Public Debates on Public Policy	
PPUA 5230	Housing Policy	
PPUA 5234	Land Use and Urban Growth Policy	
PPUA 5249	Sustainable Urban Coastal Policy	
PPUA 5260	Ecological Economics	
PPUA 5262	Big Data for Cities	
PPUA 5264	Energy Democracy and Climate Resilience: Technology, Policy, and Social Change	
PPUA 5266	Urban Theory and Science	
PPUA 5268	International Environmental Policy	
PPUA 5270	Food Systems and Public Policy	
PPUA 5390	Special Topics in Public Policy and Urban Affairs	
PPUA 6201	The 21st-Century City: Urban Opportunities and Challenges in a Global Context	
PPUA 6505	Public Budgeting and Financial Management	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6522	Administrative Ethics and Public Management	
PPUA 6551	Nonprofit Organizations and Social Change	
PPUA 6552	The Nonprofit Sector in Civil Society and Public Affairs	
PPUA 6553	Nonprofit Financial Resource Development	
PPUA 6862	Internship with Research	
PPUA 6966	Practicum	
PPUA 7346	Resilient Cities	
PPUA 7673	Capstone in Public Policy and Urban Affairs	
SOCL 7267	Environment, Health, and Society	
SOCL 7287	Social Movements in Health	

Program Credit/GPA Requirements

36 total semester hours required
Minimum 3.000 GPA required

Urban Informatics, MS

The Master of Science in Urban Informatics (MSUI) degree couples comprehensive data analytics skills with an understanding of the big questions faced by cities in the 21st-century city. This cutting-edge program is built upon a unique cross-college initiative, which offers comprehensive state-of-the-art training in the core skills of data analytics—including quantitative analysis, data mining, machine learning, and data visualization. Urban informatics students supplement training in these foundational skills with a specialized sequence of courses that address how data and technology are being used to tackle key social, infrastructural, and environmental challenges.

By combining a theoretically informed perspective of cities with advanced skills in accessing, managing, analyzing, and communicating insights from large complex, data sets, graduates are a part of the next wave of urban professionals ready to lead in the public, private, and nonprofit sectors. Given the continuous growth in urban data and technology, these professionals are essential to shaping the future of urban areas around the globe.

This program provides a uniquely integrated urban and informatics degree with a substantial experiential education component. The focus throughout is on practical application, and students have multiple opportunities to apply what they are learning.

The master's program offers an optional cooperative education experience (co-op) to eligible students. Cooperative education is central to both the Northeastern experience and to the College of Social Sciences and Humanities experiential liberal arts framework. Northeastern's signature co-op ecosystem provides qualified master's students with six-month work experiences in businesses, nonprofits, and government agencies in Boston and across the United States. Graduate students take their work from campus learning spaces, apply their knowledge outside of the classroom, and then bring knowledge and skills gained in community learning spaces back to our campus learning spaces during the cocurricular experiential integration course.

Please review the tuition and fee (https://studentfinance.northeastern.edu/billing-payments/tuition-and-fees/) page as credit costs differ depending on the College in which the course resides.

Climate and Resilience Concentration

This graduate concentration is available to students in the Master of Urban Informatics (MSUI). It is designed for MSUI students who want to specialize in the policy challenges that arise from climate change and the methodological tools designed to respond to them, especially those that help us understand and instill resilience in communities that are vulnerable to disruption. The concentration is comprised of three courses: a method and application course specific to the concentration;

an analysis course specific to the concentration; and the requirement to complete a capstone or practicum relevant to climate and resilience.

Communities and Economic Development Concentration

This graduate concentration is available to students in the Master of Urban Informatics (MSUI). It is designed for MSUI students who want to specialize in the policy challenges associated with neighborhoods and communities and the methodological tools for addressing them. This includes examining more closely how communities work and the types of interventions that can help them to thrive and prosper. The concentration is comprised of three courses: a method and application course specific to the concentration; an analysis course specific to the concentration; and the requirement to complete a capstone or practicum relevant to communities and economic development.

Transportation and Infrastructure Concentration

This graduate concentration is available to students in the Master of Urban Informatics (MSUI). It is designed for MSUI students who want to specialize in the policy challenges and methods associated with transportation and related infrastructure. This includes questions of policy and operations pertaining to traffic management and public transit and the skills for analyzing mobility decisions. The concentration is comprised of three courses: a method and application course specific to the concentration; an analysis course specific to the concentration; and the requirement to complete a capstone or practicum relevant to transportation or infrastructure.

CSSH Graduate Programs General Regulations (p. 473)

Academic Standing/Progress

Students in the program are monitored for academic progress. Those students whose grade-point average (GPA) falls below a 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to a 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Data Science Courses		
DA 5020	Collecting, Storing, and Retrieving Data	4
or DA 5030	Introduction to Data Mining/Machine Learning	
or PPUA 7237	Advanced Spatial Analysis of Urban Systems	
INSH 5301	Introduction to Computational Statistics	4
INSH 5302	Information Design and Visual Analytics	4
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	4
Methods and Applications		
PPUA 5262	Big Data for Cities	4

Concentrations

- No concentration (p. 511)
- Climate and Resilience (p. 511)
- Communities and Economic Development (p. 512)
- Transportation and Infrastructure (p. 512)

No Concentration

Code	Title	Hours
Methods and Applications		
PPUA 5266	Urban Theory and Science	4
Analysis		
Complete 4 semester hours from the following:		4
INSH 6406	Analyzing Complex Digitized Data	
POLS 7334	Social Networks	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 6212	Research Toolkit for Urban and Regional Policy: Project Management (2 semester hours)	
PPUA 6213	Research Toolkit for Urban and Regional Policy: Data Visualization (2 semester hours)	
PPUA 6216	Research Toolkit for Urban and Regional Policy: Grant Writing (2 semester hours)	
Practicum or Capstone		
PPUA 6966	Practicum	4
or PPUA 7673	Capstone in Public Policy and Urban Affairs	
Portfolio		
PPUA 6410	Urban Informatics Portfolio	1

Climate and Resilience Concentration

Code	Title	Hours
Method and Application		
Complete 4 semester hours from the following:		4
PPUA 5260	Ecological Economics	
PPUA 5264	Energy Democracy and Climate Resilience: Technology, Policy, and Social Change	
PPUA 5268	International Environmental Policy	
PPUA 6101	Environmental Science and Policy Seminar 1	
PPUA 7346	Resilient Cities	
Analysis		
Complete 4 semester hours from the following:		4
INSH 6302	Qualitative Methods	
POLS 7334	Social Networks	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
CIVE 7000-level Special Topics in Engineering—Approved by program director		
Practicum or Capstone		
Complete topic-focused capstone or practicum approved by program director:		4
PPUA 6966	Practicum	
or PPUA 7673	Capstone in Public Policy and Urban Affairs	
Portfolio		
PPUA 6410	Urban Informatics Portfolio	1

Communities and Economic Development Concentration

Code	Title	Hours
Method and Application		
Complete 4 semester hours from the following:		4
CRIM 6270	Crime and Community Context	
IE 7374	Special Topics in Industrial Engineering (Sharing Economy Systems)	
PPUA 5230	Housing Policy	
PPUA 5265	Urban and Regional Policy in Developing Countries	
PPUA 6502	Economic Analysis for Policy and Planning	
PPUA 6552	The Nonprofit Sector in Civil Society and Public Affairs	
Analysis		
Complete 4 semester hours from the following:		4
INSH 6302	Qualitative Methods	
INSH 6406	Analyzing Complex Digitized Data	
POLS 7334	Social Networks	
PPUA 6509	Techniques of Program Evaluation	
Practicum or Capstone		
Complete topic-focused capstone or practicum approved by program director:		4
PPUA 6966	Practicum	
or PPUA 7673	Capstone in Public Policy and Urban Affairs	
Portfolio		
PPUA 6410	Urban Informatics Portfolio	1

Transportation and Infrastructure Concentration

Code	Title	Hours
Method and Application		
Complete one of the following:		4
IE 7374	Special Topics in Industrial Engineering (Sharing Economy Systems)	
PPUA 7346	Resilient Cities	
Analysis		
Complete 4 semester hours from the following:		4
CIVE 7110	Critical Infrastructure Resilience	
CIVE 7380	Performance Models and Simulation of Transportation Networks	
CIVE 7381	Transportation Demand Forecasting and Model Estimation	
NETS 7350	Bayesian and Network Statistics	
CIVE 7000-level Special Topics in Engineering - Approved by program director.		
Practicum or Capstone		
Complete topic-focused capstone or practicum approved by program director:		4
PPUA 6966	Practicum	
or PPUA 7673	Capstone in Public Policy and Urban Affairs	
Portfolio		
PPUA 6410	Urban Informatics Portfolio	1

Optional Co-op Experience

Code	Title	Hours
Requires two consecutive semesters of Co-op Work Experience and Experiential Integration:		2
PPUA 6964 and INSH 6864	Co-op Work Experience and Experiential Integration	

Program Credit/GPA Requirements

33 total semester hours required (35 with optional co-op)
Minimum 3.000 GPA required

Urban Planning and Policy, MS

The Master of Science in Urban Planning and Policy (MUPP) program trains leaders interested in building just and sustainable solutions to today's critical urban problems. Students in the program develop the theoretical and analytical tools to understand contemporary challenges of social and environmental injustice in cities and urban regions. They develop professional tools to work effectively in the realms of planning, policy, politics, and advocacy to impact urban challenges, including affordable housing provision, equitable and sustainable economic growth, sustainable transportation, and climate change adaptation and mitigation. This innovative program combines the expertise in urban planning and policy analysis data analytics of the School of Public Policy and Urban Affairs with expertise in physical planning, design, and data visualization at the School of Architecture. The core curriculum of the program provides students with a solid foundation in essential skills and concepts, including techniques of effective community engagement, research design and statistics, economic analysis, legal foundations of urban planning and policy, and the history of urban development and urban planning. Students also have the opportunity to develop substantial expertise in a specialization area, including urban analytics, urban sustainability and resilience, urban design and physical planning, and urban development policy and planning.

The optional cooperative education experience (co-op) is available to eligible students. Cooperative education is central to both the Northeastern experience and to the College of Social Sciences and Humanities experiential liberal arts framework. Northeastern's signature co-op ecosystem provides qualified master's students with six-month work experiences in businesses, nonprofits, and government agencies in Boston and across the United States. Graduate students take their work from campus learning spaces, apply their knowledge outside of the classroom, and then bring knowledge and skills gained in community learning spaces back to our campus learning spaces during the cocurricular experiential integration course.

In addition to the co-op option, students in the MUPP program have opportunities to gain experience in the application of their knowledge and skills via internships, class projects, and a capstone research report. They graduate prepared for careers working for state and local government, federal agencies, community development corporations and other nonprofit organizations, research institutes, and as private-sector planning consultants.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Planning and Policy		
LPSC 5201	Law and the City	4
PPUA 6201	The 21st-Century City: Urban Opportunities and Challenges in a Global Context	4
PPUA 6502	Economic Analysis for Policy and Planning	4
SUEN 6340	Topics in Urban Environmental Design	4
Research Design		
INSH 6300	Research Methods in the Social Sciences	4
Quantitative Techniques		
Students in the urban analytics focus area are encouraged to take INSH 5301.		
Choose one from the following:		4
INSH 5301	Introduction to Computational Statistics	
INSH 6500	Statistical Analysis	

Focus Areas

Complete one of the following focus areas:

- Urban Design and Physical Planning (p. 63)
- Urban Analytics (p. 63)
- Sustainability and Resilience (p. 63)
- Urban Development Policy and Planning (p. 63)

URBAN DESIGN AND PHYSICAL PLANNING

Code	Title	Hours
Gateway Course		
ARCH 6340	Graduate Topics in Architecture	4
Tracks		
Complete one of the following tracks:		8
Urban Design and Real Estate		
ARCH 5310	Design Tactics and Operations	
ARCH 5530	Innovative Models in Real Estate Development and Design	
Physical Planning and Design for Sustainable Urbanism		
SUEN 7230	Urban Ecologies and Technologies 1	
SUEN 7240	Urban Ecologies and Technologies 2	
Urban Experience Track		
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	
ARTG 6310	Design for Behavior and Experience	
Capstone		
SUEN 6120	Graduate Studio 2: Sustainable Urban Systems	6

URBAN ANALYTICS

Code	Title	Hours
Gateway Course		
PPUA 5262	Big Data for Cities	4
Required Courses		
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	4
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	4
Capstone		
PPUA 7673	Capstone in Public Policy and Urban Affairs	4

SUSTAINABILITY AND RESILIENCE

Code	Title	Hours
Gateway Course		
LPSC 7312	Cities, Sustainability, and Climate Change	4
or SUEN 6310	Cities, Nature, and Design in Contemporary History and Theory	
Methods		
Complete one of the following:		4
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
SUEN 7230	Urban Ecologies and Technologies 1	
Capstone		
PPUA 7673	Capstone in Public Policy and Urban Affairs	4
Elective		
Complete one of the following:		4
PPUA 5231	Transportation Policy	
PPUA 5234	Land Use and Urban Growth Policy	
PPUA 5238	Climate Change and Global Urbanization	
PPUA 5249	Sustainable Urban Coastal Policy	
PPUA 5260	Ecological Economics	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
SUEN 6110	Graduate Studio 1: Sustainable Urban Sites	
SUEN 6120	Graduate Studio 2: Sustainable Urban Systems	
SUEN 6220	Implementation and Visualization for Urban Environments 2	
SUEN 6310	Cities, Nature, and Design in Contemporary History and Theory	
SUEN 6340	Topics in Urban Environmental Design	
SUEN 7230	Urban Ecologies and Technologies 1	
SUEN 7240	Urban Ecologies and Technologies 2	
SUEN 7320	Pro-Seminar: Issues in Designed Urban Environments	

URBAN DEVELOPMENT POLICY AND PLANNING

Code	Title	Hours
Gateway Course		
Complete one of the following:		4
PPUA 5230	Housing Policy	
PPUA 5231	Transportation Policy	

PPUA 5233	Contemporary Community Development	
PPUA 5265	Urban and Regional Policy in Developing Countries	
Methods		
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	4
or PPUA 5236	Introduction to Real Estate Development for Urban Policy Makers	
Capstone		
PPUA 7673	Capstone in Public Policy and Urban Affairs	4
Elective		
Complete one of the following:		4
PPUA 5230	Housing Policy	
PPUA 5231	Transportation Policy	
PPUA 5232	Immigration and Urban America	
PPUA 5233	Contemporary Community Development	
PPUA 5234	Land Use and Urban Growth Policy	
PPUA 5236	Introduction to Real Estate Development for Urban Policy Makers	
PPUA 5270	Food Systems and Public Policy	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6530	State and Local Public Finance	
PPUA 6551	Nonprofit Organizations and Social Change	
SUEN 6110	Graduate Studio 1: Sustainable Urban Sites	
SUEN 6120	Graduate Studio 2: Sustainable Urban Systems	
SUEN 6340	Topics in Urban Environmental Design	

Electives

Code	Title	Hours
Complete two of the following:		8
ARCH 5310	Design Tactics and Operations	
ARCH 5530	Innovative Models in Real Estate Development and Design	
ARCH 6100	Graduate Skills Studio	
ARCH 6330	Seminar in Modern Architecture	
ARCH 6340	Graduate Topics in Architecture	
ARTG 5100	Information Design Studio 1: Principles	
ARTG 5120	Research Methods for Design	
ARTG 5130	Visual Communication for Information Design	
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 6330	Information Design Mapping Strategies	
DA 5020	Collecting, Storing, and Retrieving Data	
DA 5030	Introduction to Data Mining/Machine Learning	
INSH 5302	Information Design and Visual Analytics	
PPUA 5230	Housing Policy	
PPUA 5231	Transportation Policy	
PPUA 5232	Immigration and Urban America	
PPUA 5233	Contemporary Community Development	
PPUA 5234	Land Use and Urban Growth Policy	
PPUA 5236	Introduction to Real Estate Development for Urban Policy Makers	
PPUA 5238	Climate Change and Global Urbanization	
PPUA 5245	Education Policy in the United States	
PPUA 5249	Sustainable Urban Coastal Policy	
PPUA 5260	Ecological Economics	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
PPUA 5265	Urban and Regional Policy in Developing Countries	
PPUA 5270	Food Systems and Public Policy	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6530	State and Local Public Finance	
PPUA 6551	Nonprofit Organizations and Social Change	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	
SUEN 6110	Graduate Studio 1: Sustainable Urban Sites	
SUEN 6120	Graduate Studio 2: Sustainable Urban Systems	
SUEN 6210	Implementation and Visualization for Urban Environments 1	
SUEN 6220	Implementation and Visualization for Urban Environments 2	
SUEN 6310	Cities, Nature, and Design in Contemporary History and Theory	
SUEN 6340	Topics in Urban Environmental Design	
SUEN 7230	Urban Ecologies and Technologies 1	
SUEN 7240	Urban Ecologies and Technologies 2	
SUEN 7320	Pro-Seminar: Issues in Designed Urban Environments	

Optional Co-op Experience

Code	Title	Hours
Requires two consecutive semesters of Co-op Work Experience and Experiential Integration:		2
PPUA 6964 and INSH 6864	Co-op Work Experience and Experiential Integration	

Program Credit/GPA Requirements

48 total semester hours required (50 with optional co-op)
Minimum 3.000 GPA required

Law, JD / Public Policy, MPP

The JD/Master of Public Policy (MPP) is designed to equip graduates with a unique blend of skills for navigating a complex and rapidly changing policy landscape. The program builds on students' legal training with a compelling blend of skills in applied public policy analysis, policy design, and strategic policy formation. Students also gain career-

relevant experience through internships, small group capstone projects, and other interactions with professionals in the field. All are part of a learning process designed to enable the Northeastern law and public policy graduates to navigate, and to redefine, diverse policy areas.

Ideally, students would apply to Northeastern's JD and MPP programs simultaneously. Those who apply and are admitted to both programs take MPP classes after completing their first year in the School of Law. Applicants may also be considered after they have enrolled in the JD program; interested JD students should consult the School of Law's Office of Academic and Student Affairs and the School of Public Policy and Urban Affairs graduate program director for more information.

Students enrolled in this dual-degree program will be able to count 8 JD credit hours toward their MPP degree and 12 MPP credit hours toward their JD degree. Students should consult advisors in each program if they have questions about which courses may be shared between degrees.

All JD students, including FlexJD students, are ordinarily eligible to apply into dual degree pathways.

Nonprofit Sector, Philanthropy, and Social Change, Graduate Certificate

School of Public Policy and Urban Affairs

CSSH Graduate Programs General Regulations (p. 473)

The Graduate Certificate in Nonprofit Sector, Philanthropy, and Social Change is a response to recent developments in social change theory, practice, and funding that are placing new demands and expectations on social change actors in the nonprofit, public, and private sectors, including nonprofit leaders, philanthropists, policymakers, and corporate social responsibility managers. These developments include the emergence of hybrid, cross-sector business models and new intermediary mechanisms for channeling the flow of capital into social change; new expectations and standards for performance measurement, transparency, and accountability; more sophisticated use of data and technology to support decision making, evaluation, and continual improvement; decreased public funding for traditional nonprofit activities; and the emergence of social media as a vehicle for mobilizing people and resources. The certificate enables social change professionals in all sectors to respond to these changes more effectively and will distinguish itself from other nonprofit certificate programs by focusing on the relationship between social program implementation and funding.

The certificate is a professionally oriented, application-based program for students seeking leadership positions in nonprofit organizations or in a public agency that deals extensively with nonprofits. The curriculum is designed to address the distinctive features and practices of the nonprofit sector and emphasizes management techniques helpful to nonprofit leaders.

Academic Standing/Progress

Students in the program are monitored for academic progress. Those students whose GPA falls below a 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to a 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
PPUA 6551	Nonprofit Organizations and Social Change	4
PPUA 6552	The Nonprofit Sector in Civil Society and Public Affairs	4

Elective

Code	Title	Hours
Complete 4 semester hours from the following. Courses outside this list may be taken as electives with approval of the graduate program director.		4
PPUA 6509	Techniques of Program Evaluation	
PPUA 6522	Administrative Ethics and Public Management	
PPUA 6553	Nonprofit Financial Resource Development	
PPUA 6966	Practicum	
PPUA 7243	International Development Administration and Planning	
PPUA 7976	Directed Study	

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

Public Policy Analysis, Graduate Certificate

CSSH Graduate General Regulations (p. 473)

The Graduate Certificate in Public Policy Analysis seeks to provide students with the tools to analyze and shape public policy at the local, state, and national levels. Students have an opportunity to gain an understanding of the political and legal processes of policymaking, develop skills central to conducting research on policy questions, and learn techniques for evaluating the effectiveness of competing policies.

Academic Standing/Progress

Students in the program are monitored for academic progress. Those students whose grade-point average (GPA) falls below a 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to a 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

Program Requirements

Core Requirements

Students may not reuse required degree courses for the certificate.

Code	Title	Hours
Analysis Methods and Skills		
Complete 8 semester hours from the following:		8
INSH 5302	Information Design and Visual Analytics	
INSH 6300	Research Methods in the Social Sciences	
LPSC 7311	Strategizing Public Policy	
or PPUA 6506	Techniques of Policy Analysis	
PPUA 6502	Economic Analysis for Policy and Planning	

PPUA 5260	Ecological Economics
PPUA 5261	Dynamic Modeling for Environmental Decision Making
PPUA 5262	Big Data for Cities
PPUA 5263	Geographic Information Systems for Urban and Regional Policy
PPUA 6509	Techniques of Program Evaluation
PPUA 7237	Advanced Spatial Analysis of Urban Systems
Policy	
Complete 4 semester hours from the following:	4
PPUA 5230	Housing Policy
PPUA 5231	Transportation Policy
PPUA 5232	Immigration and Urban America
PPUA 5234	Land Use and Urban Growth Policy
PPUA 5240	Health Policy and Politics
PPUA 5245	Education Policy in the United States
PPUA 5264	Energy Democracy and Climate Resilience: Technology, Policy, and Social Change
PPUA 5270	Food Systems and Public Policy
PPUA 6525	Institutions and Public Policy

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

Sustainability and Climate Change Policy, Graduate Certificate

This graduate certificate, a collaboration between the School of Public Policy (SPPUA) and the School of Law (NUSL), is designed to prepare students for the dynamic, evolving landscape of climate and sustainability policy. Interest in the area of climate and sustainability policy is expanding rapidly among graduate students in multiple programs throughout Northeastern and among professionals who may be considering graduate coursework at Northeastern. This certificate provides students from multiple backgrounds an option for gaining interdisciplinary skills and perspectives in climate and sustainability policy. Given the growing need in every organization, including private sector, public sector, and nonprofits, for professionals with knowledge and training in how to respond to the rapidly changing policy and regulatory frameworks in climate and sustainability, this certificate is open to JD, master's and PhD students throughout the university. This certificate is also available to professionals who have not yet been admitted to one of Northeastern's graduate programs.

Academic Standing/Progress

Students in the program are monitored for academic progress. Those students whose grade-point average (GPA) falls below a 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to a 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Policy		
Complete 8 semester hours from the following:		8
ENVR 5350	Sustainable Energy and Climate Solutions	
LPSC 7312	Cities, Sustainability, and Climate Change	
PPUA 5100	Climate and Development	
PPUA 5264	Energy Democracy and Climate Resilience: Technology, Policy, and Social Change	
PPUA 5268	International Environmental Policy	
PPUA 5270	Food Systems and Public Policy	
PPUA 6101	Environmental Science and Policy Seminar 1	
Law		
Complete 3 semester hours from the following:		3
LAW 7329	Environmental Law	
LAW 7634	Energy Law and Policy	
LAW 7676	Energy Justice: Theory, Law, and Policy for a Just Clean Energy Transition	
Practicum		
PPUA 6966	Practicum	1

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

Urban Analytics, Graduate Certificate

CSSH Graduate General Regulations (p. 473)

With 75 percent of the world's population projected to be living in cities by 2050, the need for professionals in urban planning and related careers will only increase. The Graduate Certificate in Urban Analytics seeks to prepare students outside of the Master of Science in Urban Informatics program to manage the progressively complex issues involved with rapidly expanding data and technological resources in cities. As Claire Lane of the City of Boston recently noted, "The blueprints for great cities are increasingly anchored in big data, expressed in GIS [Geographic Information Systems] and codified in coherent policy." Successful graduates with an urban analytics certificate have skills in each of these areas, which prepares them to be professionals ready to shape the future of cities across the globe.

Students are trained with the practical and theoretical knowledge necessary to understand the intricacies of interconnected urban systems and to analyze how these systems work together to create sustainable, resilient, and just cities. The curriculum emphasizes the expertise needed to bridge emerging technological capacities and traditional policymaking processes. Students cultivate applied skills in visual presentation, analysis, and modeling of new data sets—all of which helps to inform investment and policymaking. Inspired by Northeastern's leadership in experiential education, students use Boston and cities around the world as learning labs.

ACADEMIC STANDING/PROGRESS

Students in the program are monitored for academic progress. Those students whose grade-point average (GPA) falls below a 3.000 are notified

by and meet with the director of academic programs. They are counseled that if their GPA does not rise to a 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
PPUA 5262	Big Data for Cities	4
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	4

Elective

Code	Title	Hours
Complete 4 semester hours from the following or another elective in consultation with your faculty adviser:		4
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5266	Urban Theory and Science	
PPUA 6212	Research Toolkit for Urban and Regional Policy: Project Management	
PPUA 6213	Research Toolkit for Urban and Regional Policy: Data Visualization	
PPUA 6216	Research Toolkit for Urban and Regional Policy: Grant Writing	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

Urban Studies, Graduate Certificate

CSSH Graduate Programs General Regulations (p. 473)

The Graduate Certificate in Urban Studies provides a foundation in the fundamentals of urban planning and policy theory for students outside the Master of Science in Urban Planning and Policy degree. It also allows students to pursue course work in a range of areas of concentration, including housing and community development, urban environmental sustainability, economic development, international comparative urban policy, and transportation.

Academic Standing/Progress

Students in the program are monitored for academic progress. Those students whose grade-point average (GPA) falls below a 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to a 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
PPUA 6201	The 21st-Century City: Urban Opportunities and Challenges in a Global Context	4
PPUA 7673	Capstone in Public Policy and Urban Affairs	4

Elective

Code	Title	Hours
Complete 4 semester hours in the following range (selected by advisement):		4
PPUA 5000 to PPUA 7999		

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

Sociology

Website (http://www.northeastern.edu/cssh/socant/)

Liza Weinstein, PhD
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CSSH Graduate Programs General Regulations (p. 473)

Uncertainty about the economy, healthcare, and the labor market. Ethnic conflicts in an era of rapid globalization. Concern for the environment. Shifting gender arrangements as work and family come into conflict. Violence in school and even in houses of worship.

Never has there been a greater need for sociological research focused on the problems and issues of our time.

The Department of Sociology and Anthropology at Northeastern University offers a PhD degree in sociology within a flexible program attractive to students interested in both academic and nonacademic careers. Students pursuing the PhD degree earn an MA degree en route to completing the doctorate, unless they earned the MA in sociology elsewhere. The program seeks to provide students with the theoretical foundation and research skills needed to engage in a career in teaching and research, in the public sector, or in industry. Thirty-two faculty members bring a wide range of substantive interests, organized around four specialization areas: the sociology of gender; globalization; environment and health; and urban sociology. Apart from these formal areas of concentration, the department has extraordinary strengths in inequality and social movements.

Our faculty have won numerous prizes for excellence in the classroom, and many have also played leadership roles in establishing prestigious centers and interdisciplinary programs on Northeastern's campus.

The Department of Sociology and Anthropology is a founding unit of Northeastern's School of Public Policy and Urban Affairs, which is dedicated to providing advanced research opportunities in a multidisciplinary environment. The department also maintains strong ties with the Brudnick Center for the Study of Conflict and Violence;

the Women's, Gender, and Sexuality Studies program; the Kitty and Michael Dukakis Center for Urban and Regional Policy; the Northeastern Environmental Justice Research Collaborative; the Social Science Environmental Health Research Institute; and PhD in Public Policy program.

Programs

Doctor of Philosophy

- Sociology (p. 518)

Sociology, PhD

The Department of Sociology and Anthropology at Northeastern University is home to a distinguished graduate program offering a PhD in Sociology. The primary objectives of our graduate program are to offer a strong curricular foundation in sociology and the social sciences; to inculcate in students a depth of knowledge in the basic tools of the discipline; to train our students to be outstanding teachers and researchers; and to provide professional socialization that adequately prepares students for a career in the discipline.

The PhD program is designed to attract students who wish to develop a broad base of sociological knowledge, such as would equip students to embark on academic careers in leading institutions of higher education. The PhD program boasts a wide array of curricular strengths and diverse methodological offerings, all of which draw upon the department's emphasis on the study of social inequalities along lines of race, class, and gender. Faculty expertise ranges widely from domestic U.S. concerns to issues that affect groups, regions, and societies on a global scale.

The PhD program is designed to admit relatively small numbers of graduate students each year, which affords students the opportunity to forge close working relationships with the faculty. Our faculty and graduate students work together in a number of interdisciplinary research projects, programs, and centers, including the Social Science Environmental Health Research Institute (http://www.northeastern.edu/environmentalhealth/); the Brudnick Center on Violence and Conflict (http://www.northeastern.edu/brudnickcenter/); the Dukakis Center for Urban Research and Policy (http://www.northeastern.edu/dukakiscenter/); the Institute for Health Equity and Social Justice Research (http://www.northeastern.edu/iuhrp/); the Environmental Justice Research Collaborative (http://www.northeastern.edu/nejrc/); the Institute on Race and Justice (http://www.northeastern.edu/irj/); and the Women's, Gender, and Sexuality Studies Program (https://www.northeastern.edu/cssh/wgss/). Many of the faculty in the Department of Sociology and Anthropology have additional interests and are affiliated with other departments on campus, including environmental studies; law and public policy; Latino, Latin American, and Caribbean studies; African-American studies; international affairs; Jewish studies; and criminal justice. Students who wish to work with faculty in other disciplines are encouraged to enlist the aid of the sociology graduate director or their advisors in contacting individual faculty members.

Admissions

Students interested in the PhD apply directly to that program. Students admitted without a master's degree earn the Master of Arts in Sociology en route once PhD coursework is completed. Please note that all applicants for the doctoral program are required to submit a writing sample that should consist of written materials that demonstrate their capacity for scholarship at the doctoral level. (Copies of several course or term papers or a copy of a master's thesis or paper are appropriate.)

Theory Examination

Students entering the graduate program must take a theory qualifying examination at the conclusion of their first year of study during the spring semester. The theory qualifying examination is a standard exam taken by all students in the same cohort. The exam is graded on a pass/fail basis. Students who fail the examination may take it a second time but will not be allowed to enroll for coursework beyond the 30-semester-hour MA requirement or their first year of PhD residence (whichever case applies) until successfully completing the qualifying exam. Students who fail the examination on their second attempt will be asked to leave the program. In the latter case, a student may petition the graduate committee for a review of the student's record and performance in the program.

Degree Candidacy

To enter into degree candidacy, the student must have earned a Master of Arts degree or its departmental semester-hour equivalent, passed the qualifying examination, successfully defended two field statements, and defended their dissertation proposal.

Students who have completed required coursework with a cumulative GPA of 3.000 or better may be eligible to receive an MA Sociology (p. 521) *degree. In addition, students who do not qualify for the doctoral degree, but who have completed required coursework with a cumulative GPA of 3.000 or better, may be eligible to receive a terminal* MA Sociology (p. 521) *degree. Note that no students will be admitted directly into the* MA Sociology (p. 521) *to pursue a master's degree.*

PhD Program Requirements

Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Qualifying examination
Annual review
Two field statements
Dissertation proposal
Dissertation defense

Core Requirements

Code	Title	Hours
Foundations		
SOCL 7200	Foundations of Social Theory 1	4
SOCL 7201	Foundations of Social Theory 2	4
Research Methods		
INSH 6300	Research Methods in the Social Sciences	4
INSH 6500	Statistical Analysis	4
or INSH 5301	Introduction to Computational Statistics	
Advanced Methods		
Complete 8 semester hours from the following (courses taken after this requirement is fulfilled will be counted as electives):		8
CRIM 7713	Advanced Research and Evaluation Methods	
CRIM 7715	Multivariate Analysis 1	
CRIM 7716	Multivariate Analysis 2	
CRIM 7718	Advanced Data Analysis	
INSH 6302	Qualitative Methods	

INSH 5302	Information Design and Visual Analytics
INSH 6406	Analyzing Complex Digitized Data
INSH 7400	Quantitative Analysis
INSH 7500	Advanced Quantitative Analysis
INSH 7600	Advanced Methodological and Quantitative Techniques
PHTH 6320	Qualitative Methods in Health and Illness
PPUA 5262	Big Data for Cities
PPUA 5263	Geographic Information Systems for Urban and Regional Policy
PPUA 6509	Techniques of Program Evaluation

Electives

Code	Title	Hours
Complete 36 semester hours in the following subject areas:		36
SOCL		
CRIM 6200	Criminology	
CRIM 6202	The Criminal Justice Process	
CRIM 6270	Crime and Community Context	
CRIM 7201	Global Criminology	
CRIM 7264	Immigration and Crime	
ENGL 7370	Introduction to Digital Humanities	
HIST 7228	Atlantic Connections	
HIST 7370	Texts, Maps, and Networks: Readings and Methods for Digital History	
POLS 7325	Contemporary Issues in Third World Development	
POLS 7333	Science, Technology, and Public Policy	
POLS 7334	Social Networks	
POLS 7341	Security and Resilience Policy	
POLS 7343	Counterterrorism	
POLS 7344	Hard Power, Soft Power, and Smart Power	
POLS 7346	Resilient Cities	
POLS 7362	Nationalism	
POLS 7366	Genocide in a Comparative Perspective	
POLS 7369	International Security	
POLS 7370	Europe and European Union Governance	
POLS 7376	Government and Politics of the Middle East	
POLS 7387	Global Governance	
POLS 7441	Cyberconflict	
POLS 7704	Critical Infrastructure Resilience	
PPUA 5100	Climate and Development	
PPUA 5240	Health Policy and Politics	
PPUA 6201	The 21st-Century City: Urban Opportunities and Challenges in a Global Context	
PPUA 6220	How Healthcare Works: Business and Policy Innovations	
PPUA 6552	The Nonprofit Sector in Civil Society and Public Affairs	
PPUA 7243	International Development Administration and Planning	
PPUA 7346	Resilient Cities	
PPUA 7521	Seminar in Urban Theory	
SOCL 5240	Feminist Resistance	
SOCL 7100	Queer Theory: Sexualities, Genders, Politics	
or WMNS 7100	Queer Theory: Sexualities, Genders, Politics	
SOCL 7221	Globalization, Development, and Social Justice	
SOCL 7225	Gender and Social Movements	
SOCL 7227	Race and Ethnic Relations	
SOCL 7263	Social Psychology of Stratification	
SOCL 7265	Sociology of Gender	
SOCL 7267	Environment, Health, and Society	
SOCL 7268	Globalization and the City	
SOCL 7270	Sociology of Work and Employment	
SOCL 7273	Gender and Social Policy	
SOCL 7287	Social Movements in Health	
SOCL 7976	Directed Study	
WMNS 6100	Theorizing Gender and Sexuality	
WMNS 7635	Understanding the Pornographic and the Obscene	
WMNS 7900	Special Topics in Women's, Gender, and Sexuality Studies	

Dissertation

Code	Title	Hours
Exam Preparation		
Required for students who must maintain full-time status while completing comprehensive exam. Must take twice.		
SOCL 8960	Exam Preparation—Doctoral	
Research		
SOCL 9986	Research	
Dissertation		
SOCL 9990	Dissertation Term 1	
SOCL 9991	Dissertation Term 2	
Dissertation Continuation		
Following completion of two semesters of dissertation, registration in the following class is required in each semester (including the summer if the dissertation is submitted in summer) until the dissertation is completed:		
SOCL 9996	Dissertation Continuation	

Program Credit/GPA Requirements

60 total semester hours required
Minimum 3.500 GPA required

Advanced Entry PhD Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Qualifying examination or waiver
Annual review
Two field statements
Dissertation proposal

Dissertation defense

Core Requirements

Code	Title	Hours
Foundations		
SOCL 7200	Foundations of Social Theory 1	4
SOCL 7201	Foundations of Social Theory 2	4
Research Methods		
INSH 6300	Research Methods in the Social Sciences	4
INSH 6500	Statistical Analysis	4
or INSH 5301	Introduction to Computational Statistics	
Advanced Methods		
Complete 8 semester hours from the following (courses taken after this requirement is fulfilled will be counted as electives):		8
CRIM 7713	Advanced Research and Evaluation Methods	
CRIM 7715	Multivariate Analysis 1	
CRIM 7716	Multivariate Analysis 2	
CRIM 7718	Advanced Data Analysis	
INSH 5302	Information Design and Visual Analytics	
INSH 6302	Qualitative Methods	
INSH 6406	Analyzing Complex Digitized Data	
INSH 7400	Quantitative Analysis	
INSH 7500	Advanced Quantitative Analysis	
INSH 7600	Advanced Methodological and Quantitative Techniques	
PHTH 6320	Qualitative Methods in Health and Illness please note this course is only 3 credits	
PPUA 5262	Big Data for Cities	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
PPUA 6509	Techniques of Program Evaluation	

Electives

Code	Title	Hours
Complete 16 semester hours from the following courses:		
CRIM 6200	Criminology	
CRIM 6202	The Criminal Justice Process	
CRIM 6270	Crime and Community Context	
CRIM 7201	Global Criminology	
CRIM 7264	Immigration and Crime	
ENGL 7370	Introduction to Digital Humanities	
HIST 7228	Atlantic Connections	
HIST 7370	Texts, Maps, and Networks: Readings and Methods for Digital History	
POLS 7325	Contemporary Issues in Third World Development	
POLS 7333	Science, Technology, and Public Policy	
POLS 7334	Social Networks	
POLS 7341	Security and Resilience Policy	
POLS 7343	Counterterrorism	
POLS 7344	Hard Power, Soft Power, and Smart Power	
POLS 7346	Resilient Cities	
POLS 7362	Nationalism	
POLS 7366	Genocide in a Comparative Perspective	
POLS 7369	International Security	
POLS 7370	Europe and European Union Governance	
POLS 7376	Government and Politics of the Middle East	
POLS 7387	Global Governance	
POLS 7441	Cyberconflict	
POLS 7704	Critical Infrastructure Resilience	
PPUA 5100	Climate and Development	
PPUA 5240	Health Policy and Politics	
PPUA 6201	The 21st-Century City: Urban Opportunities and Challenges in a Global Context	
PPUA 6220	How Healthcare Works: Business and Policy Innovations	
PPUA 6552	The Nonprofit Sector in Civil Society and Public Affairs	
PPUA 7243	International Development Administration and Planning	
PPUA 7346	Resilient Cities	
PPUA 7521	Seminar in Urban Theory	
SOCL 5240	Feminist Resistance	
SOCL 7100	Queer Theory: Sexualities, Genders, Politics	
or WMNS 7100	Queer Theory: Sexualities, Genders, Politics	
SOCL 7221	Globalization, Development, and Social Justice	
SOCL 7225	Gender and Social Movements	
SOCL 7227	Race and Ethnic Relations	
SOCL 7263	Social Psychology of Stratification	
SOCL 7265	Sociology of Gender	
SOCL 7267	Environment, Health, and Society	
SOCL 7268	Globalization and the City	
SOCL 7270	Sociology of Work and Employment	
SOCL 7273	Gender and Social Policy	
SOCL 7287	Social Movements in Health	
SOCL 7976	Directed Study	
WMNS 6100	Theorizing Gender and Sexuality	
WMNS 7615	Feminist Inquiry	
WMNS 7635	Understanding the Pornographic and the Obscene	

Dissertation

Code	Title	Hours
Exam Preparation		
Students register for this course while writing each their two field statements. Must take twice.		
SOCL 8960	Exam Preparation—Doctoral	
Research		
SOCL 9986	Research	
Dissertation		
Complete the following courses:		
SOCL 9990	Dissertation Term 1	

SOCL 9991	Dissertation Term 2
Dissertation Continuation	
Following completion of two semesters of dissertation, registration in the following class is required in each semester (including the summer if the dissertation is submitted in summer) until the dissertation is completed:	
SOCL 9996	Dissertation Continuation

Program Credit/GPA Requirements

40 total semester hours required
Minimum 3.500 GPA required

Sociology, MA

This degree is only awarded to students who enter the doctoral degree program in sociology without an advanced degree in sociology. Students may qualify to receive an MA degree upon completing the program requirements listed here. Please see the PhD in Sociology (p. 518) for more information about this program. No students will be admitted directly into this program to pursue a master's degree.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

MILESTONES

Annual review

TRACKS

Complete one of the following tracks:

Academic Track

Code	Title	Hours
Foundations		
A grade of B or higher is required in each foundations course:		
SOCL 7200	Foundations of Social Theory 1	4
SOCL 7201	Foundations of Social Theory 2	4
Research Methods		
INSH 6300	Research Methods in the Social Sciences	4
Statistical Methods		
INSH 6500	Statistical Analysis	4
Electives		
Complete 14 semester hours from the following:		14
SOCL 5000–7990		

Applied Track

Code	Title	Hours
Foundations		
A grade of B or higher is required:		
SOCL 7200	Foundations of Social Theory 1	4
Research Methods		
INSH 6300	Research Methods in the Social Sciences	4
Statistical Methods		
INSH 6500	Statistical Analysis	4
Advanced Methods		
Complete one of the following:		4
CRIM 7713	Advanced Research and Evaluation Methods	
CRIM 7715	Multivariate Analysis 1	
CRIM 7716	Multivariate Analysis 2	
CRIM 7718	Advanced Data Analysis	
INSH 6302	Qualitative Methods	
INSH 7400	Quantitative Analysis	
INSH 7600	Advanced Methodological and Quantitative Techniques	
PHTH 6320	Qualitative Methods in Health and Illness	
PPUA 5262	Big Data for Cities	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
PPUA 6509	Techniques of Program Evaluation	
Electives		
Complete 14 semester hours from the following:		14
SOCL 5000–7990		

Program Credit/GPA Requirements

30 total semester hours required
Minimum 3.00 GPA required

Interdisciplinary

Doctor of Philosophy (PhD)

- Network Science (p. 135)

Master of Science (MS)

- Applied Quantitative Methods and Social Analysis

Graduate Certificate

- Computational Social Science (p. 525)
- Data Analytics (p. 124)
- Information Ethics (p. 526)
- Women's, Gender, and Sexuality Studies (p. 526)

Network Science, PhD

Website (http://www.networkscienceinstitute.org)

The PhD program in network science aims to enhance our understanding of networks arising from the interplay of human behavior, sociotechnical infrastructures, information diffusion, and biological agents. This is an intrinsically multidisciplinary activity, with members of the network science community representing a wide range of fields including computer science, information science, complexity, physics, sociology, communication, organizational behavior, political science, and epidemiology. This is an interdisciplinary doctoral program focused on training students in network science across several colleges—including the College of Social Sciences and Humanities, the College of Science, the Khoury College of Computer Sciences, and Bouvé College of Health Sciences—with several research areas, including computational sciences, information sciences, health and life sciences, social sciences, and theoretical physics. See other collaborating colleges' catalog sections for possible elective courses.

Coursework is dependent on a student's area of research and subject to prior approval by their faculty advisor. Required coursework includes 20

semester hours of core courses in network science, plus an additional 20 semester hours of courses relevant to the students' area of research. A minimum of 40 credit hours of coursework is required, though the graduate program committee may recommend additional coursework based on student research interests.

Satisfactory progress in the program will be ongoing and formally evaluated at the end of both the first and second years of the program. Students are expected to maintain a cumulative GPA of 3.000 or better in all coursework. Students are not allowed to retake courses. A student who does not maintain the 3.000 GPA, or is not making satisfactory progress on their dissertation research, may be recommended for termination by the graduate program committee.

Each student will have one primary research advisor from the network science doctoral program faculty.

Students will be expected to select their research advisor by the end of the spring semester of their second year in the program.

The dissertation committee consists of at least four members: the dissertation advisor, one additional network science doctoral program faculty member, one member expert in the specific topic of research (can be from outside the university), and one additional tenured/tenure-track faculty member from the concentration department/conferring college. The dissertation advisor must be a full-time tenured or tenure-track member of the Northeastern University faculty. Students may repeat the comprehensive examination once if they are unsuccessful.

Degree Candidacy

A student is considered a PhD candidate upon completion of all required coursework with a minimum cumulative GPA of 3.000, satisfactory completion of the qualification exam, and satisfactory completion of the comprehensive exam.

Qualifying Examination

The qualification exam will be an oral examination of the material during the students' coursework. The exam will be an hour in length and consist of questions selected by network science faculty who comprise the qualifying examination and dissertation committee. Students will receive 50 to 80 potential questions, which they must be prepared to answer, one month before the exam. The exam will consist of a subset of these questions. The qualifying exam will be offered twice annually, in the fall and spring term. All students are required to initially sit for the exam in the fall, typically in their third year of the PhD program. Students who do not pass the qualifying exam on their first attempt are expected to retake the exam in the spring term. Students may sit for the qualifying exam no more than twice.

Students who fail to complete the qualifying examination but who have completed all the PhD program's required coursework with a cumulative GPA of 3.000 or better will be awarded a terminal Master of Science in Network Science degree. Note that no students will be admitted directly into the network science program for receipt of a master's degree.

Comprehensive Examination

Students must submit a written dissertation proposal to the Dissertation Committee. The proposal (with the aid and approval of their dissertation advisor) will outline a plan to carry out new and original research. The proposal should identify relevant literature, the research problem, the research plan, and the potential impact on the field. An oral presentation of the proposal will be made in an open forum before a public audience and the Dissertation Committee, followed by questions from non-committee members. The written proposal must be given to committee member at least two weeks prior to the oral presentation. After the presentation,the student will meet with the dissertation committee to address any concerns raised in either the written proposal or the presentation.The Comprehensive Exam must precede the final dissertation defense by at least one year.

Dissertation Defense

A PhD student must complete and defend a dissertation that involves original research in network science. The dissertation defense must adhere to Northeastern University academic policies.

Students who do not qualify for the doctoral degree, but who have completed required coursework with a cumulative GPA of 3.000 or better, may be eligible to receive a terminal MS Network Science (p. 523)*degree. Note that no students will be admitted directly into the Network Science program to pursue a master's degree.*

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review
Qualifying exam
Dissertation committee
Dissertation proposal
Dissertation defense

Core Requirements

Code	Title	Hours
PHYS 5116	Complex Networks and Applications	4
NETS 6116	Complex Networks and Applications 2	4
PHYS 7332	Network Science Data 2	4
or NETS 7332	Machine Learning with Graphs	
POLS 7334	Social Networks (NETS)	4
PHYS 7335	Dynamical Processes in Complex Networks	4

Specializations

Choose one of the following specializations or 20 semester hours of elective coursework from the electives course list:

- Computer Science (p.)
- Social Science (p.)
- Epidemiology (p. 136)
- Physics/Theory (p. 137)
- Math (p. 137)
- Coursework (p.)

COMPUTER SCIENCE

Code	Title	Hours
CS 5800	Algorithms	4
CS 6140	Machine Learning	4
or CS 6220	Data Mining Techniques	
Complete 12 semester hours of elective courses from the elective list below. Students who wish to take courses outside of the electives list below must do so in consultation with their adviser.		12

SOCIAL SCIENCE

Code	Title	Hours
NETS 7350	Bayesian and Network Statistics	4
NETS 7360	Research Design for Social Networks	4
Complete 12 semester hours of elective courses from the elective list below. Students who wish to take courses outside of the electives list below must do so in consultation with their adviser.		12

EPIDEMIOLOGY

Code	Title	Hours
PHTH 5202	Introduction to Epidemiology	3
PHTH 6202	Intermediate Epidemiology	3
Complete 14 semester hours of elective courses from the elective list below. Students who wish to take courses outside of the electives list below must do so in consultation with their adviser.		14

PHYSICS/THEORY

Code	Title	Hours
MATH 7233	Graph Theory	4
PHYS 7337	Statistical Physics of Complex Networks	4
Complete 12 semester hours of elective courses from the elective list below. Students who wish to take courses outside of the electives list below must do so in consultation with their adviser.		12

MATH

Code	Title	Hours
CS 5800	Algorithms	4
MATH 7233	Graph Theory	4
Complete 12 semester hours of elective courses from the elective list below. Students who wish to take courses outside of the electives list below must do so in consultation with their adviser.		12

COURSEWORK

Code	Title	Hours
Complete 20 semester hours of elective courses from the elective list below. Students who wish to take courses outside of the electives list below must do so in consultation with their adviser.		20

ELECTIVES LIST

Common electives include the following:

Code	Title	Hours
CS 5800	Algorithms	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	
CS 6220	Data Mining Techniques	
CS 7180	Special Topics in Artificial Intelligence	
CS 7260	Visualization for Network Science	
CS 7295	Special Topics in Data Visualization	
NETS 7341	Network Economics	
NETS 7350	Bayesian and Network Statistics	
NETS 7976	Directed Study	
NETS 7983	Topics	
MATH 7233	Graph Theory	
MATH 7243	Machine Learning and Statistical Learning Theory	
PHYS 7305	Statistical Physics	
PHYS 7321	Computational Physics	
PHYS 7337	Statistical Physics of Complex Networks	

Dissertation

Code	Title	Hours
NETS 9990	Dissertation Term 1	
NETS 9991	Dissertation Term 2	

Program Credit/GPA Requirements

40 total semester hours required
Minimum 3.000 GPA required

Plan of Study

Year 1

Fall	Hours	Spring	Hours
PHYS 5116	4	PHYS 7332	4
PHYS 7331 or INSH 5301 (If required, may be substituted with an elective)	4	NETS 6116	4
		POLS 7334	4
	8		12

Year 2

Fall	Hours	Spring	Hours
PHYS 7335	4	Two Elective Courses	8
Two Elective Courses	8		
	12		8

Year 3

Fall	Hours	Spring	Hours
NETS 9990	0	NETS 9991	0
	0		0

Year 4

Fall	Hours
NETS 9996	0
	0

Total Hours: 40

Network Science, MS

Please see PhD (p. 135)*Network Science* for further information about this program. Note that no students will be admitted directly into this program to pursue a master's degree.

Program Requirements

Core Requirements

Code	Title	Hours
A grade of B or higher is required in each foundational course:		
NETS 6116	Complex Networks and Applications 2	4
PHYS 5116	Complex Networks and Applications	4
PHYS 7332	Network Science Data 2	4

PHYS 7335	Dynamical Processes in Complex Networks	4
POLS 7334	Social Networks	4

Electives

See PhD (p. 135)*Network Science* for common elective options.

Code	Title	Hours
20 SH of elective coursework required.		20

Program Credit/GPA Requirements

40 total semester hours required

Minimum 3.000 GPA required (change is applicable)

Applied Quantitative Methods and Social Analysis, MS

The Master of Science in Applied Quantitative Methods and Social Analysis is an interdisciplinary, flexible, and innovative degree that focuses on quantitative research methods for social analysis strategies and techniques. The program integrates the interdisciplinary perspectives and methodological and analytical tools across the College of Social Sciences and Humanities. The program seeks to educate ambitious social scientists and analysts primed to deploy computational tools for social analysis and tackle social science questions of equity, hierarchy, social organization, and social systems. The 21st-century economy will increasingly demand a workforce capable of collecting, processing, analyzing, and interpreting large-scale data on human attributes, personal preferences, social attributes, and political behavior. In response, this program provides students with rigorous training in quantitative research and social science methods to address important questions of social inquiry. Emphasizing public dissemination of findings, the program prepares students to inform policymakers, decision makers in the private and public sectors, and the broader community. These skills prepare graduates to pursue analytical or research careers in corporations, nonprofits, and public services or to continue their education.

Students in this degree program will have the opportunity to gain advanced training in statistical analysis and research methodology aligned to key areas of strength in CSSH, including data analytics in the social sciences, computational social science, network analysis in the social sciences, statistical methods in the social sciences, information ethics for social analysis, geospatial analysis, and the digital humanities. Students will also have the opportunity to stack a range of graduate certificate programs into the master's degree.

The program will take advantage of various co-op opportunities—positions such as policy analysts, network scientists, econometricians, and crime analysts—that provide students a professional environment to integrate quantitative skills and social analysis. The learning opportunities in professional settings (private sector, government, or nonprofit sector) reinforce the development of advanced quantitative skills and their applied nature to contemporary social issues. Ultimately, the Master of Science in Applied Quantitative Methods and Social Analysis will position students to enter the labor force with the competitive advantage of these experiences and skills.

CSSH Graduate Programs General Regulations (p. 473)

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Core Requirements		
INSH 6300	Research Methods in the Social Sciences	4
INSH 6500	Statistical Analysis	4

Required Concentration

Complete one of the following concentrations:

- Data Analytics in the Social Sciences
- Computational Social Science
- Network Analysis in the Social Sciences
- Statistical Methods in the Social Sciences
- Information Ethics for Social Analysis

DATA ANALYTICS IN THE SOCIAL SCIENCES

Code	Title	Hours
Concentration Requirements		
INSH 5301	Introduction to Computational Statistics	4
INSH 5302	Information Design and Visual Analytics	4
DA 5020	Collecting, Storing, and Retrieving Data	4
or DA 5030	Introduction to Data Mining/Machine Learning	

COMPUTATIONAL SOCIAL SCIENCE

Code	Title	Hours
Concentration Requirements		
INSH 5302	Information Design and Visual Analytics	4
or INSH 5304	Social Network Analysis	
or POLS 7334	Social Networks	
or PPUA 5262	Big Data for Cities	
or PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
INSH 5303	Machine Learning in the Social Sciences	4
or DA 5030	Introduction to Data Mining/Machine Learning	
INSH 6406	Analyzing Complex Digitized Data	4
or INSH 5301	Introduction to Computational Statistics	

NETWORK ANALYSIS IN THE SOCIAL SCIENCES

Code	Title	Hours
Concentration Requirements		
INSH 5301	Introduction to Computational Statistics	4
INSH 5302	Information Design and Visual Analytics	4
INSH 5304	Social Network Analysis	4
or POLS 7334	Social Networks	

STATISTICAL METHODS IN THE SOCIAL SCIENCES

Code	Title	Hours
Concentration Requirements		
INSH 5301	Introduction to Computational Statistics	4

INSH 7400	Quantitative Analysis	4
INSH 7500	Advanced Quantitative Analysis	4

INFORMATION ETHICS FOR SOCIAL ANALYSIS

Code	Title	Hours
Concentration Requirements		
PHIL 5001	Global Justice	4
or PHIL 5002	Ethics and Public Policy	
or PHIL 5010	AI Ethics	
PHIL 5005	Information Ethics	4
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	4

ELECTIVES

Electives are selected in consultation with the program director. Concentration courses may not be double counted as elective courses.

Code	Title	Hours
Complete 12 semester hours from the following:		12
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
DA 5020	Collecting, Storing, and Retrieving Data	
DA 5030	Introduction to Data Mining/Machine Learning	
ECON 5105	Math and Statistics for Economists	
ECON 5140	Applied Econometrics	
HIST 7370	Texts, Maps, and Networks: Readings and Methods for Digital History	
INSH 5301	Introduction to Computational Statistics	
INSH 5302	Information Design and Visual Analytics	
INSH 5303	Machine Learning in the Social Sciences	
INSH 5304	Social Network Analysis	
or POLS 7334	Social Networks	
INSH 6302	Qualitative Methods	
INSH 6406	Analyzing Complex Digitized Data	
INSH 7400	Quantitative Analysis	
INSH 7500	Advanced Quantitative Analysis	
PHIL 5001	Global Justice	
PHIL 5002	Ethics and Public Policy	
PHIL 5005	Information Ethics	
PHIL 5010	AI Ethics	
PHYS 5116	Complex Networks and Applications	
PPUA 5260	Ecological Economics	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5262	Big Data for Cities	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6509	Techniques of Program Evaluation	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	

Optional Co-op Experience

Code	Title	Hours
Requires two consecutive semesters of Co-op Work Experience and Experiential Integration.		2
INSH 6864	Experiential Integration	
INSH 6964	Co-op Work Experience	

Program Credit/GPA Requirements

32 total semester hours required (34 with optional co-op)
Minimum 3.000 GPA required

Computational Social Science, Graduate Certificate

The certificate highlights how big data, computational analysis, and related techniques can be used to shed light on theoretical and policy questions in the fields of public policy, public health, sociology, criminal justice, political science, economics, computer science, and network science. The certificate will contribute to students' understanding of:

- How to collect, analyze, and interpret insights culled from applying computational analyses to big data in social science domains
- The ways in which computational analysis can be used to develop policy and evaluate policy outcomes and results

The field is new and developing rapidly, and employers are eager to hire students trained in this area—both because computational social science is at the cutting edge of interdisciplinary work and because it offers new opportunities for research and analysis. This certificate leverages the real-world relevance of big data, source data, machine learning, and predictive analytics, which are dominant aspects of the contemporary workplace landscape. The certificate is available on the Boston campus and online modalities.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
INSH 5301	Introduction to Computational Statistics	4
or INSH 6406	Analyzing Complex Digitized Data	
INSH 5303	Machine Learning in the Social Sciences	4
or DA 5030	Introduction to Data Mining/Machine Learning	

Elective

Code	Title	Hours
Complete 4 SH from the following:		4
INSH 5302	Information Design and Visual Analytics	
POLS 7334	Social Networks	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
PPUA 5262	Big Data for Cities	

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

Data Analytics, Graduate Certificate

The interdisciplinary Graduate Certificate in Data Analytics is offered through a collaboration between the Khoury College of Computer Sciences and the College of Social Sciences and Humanities. The certificate curriculum emphasizes the skills needed to bridge between emerging technological capacities and traditional policymaking processes. The program is designed to provide students with foundational knowledge in data science—including data management, machine learning, data mining, statistics, and visualizing and communicating data—that can be applied to data-driven decision making in any discipline.

For more information on the certificate, refer to the program's website (https://www.northeastern.edu/graduate/program/graduate-certificate-in-data-analytics-boston-14423/).

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
DA 5020	Collecting, Storing, and Retrieving Data	4
DA 5030	Introduction to Data Mining/Machine Learning	4
INSH 5301	Introduction to Computational Statistics	4
INSH 5302	Information Design and Visual Analytics	4

Program Credit/GPA Requirements

16 total semester hours required
Minimum 3.000 GPA required

Information Ethics, Graduate Certificate

The Graduate Certificate in Information Ethics is intended to help students build a working knowledge of the primary theories, frameworks, concepts, and issues in information ethics, as well as to help students develop robust skills in ethical analysis and evaluation.

Students who complete the certificate will be able to conduct comprehensive ethics and value analysis and assessment of emerging issues and problems related to such things as data collection, management, and use; design and implementation of artificial intelligence and machine learning; development and deployment of autonomous systems; and online, networked, and digital experiences and systems.

The certificate is open to students in any graduate program at Northeastern.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicted.

Note: At least two of the three courses taken to fulfill the certificate requirements must be PHIL courses.

Core Requirements

Code	Title	Hours
Complete two of the following:		8
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
PHIL 5005	Information Ethics	
PHIL 5010	AI Ethics	

Elective

Code	Title	Hours
Complete one of the following. The elective course must be different than the core courses:		4
PHIL 5001	Global Justice	
PHIL 5002	Ethics and Public Policy	
PHIL 5005	Information Ethics	
PHIL 5010	AI Ethics	

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

Women's, Gender, and Sexuality Studies, Graduate Certificate

Website (https://www.northeastern.edu/cssh/wgss/graduate/certificate/)

The Graduate Certificate in Women's, Gender, and Sexuality Studies (WGSS) is designed for students currently enrolled in a Northeastern University **master's or doctoral** program. The certificate aims to provide enhanced competency by:

- Analyzing contemporary feminist theoretical frameworks, methodologies, issues, and topics and their relation to established disciplines
- Focusing on the intersection of gender with sexuality, race, class, and other vectors of power and identity
- Broadening and enriching analytical skills in one or more disciplines while drawing on the interdisciplinary perspectives of WGSS
- Challenging the traditional separation of academic theory from political and professional practice

Prospective certificate students are advised initially to consult with the WGSS program director and the adviser in their home department to develop a plan for completing the certificate.

In addition to the College of Social Sciences and Humanities certificate, there is a specialized pathway for students enrolled in the Master's of Public Health program (p. 288). These students are able to apply theories, concepts, and methods gained from the WGSS certificate to urban health issues. Students will work closely with advisors in their home school and in WGSS to select a course of study to complete the certificate, including incorporating gender and sexuality studies into their MPH coursework as final projects/papers and naming a WGSS faculty member to their capstone committee (if using the capstone as an elective for the certificate). *Note:* Students pursuing the BS/MPH accelerated program and WGSS certificate should wait until they have *matriculated* into the MPH program to declare the certificate and to begin coursework toward the WGSS certificate.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Foundational Requirement

Code	Title	Hours
All students, regardless of disciplinary background, must complete one of the following:		4
WMNS 6100	Theorizing Gender and Sexuality	
WMNS 7100	Queer Theory: Sexualities, Genders, Politics	
or SOCL 7100	Queer Theory: Sexualities, Genders, Politics	
WMNS 7615	Feminist Inquiry	

General Option

Code	Title	Hours
Electives		
Complete two courses according to the instructions from the Elective List (below the MPH Option). At least one should come from outside the student's home department.		8

MPH Option

Code	Title	Hours
MPH students should plan to take one foundational required course from the list above and to focus final projects in core MPH courses on gender/sexuality in public health.		
Electives		
Complete eight semester hours according to the instructions from the Elective List. One course may be the capstone, if the topic selected focuses on gender and/or sexuality in connection to the selected urban health issue and the student enrolls in a 1-semester-hour directed study with the WGSS faculty member who will sit on the capstone committee.		8

Elective List

Code	Title	Hours
At least one course must come from outside the student's home discipline. Any foundational course not taken to complete the required foundational coursework may be taken as an elective but may not count as both the foundational requirement and an elective. Electives outside this list, particularly special topics courses not listed here, may be chosen in consultation with program director. Students may also consider courses at the Graduate Consortium for Studies of Gender, Culture, Women, and Sexuality (located at MIT). MPH students, in conversation with their advisors, may substitute PHTH 6910 for one elective.		
ECON 5292	Gender and Development Economics	
HIST 5240	Feminist Resistance	
SOCL 5240	Feminist Resistance	
SOCL 7225	Gender and Social Movements	
SOCL 7265	Sociology of Gender	
SOCL 7273	Gender and Social Policy	
SOCL 7287	Social Movements in Health	
SOCL 7100	Queer Theory: Sexualities, Genders, Politics	
WMNS 5240	Feminist Resistance	
WMNS 6100	Theorizing Gender and Sexuality (if not taken as core course)	
WMNS 7100	Queer Theory: Sexualities, Genders, Politics (if not taken as core course)	
WMNS 7615	Feminist Inquiry (if not taken as core course)	
WMNS 7635	Understanding the Pornographic and the Obscene	
WMNS 7900	Special Topics in Women's, Gender, and Sexuality Studies	
WMNS 7976	Directed Study	
PHTH 6910	Public Health Capstone (with 1-SH directed study)	

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

Gordon Institute of Engineering Leadership

Website (http://www.northeastern.edu/gordonleadership/)

Simon Pitts
Director and Head—Gordon Institute of Engineering Leadership

415 Stearns Center
617.373.4800
617.373.7680 (fax)

The Gordon Engineering Leadership Program (GEL) offered by the Gordon Institute of Engineering Leadership is a transformational graduate program designed to build a future corps of engineering leadership professionals. GEL seeks to accelerate leadership development capability in an engineering context through a concentrated curriculum that inculcates both the psychological skills and capabilities needed to lead engineers in parallel with technical skills to successfully engineer products to customers and markets. The program teaches relevant leadership theory followed by practice in leadership laboratories. Technical product development and scientific principles courses are followed by the completion of a market-worthy challenge project. This learning framework is supplemented with three-way mentoring from industry, faculty, and program mentors. Graduates of the program, known as Gordon Fellows, have an opportunity to gain the knowledge, skills, and attitudes required to successfully lead engineering teams. They stand out from their peers in their ability to invent, innovate, and implement engineering projects from concept to market success. Participation in GEL accelerates Gordon Fellows' careers, making them more valuable to their company.

The Challenge

When relatively unseasoned engineers run teams or projects, most fail to satisfy all of the project's critical requirements—missing the mark in functionality, performance, quality, time-to-market, cost, or other key objectives.

This shortfall exists because engineers enter the workforce without critical skills related to:

- Competitiveness
- Taking responsibility to prevent failure
- Market and customer focus
- Influencing and motivating skills

- Interdisciplinary decision making and teamwork capability
- Simultaneous optimization of all elements of performance, quality, cost, and timing
- Front-loading the engineering process
- Financial acumen
- Big-picture engineering
- Leadership abilities and organizational social awareness
- Enterprise understanding
- Program management tools and processes
- Designing to avoid failure modes
- Designing for lean manufacture

The Mission

GEL's mission is to create an elite cadre of engineering leaders who stand out from their peers in their ability to invent, innovate, and implement engineering projects from concept to market success.

These leaders will demonstrate an exceptional ability to lead engineering teams by providing purpose, direction, and motivation to influence others to achieve their collective goals.

The Method

To close the gaps and realize its mission, GEL concentrates on the knowledge, skills, and abilities that reside at the intersection of engineering and leadership.

At the end of the program, Gordon Fellows emerge with the awareness, confidence, vision, and technical dexterity to drive positive change within their organizations and society.

Admissions

GEL candidates must apply for and be admitted to both the Northeastern Graduate School of Engineering and the Gordon Engineering Leadership Program.

Students pursue GEL as part of a Master of Science degree in the engineering discipline of their choice or as a stand-alone graduate certificate. Upon completion of a Master of Science degree, students earn both the Master of Science degree in the discipline of choice and a Graduate Certificate in Engineering Leadership. Students who already hold a graduate degree in engineering or have greater than three years of engineering work experience can complete the program to earn a Graduate Certificate in Engineering Leadership. The core GEL curriculum takes place during one calendar year (September–July), and additional coursework required for the Master of Science degree can be pursued before, after, or in parallel with GEL.

Programs

Graduate Certificate

- Engineering Leadership (p. 245)
- Technology Leadership (p. 529)

Engineering Leadership, Graduate Certificate

The Gordon Engineering Leadership Program is a transformational, technical, and challenging graduate-level learning experience targeted for engineering professionals.

The Gordon Institute offers a **Graduate Certificate in Engineering Leadership** as formal recognition of midlevel engineers' leadership acumen and broadened cross-functional capabilities.

Pursuing the graduate certificate allows participants to:

- Take part in a hands-on curriculum taught by industry-experienced professors
- Work with peers from across engineering fields on leadership skills development
- Receive one-on-one mentoring from industry experts and faculty

The Gordon Engineering Leadership Program anchors around an intense, market-worthy challenge project based on your organization's strategic needs. This is a unique opportunity to apply your classroom experience in a professional setting, potentially further accelerating your career.

How to Earn a Graduate Certificate in Engineering Leadership

If you already have a Master of Science, then you can complete the one-year program to earn a Graduate Certificate in Engineering Leadership.

If you do not have a Master of Science, then you can still be considered for the Graduate Certificate in Engineering Leadership if you have at least three years of engineering work experience.

Additional Information can be found on the Gordon Engineering Leadership Program website. (http://www.northeastern.edu/gordonleadership/)

Beyond a Graduate Certificate

Most candidates pursue the Gordon Engineering Leadership Program as part of a Master of Science degree in the engineering discipline of their choice. Upon completion, they earn both the Master of Science degree and a Graduate Certificate in Engineering Leadership.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
ENLR 5121	Engineering Leadership 1	2
ENLR 5122	Engineering Leadership 2	2
ENLR 5131	Scientific Foundations of Engineering 1	2
ENLR 5132	Scientific Foundations of Engineering 2	2
ENLR 7440	Engineering Leadership Challenge Project 1	4
ENLR 7442	Engineering Leadership Challenge Project 2	4

Students can enroll in the Engineering Leadership Graduate Certificate while pursuing the following degrees:

- MSBioE Bioengineering (http://www.northeastern.edu/gordonleadership/degree/ms-in-bioengineering/)
- MS Biotechnology (http://www.northeastern.edu/gordonleadership/degree/ms-in-biotechnology/)
- MSChE Chemical Engineering (http://www.northeastern.edu/gordonleadership/degree/chemical-engineering/)
- MSCivE Civil Engineering (select concentration) (https://provost.northeastern.edu/gordon/certificate-and-degree-options/college-of-engineering/ms-in-civil-engineering/)
- MSCSE Computer Systems Engineering (https://provost.northeastern.edu/gordon/certificate-and-degree-options/college-of-engineering/ms-in-computer-systems-engineering/)

- MS Cybersecurity (https://provost.northeastern.edu/gordon/certificate-and-degree-options/khoury-college-of-computer-sciences/ms-in-information-assurance-and-cyber-security/)
- MS Data Analytics Engineering (https://provost.northeastern.edu/gordon/certificate-and-degree-options/college-of-engineering/ms-in-data-analytics-engineering/)
- MSECE Electrical and Computer Engineering (select concentration) (https://provost.northeastern.edu/gordon/certificate-and-degree-options/college-of-engineering/ms-in-electrical-and-computer-engineering/)
- MSECEL Electrical and Computer Engineering Leadership (https://provost.northeastern.edu/gordon/certificate-and-degree-options/college-of-engineering/ms-in-electrical-and-computer-engineering-leadership/)
- MSENE Energy Systems (https://provost.northeastern.edu/gordon/certificate-and-degree-options/college-of-engineering/ms-in-energy-systems/)
- MSEM Engineering Management (https://provost.northeastern.edu/gordon/certificate-and-degree-options/college-of-engineering/ms-in-engineering-management/)
- MS Engineering and Public Policy (select concentration) (https://provost.northeastern.edu/gordon/certificate-and-degree-options/college-of-engineering/ms-in-engineering-and-public-policy/)
- MSEnvE Environmental Engineering (http://www.northeastern.edu/gordonleadership/degree/ms-in-environmental-engineering/)
- MSIE Industrial Engineering (https://provost.northeastern.edu/gordon/certificate-and-degree-options/college-of-engineering/ms-in-industrial-engineering/)
- MSIS Information Systems (http://www.northeastern.edu/gordonleadership/degree/ms-in-information-systems/)
- MSME Mechanical Engineering (select concentration) (https://provost.northeastern.edu/gordon/certificate-and-degree-options/college-of-engineering/ms-in-mechanical-engineering/)
- MSOR Operations Research (https://provost.northeastern.edu/gordon/certificate-and-degree-options/college-of-engineering/ms-in-operations-research/)
- MSSBS Sustainable Building Systems (http://www.northeastern.edu/gordonleadership/degree/ms-in-sustainable-building-systems/)
- MS Telecommunication Networks (http://www.northeastern.edu/gordonleadership/degree/ms-in-telecommunication-networks/)

Program Credit/GPA Requirements

16 total semester hours required
Minimum 3.000 GPA required

Technology Leadership, Graduate Certificate

The Graduate Certificate in Technology Leadership offered by the Gordon Institute of Engineering Leadership (GIEL) is a transformational graduate program designed to build a future corps of technology leadership professionals. GIEL seeks to accelerate leadership development capability in a technical context through a concentrated curriculum that inculcates both the psychological skills and capabilities needed to lead in parallel with technical skills to successfully release products to customers and markets. The program teaches relevant leadership theory followed by practice in leadership laboratories. Technical product development and scientific principles courses are followed by the completion of a market-worthy challenge project. This learning framework is supplemented with three-way mentoring from industry, faculty, and program mentors. Graduates of the program, known as Gordon Fellows, have an opportunity to gain the knowledge, skills, and attitudes required to successfully lead technical teams. They stand out from their peers in their ability to invent, innovate, and implement technology projects from concept to market success. Participation in GIEL accelerates Gordon Fellows' careers, making them more valuable to their company.

The Challenge

When relatively unseasoned professionals run teams or projects, most fail to satisfy all of the project's critical requirements—missing the mark in functionality, performance, quality, time-to-market, cost, or other key objectives.

This shortfall exists because professionals enter the workforce without critical skills related to:

- Competitiveness
- Taking responsibility to prevent failure
- Market and customer focus
- Influencing and motivating skills
- Interdisciplinary decision making and teamwork capability
- Simultaneous optimization of all elements of performance, quality, cost, and timing
- Front-loading the technology delivery process
- Financial acumen
- Big-picture engineering
- Leadership abilities and organizational social awareness
- Enterprise understanding
- Program management tools and processes
- Designing to avoid failure modes
- Designing for lean manufacture

The Mission

GIEL's mission is to create an elite cadre of technology leaders who stand out from their peers in their ability to invent, innovate, and implement technical projects from concept to market success.

These leaders will demonstrate an exceptional ability to lead teams by providing purpose, direction, and motivation to influence others to achieve their collective goals.

The Method

To close the gaps and realize its mission, GIEL concentrates on the knowledge, skills, and abilities that reside at the intersection of technology and leadership.

At the end of the program, Gordon Fellows emerge with the awareness, confidence, vision, and technical dexterity to drive positive change within their organizations and society.

Admissions

Candidates must apply for and be admitted to both a master's degree program at Northeastern and the Graduate Certificate in Technology Leadership.

Students pursue the Graduate Certificate in Technology Leadership as part of a master's degree or as a stand-alone graduate certificate. Upon completion of a Master of Science degree, students earn both the Master of Science degree in the discipline of choice and a Graduate Certificate in Technology Leadership. Students who already hold a graduate degree or have greater than three years' industry work experience can complete the program to earn a stand-alone Graduate Certificate in Technology Leadership. The core GIEL curriculum takes place during one calendar year (September–July), and additional coursework required for the Master of Science degree can be pursued before, after, or in parallel with GIEL.

For more information contact Amy Manley, Director of Admissions and Marketing, (617) 373-4800 or a.manley@northeastern.edu.

Program Requirements

Code	Title	Hours
TELR 5121	Technology Leadership 1	2
TELR 5122	Technology Leadership 2	2
TELR 5131	Scientific Foundations of Technology 1	2
TELR 5132	Scientific Foundations of Technology 2	2
TELR 7440	Technology Leadership Challenge Project 1	4
TELR 7442	Technology Leadership Challenge Project 2	4

[1] The Scientific Foundations of Technology 1 (TELR 5131) and Scientific Foundations of Technology 2 (TELR 5132) requirements may be met by completion of Special Problems in Technology Leadership (TELR 7400) upon approval of program director.

Program Credit/GPA Requirements

16 total semester hours required
Minimum 3.000 GPA required

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Yang Zhang
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Yue May Zhang
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Qianqian Zhang-Wu
Teaching Professor, English; Boston College, PhD

Qing Zhao
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Kuncheng Zheng
Assistant Professor, Finance; University of Michigan, PhD

Yi Zheng
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Lin Zhou
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Ting Zhou
Associate Professor, Mathematics; University of Washington, PhD

Xiaomu Zhou
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Ronald Zullo
Senior Lecturer, Accounting; Bentley University, MS

Günther K. H. Zupanc
Professor, Biology; University of California, San Diego, PhD; University of Tübingen (Germany), Dr. rer. nat. habil.

Alexander Zvonok
Research Assistant Professor, Center for Drug Discovery; Belarusian State University (Belarus), PhD

Nikolai Zvonok
Research Assistant Professor, Center for Drug Discovery; Russian Academy of Sciences (Russia), PhD

Appendix

University Leadership

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Elizabeth Hudson, BA, MA, PhD, *Dean of the College of Arts, Media and Design*
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Statements of Accreditation and State Authorization

Accreditation

Northeastern University has maintained its status as a member in good standing of the New England Commission of Higher Education, Inc. (NECHE), previously New England Association of Schools and Colleges (NEASC), since it was awarded its initial accreditation in 1940. The university was last reviewed by NECHE in 2018 and will be reviewed again in fall 2028.

Northeastern University possesses degree-granting authority in Massachusetts, under the auspices of the Massachusetts Board of Higher Education.

Bouvé College of Health Sciences

Program	Accrediting Agency
BS Health Science	Council on Education for Public Health (CEPH)
MPH Public Health	Council on Education for Public Health (CEPH)
BSN Nursing	Commission on Collegiate Nursing Education (CCNE) and Massachusetts Board of Registration in Nursing[2]
BSN Nursing, Accelerated Program for Second-Degree Students[2]	Commission on Collegiate Nursing Education (CCNE) and Massachusetts Board of Registration in Nursing[2]
BSN Nursing, Accelerated Program for Second-Degree Students[3]	Commission on Collegiate Nursing Education (CCNE) and North Carolina Board of Nursing[3]
MS Nursing	Commission on Collegiate Nursing Education (CCNE)
MS Nursing Anesthesia	Council on Accreditation of Nurse Anesthesia Educational Programs (COA); Commission on Collegiate Nursing Education (CCNE)
DNP Nursing Practice with Concentration in Nurse Anesthesia	Council on Accreditation of Nurse Anesthesia Educational Programs (COA); Commission on Collegiate Nursing Education (CCNE)
DNP Nursing Practice (Post-Master's)	Commission on Collegiate Nursing Education (CCNE)

MS Physician Assistant Studies	Accreditation Review Commission on Education for the Physician Assistant, Inc. (ARC-PA)
DPT Physical Therapy	Commission on Accreditation in Physical Therapy Education (CAPTE)
MS Speech-Language Pathology	Council on Academic Accreditation in Audiology and Speech-Language Pathology (CAA) of the American Speech-Language-Hearing Association (ASHA), Massachusetts Board of Elementary and Secondary Education[1]
MS/CAGS School Psychology	Massachusetts Department of Education (DOE) and National Association of School Psychologists (NASP)
PhD Counseling Psychology	American Psychological Association (APA)
PhD School Psychology	American Psychological Association (APA) and National Association of School Psychologists (NASP)
PharmD Pharmacy	Accreditation Council for Pharmacy Education (ACPE)

[1] The Massachusetts Board of Education approves (not accredits) programs.

[2] The Massachusetts Board of Registration in Nursing approves (not accredits) programs.

[3] The North Carolina Board of Nursing approves (not accredits) programs.

College of Arts, Media and Design

Program	Accrediting Agency
Master of Architecture	National Architectural Accreditation Board (NAAB)

D'Amore-McKim School of Business

Program	Accrediting Agency
All programs offered in 2021–22	AACSB International—The Association to Advance Collegiate Schools of Business

College of Engineering

Program	Accrediting Agency
BSCmpE Computer Engineering	Accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org
BSChE Chemical Engineering	Accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org
BSCE Civil Engineering	Accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org
BSEE Electrical Engineering	Accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org
BSIE Industrial Engineering	Accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org
BSME Mechanical Engineering	Accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org

College of Science

Program	Accrediting Agency
BS Biochemistry	American Society for Biochemistry and Molecular Biology (ASBMB)

College of Professional Studies

Program	Accrediting Agency
BS Finance and Accounting Management[1]	AACSB International—The Association to Advance Collegiate Schools of Business
BS Management[1]	AACSB International—The Association to Advance Collegiate Schools of Business
BSET Computer Engineering Technology	Accredited by the Technology Accreditation Commission of ABET, 111 Market Place Suite 1050 Baltimore, MD 21202-4012 Telephone: 410.347.7700
BSET Electrical Engineering Technology	Accredited by the Technology Accreditation Commission of ABET, 111 Market Place Suite 1050 Baltimore, MD 21202-4012 Telephone: 410.347.7700
BSET Mechanical Engineering Technology	Accredited by the Technology Accreditation Commission of ABET, 111 Market Place Suite 1050 Baltimore, MD 21202-4012 Telephone: 410.347.7700
MS Organizational Leadership (with concentration in Project Management)	Project Management Institute's Global Accreditation Center
Education Programs in:	
Elementary Education, 1–6	Massachusetts Department of Elementary and Secondary Education
Sheltered English Immersion Administrator—Endorsement	Massachusetts Department of Elementary and Secondary Education
Sheltered English Immersion Teacher—Endorsement	Massachusetts Department of Elementary and Secondary Education
Teacher of Biology, 8–12	Massachusetts Department of Elementary and Secondary Education
Teacher of Chemistry, 8–12	Massachusetts Department of Elementary and Secondary Education
Teacher of Earth and Space Science, 8–12	Massachusetts Department of Elementary and Secondary Education
Teacher of English, 5–12	Massachusetts Department of Elementary and Secondary Education

Teacher of English as a Second Language (ESL), PreK–6, 5–12	Massachusetts Department of Elementary and Secondary Education
Teacher of History, 5–12	Massachusetts Department of Elementary and Secondary Education
Teacher of Mathematics, 8–12	Massachusetts Department of Elementary and Secondary Education
Teacher of Physics, 8–12	Massachusetts Department of Elementary and Secondary Education
Teacher of Political Science/Political Philosophy, 8–12	Massachusetts Department of Elementary and Secondary Education
Teacher of Social Science, 5–12	Massachusetts Department of Elementary and Secondary Education
Teacher of Students with Moderate Disabilities, PreK–8, 5–12	Massachusetts Department of Elementary and Secondary Education

[1] Accredited under the aegis of the "sponsoring" full-time college.

College of Social Sciences and Humanities

Program	Accrediting Agency
BS American Sign Language—English Interpreting	Commission on Collegiate Interpreter Education
MPA Public Administration	Network of Schools of Public Policy, Affairs, and Administration

School of Law

Program	Accrediting Agency
JD Law	American Bar Association; Association of American Law Schools[1]

[1] The Association of American Law Schools is an elected membership organization, not an accrediting body.

State Approvals, Authorizations, and Exemptions

Some states require that universities authorized to operate in their state make public disclosures. Please visit State Authorization Statements and Complaint Resolution (https://www.northeastern.edu/graduate/state-authorization-statements-and-complaint-resolution/) for up-to-date, state-prescribed regulatory information applicable to all degree levels.

Major CIP Codes

The following is a list of Northeastern University majors for programs accepting new students during the 2021-2022 catalog year, along with each major's corresponding CIP code. "CIP" refers to the Classification of Instructional Programs published by the U.S. Department of Education's National Center for Education Statistics (https://nces.ed.gov/ipeds/cipcode/Default.aspx?y=56).

General Information

The *Northeastern University Catalog* contains the university's primary statements about approved academic programs and degree requirements, as authorized by the president or the Board of Trustees.

The *Northeastern University Catalog* contains current information about the university calendar, admissions, degree requirements, fees, and regulations; however, such information is not intended and should not be regarded to be contractual. Course information was current as of June 9, 2021. For updated course information, students and advisors should consult the Banner course catalog (https://nubanner.neu.edu/StudentRegistrationSsb/ssb/term/termSelection/?mode=courseSearch).

ACCREDITATION

Northeastern University is accredited by the New England Commission of Higher Education, Inc.

DELIVERY OF SERVICES

Northeastern University assumes no liability for delay or failure to provide educational or other services or facilities due to causes beyond its reasonable control. Causes include, without limitation, power failure, fire, strikes by university employees or others, damage by natural elements, and acts of public authorities. The university will, however, exert reasonable efforts, when it judges them to be appropriate, to provide comparable services, facilities, or performance; but its inability or failure to do so shall not subject the university to liability.

Northeastern University reserves the sole right to promulgate and change rules and regulations and to make changes of any nature in its program; calendar; admissions policies, procedures, and standards; degree requirements; fees; and academic schedule whenever necessary or desirable, including, without limitation, changes in course content and class schedule, the cancellation of scheduled classes and other academic activities, and the substitution of alternatives for scheduled classes and other academic activities. In any such case, the university will give whatever notice is reasonably practical.

Northeastern University will endeavor to make available to its students a fine education and a stimulating and congenial environment. However, the quality and rate of progress of an individual's academic career and professional advancement upon completion of a degree or program are largely dependent on his or her own abilities, commitment, and effort. In many professions and occupations, there are also requirements imposed by federal and state statutes and regulatory agencies for certification or entry into a particular field. These requirements may change while a student is enrolled in a program and may vary from state to state or country to country. Although the university stands ready to help its students find out about requirements and changes in them, it is the student's responsibility to initiate the inquiry.

FAMILY EDUCATIONAL RIGHTS AND PRIVACY ACT

In accordance with the Family Educational Rights and Privacy Act of 1974, Northeastern University permits its students to inspect their records wherever appropriate and to challenge specific parts of them when they feel it is necessary to do so. Specific details of the law as it applies to Northeastern are discussed in this section of the catalog (p. 27).

PERSISTENCE RATES UNDER THE STUDENT RIGHT-TO-KNOW ACT

In the fall of 2020, the persistence rate for undergraduate students who entered in the fall 2019 cohort was 96.8 percent.

TUITION DEFAULT POLICY

In cases where the student defaults on his or her tuition, the student shall be liable for the outstanding tuition and all reasonable associated collection costs incurred by the university, including attorneys' fees.

NONDISCRIMINATION POLICIES

Northeastern University is committed to providing a living, learning, and working environment free from discrimination and harassment and does not discriminate on the basis of race, color, religion, genetic information, sex, gender, gender identity, sexual orientation, age, national origin, ancestry, disability, or veteran status in admission to, access to, treatment in, or employment in its programs and activities. The university will not tolerate any conduct that violates rights guaranteed by law, or any of the university policies that prohibit discrimination, including the Policy on Equal Opportunity (https://www.northeastern.edu/policies/pdfs/Policy_on_Equal_Opportunity.pdf), Policy Prohibiting Sexual and Gender-Based Harassment (https://www.northeastern.edu/policies/pdfs/Policy_Prohibiting_Sexual_and_Gender-Based_Harassment.pdf), Policy on Rights and Responsibilities Under Title IX (https://www.northeastern.edu/policies/pdfs/Policy_on_Rights_and_Responsibilities_Under_Title_IX.pdf), and the Policy on Non-Fraternization (https://www.northeastern.edu/policies/pdfs/Policy_on_Non-Fraternization.pdf). Furthermore, university policy also includes prohibitions of retaliation for filing complaints of discrimination with the Office for University Equity and Compliance (OUEC). Links to the university's nondiscrimination policies and its grievance procedures are available at the OUEC (https://www.northeastern.edu/ouec/). Inquiries regarding the university's nondiscrimination policies may be directed to:

Office for University Equity and Compliance (https://www.northeastern.edu/ouec/)
125 Richards Hall
Northeastern University
Boston, Massachusetts 02115
617.373.4644
ouec@northeastern.edu

The university strongly encourages any person to report information relating to alleged discrimination or harassment to the OUEC (https://www.northeastern.edu/ouec/) by completing the form available at Reporting to OUEC (https://cm.maxient.com/reportingform.php?NortheasternUniv&layout_id=7) or through any of the contact options listed above. OUEC's policies, as well as other helpful information, can be found at the OUEC website (https://www.northeastern.edu/ouec/).

DISABILITY RESOURCE CENTER

The Disability Resource Center provides a variety of disability-related services and accommodations to Northeastern University's students with disabilities.

Northeastern University's compliance with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990 are coordinated by the senior director of the Disability Resource Center. Persons requiring information regarding the Disability Resource Center should contact the center at 617.373.2675 or, if using TTY, via Relay 711.

CLERY ACT

Northeastern is committed to assisting all members of the university community in providing for their own safety and security. Information regarding campus security and personal safety, including topics such as crime prevention, university police law enforcement authority, crime reporting policies, crime statistics for the most recent three-year period, and disciplinary procedures, is available in the Annual Security & Fire Safety Reports, located on the NUPD website (https://nupd.northeastern.edu/annual-reports/).

EMERGENCY INFORMATION

The university is prepared to respond to emergencies and urgent situations that require immediate action with a trained team of police officers, EMTs, health and counseling experts, student affairs and residential life staff, and other professionals from a coordinated group that is able to manage a wide range of potential situations.

In case of emergency or crisis situations that require immediate notification, university officials will deploy the NU ALERT system, which sends email, voicemail, and text messages to students, faculty, and staff. NU ALERT is intended to communicate pertinent information and, when appropriate, provide directions to those in the affected area(s).

A record of past Timely Warnings and NU ALERT Emergency Notifications for our campus community can be found on the NUPD website (https://nupd.northeastern.edu/safety-notifications/).

Examples of crisis situations range from snow storms to national emergencies that have a local impact.

Additional information on the university's emergency information systems can be found on the university's (https://www.northeastern.edu/emergency-information/)*Emergency Information* website.

Resources

Online Resources

The following online resources supplement this catalog:

- Academic Calendars (http://www.northeastern.edu/registrar/calendars.html)
- Campus Maps (http://www.northeastern.edu/campusmap/)
- Class Schedules (https://registrar.northeastern.edu/article/schedule-of-classes/)
- **University Events**

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