Northeastern University

# Graduate Catalog
# 2015–2016

# *The University*

# 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 of all requirements for the program. All descriptions of the program in the university, college, and department publications must conform to this officially approved record. Descriptions of PlusOne programs are also on file in the provost's office.

Standards of admission are specific to certificate and degree programs.

### Admission Requirements

Prior to beginning a graduate program, students must meet one of the following conditions:

- Have received a bachelor's degree or equivalent from an accredited college or university
- Have received a master's degree or equivalent degree from an accredited college or university
- Have received a first professional or equivalent degree from an accredited college or university
- Have been accepted into an approved bachelor's-to-graduate-degree program

### Registration

Northeastern University has a policy of continuous registration while enrolled full-time in a graduate degree program.

All students must register for course work, research, thesis, dissertation, or continuation courses for each semester in order to be in good standing in the program. Registration is continuous with the exception of summer. A student must be registered in summer only if he or she will be graduating in the summer or holds an award that requires registration. Students must be registered during the semester in which they complete all requirements for their degree.

When circumstances warrant, e.g., medical exigency, a student may seek a leave of absence; see page 20 for additional information about leaves of absence.

The university parental leave policy is available in the University Policies section of the Office of the Provost website (www.northeastern.edu/provost/policies/graduate.html).

### Transfer Credit

A maximum of 9 semester hours of credit (or 12 quarter hours) obtained at another institution may be accepted toward the degree, provided the credits consist of work taken at the graduate level for graduate credit, carry grades of 3.000 or better, have been earned at an accredited institution, and have not been used toward any baccalaureate or advanced degree or certificate 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.

Grades earned in transferred credits are not counted as part of the overall grade-point average earned at Northeastern.

Transfer credits will only be accepted at the discretion of the academic department and the college's graduate office.

*Note:* For the College of Professional Studies' (CPS) transfer policy, see page 217.

### Special Student Status

Those students who are not pursuing a specific degree program are classified as special students. Special students must satisfy the requirements for admission and perform at a satisfactory level in course work in order to continue as special students. Performance of a special student in graduate courses should average at least 3.000 in order for the student to be allowed to register for any subsequent classes. The number of credits that may be earned by a student enrolled as a special student is at the discretion of each graduate office. However, only a maximum of 12 graduate semester hours may be applied to a graduate program. Students interested in pursuing a degree program must make a formal application to the degree program. Special students who do not register for four consecutive semesters, excluding summer semester, will be subject to review and possible withdrawal.

Special students are not eligible for Northeastern financial aid awards or federal financial aid.

### Provisional Student Status

Provisional students are students whose academic records do not qualify them for acceptance as regular students. Provisional students must obtain a 3.000 grade-point average in the first 9 semester hours of graduate courses in order to continue in the graduate program or meet specifically delineated departmental requirements to qualify for full acceptance to a degree program. Students may not earn more than 9 semester hours while enrolled in provisional status. After the completion of 9 semester hours, students must either satisfy regular admission standards or be denied further registration in the graduate program.

Provisional students are not eligible for Northeastern financial aid awards or federal financial aid.

International students cannot be admitted provisionally or conditionally.

### 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.

### Inter- and Intracollege Graduate Courses

In colleges that have a graduate school, units within the college that do not offer graduate degree programs may offer a maximum of two courses per year if the courses are approved within a unit or units offering a graduate degree program. These courses will be subject to the same review process as other graduate courses.

### University-Mandated Training

All students must fulfill all university-mandated ethics and safety training.

## REGULATIONS APPLYING ONLY TO DOCTOR OF PHILOSOPHY (PHD) PROGRAMS

### Committee in Charge of the Graduate Student's Degree Program

The committee in charge of the graduate student's degree program is that body charged with overseeing all academic and administrative matters relating to the program. This committee will be a departmental or, in the case of colleges without departments, a college committee.

### PhD Dissertation Committees

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 he or she 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 his or her appointment resides.

If a student's major advisor leaves Northeastern, 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.

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 Associate Dean for Graduate Education.

Each PhD student shall have an annual review of his or her progress toward the degree. A copy of the review shall be submitted to the student.

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 postcandidacy, have completed all course work, and are actively engaged in completing a thesis or dissertation.

## GENERAL REGULATIONS AND REQUIREMENTS FOR NONDEGREE CERTIFICATE PROGRAMS

### Certificates That Appear on the Transcript

#### DEFINITION

A nondegree certificate program is a program of study requiring at least four graduate courses, or 12 semester hours of graduate credit, but no more than 30 semester hours of graduate credit. In CPS the number of credits for a certificate varies from 16 quarter hours to 30 quarter hours. Successful completion of such a certificate program will be recorded on the student's transcript. Appropriate graduate credits taken as part of a nondegree certificate program may be counted toward a regular graduate degree at the discretion of the committee in charge of the graduate 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 at www.northeastern.edu/provost/policies/documents/New_Program_Proposal_Guidelines.pdf.

#### 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 at www.northeastern.edu/provost/policies/documents/Dept_Review_Guidelines.pdf.

#### GENERAL REGULATIONS

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

### Course Programs That Do Not Appear on the Transcript

Colleges offering graduate programs may choose to recognize the completion of sequences of courses requiring fewer courses than a certificate program. No such recognition shall be placed on the student's transcript. Such a nontranscript program shall not involve more than four graduate courses or 12 semester hours of graduate credit. The requirements of any such nontranscript program will be forwarded to the Vice Provost for Graduate Education for record-keeping purposes.

## GENERAL REGULATIONS AND REQUIREMENTS FOR THE MASTER'S DEGREE

### Admission

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.

### Academic Classifications

Those students who have a bachelor's degree from an accredited college or university and satisfy the admissions requirements of the appropriate graduate school are classified as regular students. Domestic students whose records are not of acceptable quality may be accepted as provisional students. International students cannot be accepted provisionally. Provisional students must obtain a 3.000 grade-point average in the first 9 semester hours or otherwise fulfill the delineated departmental requirements to continue in the graduate program; they then become regular students. Any student whose record is not satisfactory may be dropped by action of the committee in charge of the degree program.

### 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 of graduate work beyond the bachelor's degree, except in the College of Professional Studies, in which 45 quarter hours of graduate work are required. There may also be other study required by the graduate school and department or program concerned. Students enrolled in a PlusOne program will be allowed to double-count prescribed graduate courses as part of their undergraduate degree.

Lower-division undergraduate course work will not be accepted to meet the minimum of postbaccalaureate semester or quarter hours required for the master's degree. No more than 4 upper-level undergraduate semester hours can be used to meet the minimum 30 graduate-semester-hour requirement and then only after approval by the local unit and the Associate Dean for Graduate Education.

### Language Requirement

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

### Comprehensive Examination

At the discretion of the committee in charge of the degree program, final written or oral comprehensive examination(s) may be required. Such examinations will be given at least two weeks before the Commencement at which the degree is to be awarded.

### 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 in sufficient time to allow for acceptance before the Commencement clearance deadline. Information on archiving a thesis with ProQuest is available in the program-relevant graduate office.

### Time Limitation

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.

## 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.

### Admission

An applicant for the Certificate of Advanced Graduate Study 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 school. 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.

### Academic Classifications and Degree Candidacy

Students admitted to a Certificate of Advanced Graduate Study program will be designated as candidates for the Certificate of Advanced Graduate Study.

### 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.

### Time Limitation

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.

## GENERAL REGULATIONS AND REQUIREMENTS FOR THE RESEARCH DOCTORATE (PHD AND EDD)

The formal requirements for the PhD degree are the following: completion of the course work mandated by the individual degree program, fulfillment of the residency requirement, formal training in the Responsible Conduct of Research (ori.hhs.gov/documents/rcrintro.pdf) for students as appropriate, a comprehensive examination or equivalent if required by the degree program, continuous registration, a final examination conducted by the student's PhD committee, and submission of a dissertation to the relevant graduate office and to ProQuest for archiving. The dissertation must be based on original and independent research.

### Admission

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

#### DOCTORAL STUDENT

Students in this classification have been admitted to a doctoral program.

#### 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 or a proposal defense.

### Residence

Every degree program shall have a policy defining residency for candidates for doctoral degrees. The committee in charge of the degree program defines residency and specifies the method by which any residence requirement is satisfied.

### Course Requirements

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

### Language Requirements

The committee in charge of the degree program establishes the nature of the language requirement, if any.

### Responsible Conduct of Research

By the end of their third year, all doctoral students for whom the Responsible Conduct of Research training is required must have completed this training. Training sessions are highly recommended for all doctoral students. The Office of the Vice Provost for Research is responsible for ensuring that appropriate training is available for doctoral students.

### 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 should be made aware of the department regulations concerning such examinations.

### Comprehensive Examination(s)

Degree programs may require a comprehensive examination as the final step before becoming a PhD candidate. The purpose of this 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 PhD program faculty will determine the process by which comprehensive examination committees are established.

### 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. This work should give evidence of the candidate's ability to carry out independent investigation and to interpret in a logical manner the results of the research. The committee in charge of the degree program establishes the method of approval of the dissertation.

Candidates for the degree of Doctor of Education must complete a dissertation that embodies the results of extended, creative, and independent research and proper evaluation and interpretation of the results. The committee in charge of the degree program establishes the method of approval of the dissertation.

### Final Oral Examination and Submission of Dissertation

The final oral examination will be carried out after the completion of all other requirements of the degree. The final oral examination will be on the subject matter of the doctoral dissertation and significant

developments in the field of the dissertation. Other fields may be included if recommended by the examining committee.

Students must have completed all degree conferral requirements (including having successfully defended their thesis and having submitted their approved thesis as required by the department and to ProQuest) by the last day of the final exam period in order to be graduated in that semester. Graduate students must be continuously enrolled through the end of the term in which they have successfully completed all degree conferral requirements.

### Time Limitation

After the establishing of degree candidacy, a maximum of five years will be allowed for the completion of the degree requirements. Under extenuating circumstances, a student may request an extension of this time frame.

## GENERAL REGULATIONS AND REQUIREMENTS FOR INTERDISCIPLINARY GRADUATE DEGREES

Northeastern University offers individually designed and ongoing 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. There are also ongoing programs for students who wish to pursue graduate studies in areas in which two or more units have jointly established a graduate program. As with individually designed programs, ongoing programs correspond in scope and depth to Northeastern's established degree standards but do not agree exactly with the regulations of individual units.

The general regulations and requirements for graduate programs (above) apply to interdisciplinary programs. Additional regulations and requirements are stated below.

### Admission

#### UNIVERSITY-APPROVED INTERDISCIPLINARY PROGRAMS

Ongoing 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 above. All administrative details, including but not limited to admission, probation notification, and graduation clearance, shall be carried out by the registration unit. 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 registration unit for the interdisciplinary program.

Successful application for admission to an individually designed interdisciplinary program consists of a carefully thought-out, 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 terminally prepared faculty member at Northeastern University. In the case of an interdisciplinary PhD proposal, this faculty member must meet the qualifications defined above. At least two units must be participating 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 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 registration 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. In the case of an interdisciplinary PhD program, this faculty member must meet the qualifications defined above. This faculty member may or may not be a member of the registration 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 registration unit on an annual basis.

# Information for Entering Students

## INFORMATION FOR NEW GRADUATE STUDENTS

Welcome to graduate studies at Northeastern University. Get to know Northeastern University through the eyes of some of our graduate students, alumni, and faculty by looking at the resources at www.northeastern.edu/graduate/prospective-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 more than 165 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.

## LIVING IN BOSTON

Boston is an exciting city that is the perfect place for students. For links to Boston landmarks, cultural institutions, news sources, city guides, and off-campus apartment listings, visit www.northeastern.edu/graduatestudentlife.

### Off Campus Student Services

226 Curry Student Center
617.373.8480
offcampus@neu.edu
www.northeastern.edu/offcampus

Off Campus Student Services provides a wide range of information, resources, and educational workshops for students who are interested in living off campus or who already live off campus.

Off Campus Student Services provides assistance in searching for off-campus housing, finding roommates, and learning more about the communities surrounding Northeastern University. Our website offers a host of resources including an apartment search database, information on transportation, and City of Boston tenant services, as well as contact information for area real estate professionals.

Off Campus Student Services publishes a monthly 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@neu.edu or stop into the office Monday through Friday.

For more information, visit the Off Campus Student Services website at www.northeastern.edu/offcampus.

## INFORMATION FOR INTERNATIONAL STUDENTS

### International Student and Scholar Institute

405 Ell Hall
617.373.2310
617.373.8788 (fax)
www.northeastern.edu/issi

The International Student and Scholar Institute (ISSI) offers a vast array of programs and services to more than 8,500 international students and scholars who represent approximately 130 nations.

The ISSI also works to promote meaningful interaction and intercultural understanding among citizens of other countries and their peers from the United States, providing educational and cultural enrichment opportunities for all members of Northeastern and the community at large.

The ISSI oversees the Student and Exchange Visitor Information System (SEVIS) at Northeastern, as mandated by the U.S. federal government, in order to ensure compliance with regulations and procedures affecting those international students and scholars in specified nonimmigrant visa classifications.

Affiliation with the ISSI begins with admission to the academic program and continues through such initiatives as the ISSI's cultural festival in February, "ISSI Carnevale," which celebrates the cultural diversity of the entire university community. For a list of ISSI services and programs, visit the website.

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 authorized by the ISSI. Note that timely registration for courses is especially important so that they may remain in compliance with current federal regulations. They should consult with the ISSI if they have questions about their individual status.

### Coming to Boston

Preparing to travel to Boston and begin your studies at Northeastern University is exciting, and you have many things to do in preparation for both. When you plan carefully, your travels and arrival in Boston should go smoothly. Here are some of the key things you should do to prepare.

- **Obtain your F-1 or J-1 visa** from the U.S. embassy or consulate in your 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 nonimmigrant visa classification. Some international students must apply and be approved for a change of status (e.g., from F-2 to F-1) before beginning the program at Northeastern. For detailed information/instructions specific to your current nonimmigrant status, as well as eligibility to participate in co-op or other forms of experiential learning required by your academic program, contact the ISSI at www.northeastern.edu/issi/visaprocess.html.
- **Mandatory 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. (CPS graduate students—7 credits, part-time graduate students—6 credits).
- **Health report:** Prior to entering Northeastern, all enrolled students must complete and submit a health report to University Health and Counseling Services. 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 www.northeastern.edu/uhcs to access the health report online.

## Planning Information

As a new international student you are expected to arrive by the start date of your program stated on the I-20 issued by Northeastern or on the DS-2019 issued by Northeastern or by your sponsoring agency/government.

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

All international students will need to attend the scheduled international student orientation program and complete the international student online check-in process. For further details on the ISSI international student orientation and online check-in process, and for other information pertinent to international students, check www.northeastern.edu/issi.

## International Student Orientation

At the beginning of each semester the ISSI organizes sessions, events, and activities designed to ensure you have completed all U.S. documentation requirements and to provide you with information and support to ease your transition to life in the United States and at Northeastern University. During these sessions, you will also have the opportunity to meet other international students, learn from shared experiences, and find any assistance you may need.

Orientation week is very important. Make sure you are following all the instructions provided by your academic department and the ISSI about the program, and attend as many scheduled events as you can to ensure a smooth transition during your first few weeks on campus.

For a schedule of required sessions and other events, see the ISSI website: www.northeastern.edu/issi/schedule.html.

If you are a U.S. citizen living abroad, you are not required to complete ISSI's activities and sessions. You are more than welcome, however, to attend other sessions and events planned by the ISSI during orientation. Visit the orientation schedule to see a full listing of other sessions and events: www.northeastern.edu/issi/schedule.html.

## Participate in Cultural Events

We are proud to offer cultural events throughout the academic year to the Northeastern community. For more information and to register, check the schedule of events on the ISSI website.

## SEVIS Compliance

The ISSI is required to comply with immigration regulations governing your student status and must submit information every semester as required by the Department of Homeland Security.

## The ISSI: Your Resource for SEVIS Advice and Assistance

The ISSI advises students on the complexities of immigration compliance and interfaces with various U.S. government agencies. The ISSI 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. Consult the ISSI whenever you have a question relating to your nonimmigrant student status or any aspect of SEVIS compliance.

## ACADEMIC RESOURCES

### Libraries

*Northeastern University Libraries*
617.373.8778
www.library.northeastern.edu

Snell Library is the university's primary research library, with collections and services supporting research and teaching across disciplines. Holdings are extensive, with a large proportion available digitally. Collections include more than 800,000 print volumes, more than 500,000 e-books, 70,000 serial subscriptions, 74,000 licensed e-journals, and more than 6,300 feet of archival and manuscript collections. Additionally, Northeastern University Libraries is a selective federal depository, maintaining a collection of materials (mostly online) published and distributed by the federal government.

Snell Library is also the primary study environment on campus, open 24/7 to the whole university community, year-round. Spaces include group, quiet, and silent work areas, with more than thirty 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 with a full suite of fabrication technologies and professional-level audio and video recording studios.

Services provided by Snell Library include both on-site and distance reference, 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. Digital scholarship project support and tools are also available through an institutional repository and data management services. The library also teaches workshops on digital media tools and resources and instructional sessions about library research for students and faculty.

A free, university-operated shuttle service provides students with a safe ride home (within a mile radius of campus) from Snell Library every 20 minutes from 7:00 p.m. to 6:00 a.m.

The School of Law Library, located on five 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. Access to print and electronic materials is provided through Scholar OneSearch, the university's online library catalog. More information can be found at 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@neu.edu
www.northeastern.edu/registrar

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 myNEU Web Portal (www.myneu.neu.edu) and public campus computers to provide students convenient access to information and services, including class schedules and registration, most recent grades, and unofficial transcripts. Additional information is available at www.northeastern.edu/registrar.

## INFORMATION TECHNOLOGY SERVICES

### Information Technology Services

617.373.4357 (xHELP)
help@neu.edu
www.northeastern.edu/its

Information Technology Services (ITS) is the centralized technology resource for students, faculty and staff. ITS provides secure, high-speed Internet access through the on-campus networks NUnet and ResNet; wireless Internet connectivity through NUwave; centralized computer labs—the InfoCommons and the Digital Media Commons (DMC)—with the latest software; on-site and remote printing; access to the Blackboard learning management system; a vast array of software applications for Windows and Mac; access to myNEU, Northeastern's online portal; on-site and online training on popular software; and high-performance research computing.

### ITS Service Desk

Help and Information Desk, Snell Library
617.373.4357 xHELP
help@neu.edu

The ITS Service Desk provides phone-based and walk-up technology support services to students, faculty, and staff. The ITS Service Desk staff also offers support for ITS-managed printers

and answers general computing questions. Contact the ITS Service Desk for the following services:

- Troubleshooting Northeastern University–provided accounts and applications, including email
- Investigating wired and wireless network connection problems
- Troubleshooting network printer problems
- Assisting students with myNEU and Blackboard questions
- Support with ITS-managed labs
- Access to equipment available for loan including AV equipment, and laptop adapters.

The ITS Service Desk is located at the Help and Information Desk on the first floor of Snell Library near the InfoCommons and provides assistance on computer-related issues to students, faculty, and staff with a valid Northeastern ID.

## myNEU

myneu.neu.edu

myNEU—the online portal for the Northeastern community—is a central resource for students, faculty, and staff. Your myNEU username and password provide access to key university platforms, from the myNEU portal to other university systems, including wireless network access, printing, and email.

The myNEU portal offers services tailored to your role at Northeastern for all academic, personal, and recreational needs. Resources available for students include links to student email, information channels, financial aid, Blackboard and online course registration. NU Alert, our real-time university emergency notification system, utilizes the contact information provided within myNEU. It is your responsibility to maintain accurate personal and emergency contact information.

## ResNet and the ResNet Resource Center

Speare Commons
617.373.HELP (x4357)
resnet@neu.edu
www.northeastern.edu/resnet

ResNet—a service of Information Technology Services and Housing Services—provides Internet access to all students living in Northeastern residence halls. The ResNet Resource Center, located in Speare Commons, provides students with support for the HuskyCable TV service, mobile devices, gaming systems and other devices, student email, computer troubleshooting, and repair services for Apple and Dell computers.

## Printing

The Northeastern Printing Program provides a limited amount of free printing each year to students, faculty and staff. Each September, as an active member of the community, you are given a credit of $120 on your Husky Card to use at your discretion at any of the ITS-managed printers located across campus. Print credits do not carry over from one academic year to the next.

Print jobs can be directly sent to the appropriate printer queue from any ITS computer labs or from your own computer by using the Virtual Print Client software to remotely print. When you locate a printer associated with the appropriate printing queue, simply swipe your Husky Card, select your print job and it will print.

## Appropriate Use Policy

The information systems of Northeastern University are intended for the use of authorized members of the community in the conduct of their academic and administrative work. The Appropriate Use Policy (AUP) describes the terms and conditions of Northeastern information systems use. For more information, visit the Appropriate Use Policy page at www.northeastern.edu/aup.

## Training Services

Snell Library
617.373.5858
training@neu.edu

Information Technology Services training provides the following instructor-led and Web-based courses to all members of the Northeastern community:

- **Web-based training.** ITS training offers computer training over the Internet, including Mac tutorials, MS Office tutorials, some application-specific training provided by the application vendors, and via Lynda.com, which offers 24/7 access to an extraordinary breadth of training modules. Web-based training is an innovative, self-paced learning method that allows students, faculty, and staff to train anytime or anywhere, using a computer with an Internet connection.
- **Instructor-led training** includes classes such as Public Speaking for Presentations, Advanced Excel, SharePoint, Adobe Photoshop, and Blackboard. These workshops are available at no charge to the entire university community.

To register for a class, visit the training section of the ITS website.

## Academic Technology Services (ATS)

212 Snell Library
www.ats.neu.edu
ats@neu.edu

For graduate students performing teaching assistant/graduate assistant work, Academic Technology Services (ATS) is a resource for choosing and implementing technological solutions for a wide range of classroom goals. Whether creating online classes or incorporating flipped classroom techniques into on-ground classes, ATS offers consultation and support for implementation. Additionally, ATS manages the Discovery Lab, located on the first floor of Snell Library, which is a space for showcasing ideas and innovations at Northeastern. The Discovery Lab is an area to host both events and exhibitions.

## CAMPUS RESOURCES

### Career Services

103 Stearns Center
617.373.2430
617.373.4231 (fax)
careerservices@neu.edu
www.northeastern.edu/careerservices

Career Services provides resources, guidance, and opportunities that help students and alumni with the following:

- Choose a major and explore career options that fit their unique attributes
- Make career decisions that will engage them 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

Northeastern's Career Services does not guarantee employment nor do student referrals to prospective employers regarding job openings.

### Campus Recreation

*Marino Recreation Center*
617.373.4433
www.campusrec.neu.edu

Exercise your body, mind, and spirit. The campus recreation program provides many outlets to help clear your mind and recharge your spirit. Our fitness facilities, unique among Boston area colleges and universities, are open year-round. All programs were designed with you in mind; so whether you enjoy group fitness classes, ice hockey or street hockey, basketball, weight training, or swimming, campus recreation has something for everyone.

Full-time Northeastern students in good standing who are enrolled in classes and/or co-op, or scheduled for vacation but have paid the campus recreation fee, have access to the Marino Recreation Center, Cabot Center, and the Badger and Rosen SquashBusters Center. Part-time students in good standing have access during any academic quarter in which they are enrolled and attending classes, as long as they have requested and paid the campus recreation fee. Help us maintain a safe and secure environment. Your Northeastern photo ID card—which must be a current, valid, and active card—must be swiped upon arrival in order to enter all facilities.

### Northeastern University Bookstore

*Main Campus*
Curry Student Center, ground floor
617.373.2286
www.northeastern.bncollege.com

The bookstore operates during the entire academic year, but days and hours may vary in accordance with the university's calendar.

Purchases can be made by cash, check, American Express, MasterCard, VISA, Discover, or Husky Card.

### Disability Resource Center

20 Dodge Hall
617.373.2675
617.373.7800 (fax)
617.373.2730 (TTY)
www.northeastern.edu/drc

The Disability Resource Center (DRC) strives to create an environment in which all are empowered to make their unique contributions to the rich academic and social life of Northeastern. Its staff takes a creative approach to assisting students who have disabilities or who are Deaf or hard of hearing by providing services that will enable them to succeed.

In accordance with federal laws and guidelines, services cannot be provided unless acceptable documentation is submitted to the DRC. Students must provide recent diagnostic documentation indicating that the disability substantially limits one or more major life activities. They must also register with the DRC and meet with a counselor.

Students who are disabled, Deaf, or hard of hearing are strongly encouraged to contact the DRC upon their acceptance to Northeastern. It is also most beneficial to schedule a meeting with a DRC counselor at least three months prior to arriving on campus in order to register and request services. Early contact with the center will allow enough time to assemble the required diagnostic documentation, register at the DRC, and set up services.

Services are individually tailored on a case-by-case basis to meet each student's needs. Support services are available for, but are not limited to, students with a documented diagnosis of learning disabilities, blindness or visual disabilities, mobility disabilities, deafness or hard of hearing disability, head injuries, psychiatric disorders, degenerative or chronic conditions, HIV-positive status or AIDS, and temporary disabilities.

The center's services include examination modification and accommodation; disability-related academic advising and course modification; note-taking services; readers and scribes; sign-language interpreters and transliterators; computer-aided, real-time information about classrooms' accessibility; advising and referral services; campus orientations; acquisition of assistive listening devices, Braille materials, taped textbooks, and raised-line drawings; and assistive technology, such as the Reading Edge machine. The center also provides liaison, advocacy, and training services for faculty, staff, and administration and coordinates special-interest groups.

DRC does not provide personal care assistance (PCA) services; the center will provide referral to local PCA service agencies, such as the Boston Center for Independent Living, www.bostoncil.org.

Northeastern does not offer transportation services; however, public transportation in greater Boston is run by the Massachusetts Bay Transportation Authority (MBTA), which offers a curb-to-curb transportation service known as The Ride for persons with disabilities. Several stops on the Orange Line branch of the MBTA subway system are very convenient to the Northeastern campus. See www.mbta.com for more information.

## Center for Advancing Teaching and Learning Through Research

215 Snell Library
617.373.3157
617.373.7779 (fax)
learningresearch@neu.edu
www.northeastern.edu/learningresearch

The Center for Advancing Teaching and Learning Through Research supports graduate students at Northeastern University in their roles as teaching assistants, instructors, and future faculty. We provide a range of opportunities for graduate students to develop their teaching practices in ways that enhance student learning and that are grounded in the learning sciences research. The center offers:

- Workshops in which graduate students explore specific topics in teaching and learning.
- Classroom observations and student-based focus groups in which graduate students receive and reflect on feedback on their teaching.
- One-on-one consultations in which graduate students can discuss any aspect of teaching and learning, such as writing a teaching statement and designing teaching materials and activities.

All of the center's services are provided on a formative and confidential basis. While we work with and provide feedback to graduate students as they design teaching materials and reflect on their own practices, we do not evaluate graduate students. Furthermore, we do not provide any information about feedback and consultation services, or even that such a service was provided, without the express consent of the graduate student who has used these services.

## Graduate Student Government

236 Curry Student Center
617.373.4502
GSG@neu.edu
www.northeastern.edu/gsg

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 are eligible to be part of the GSG Senate. Representatives from the eight graduate and professional schools 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.

## University Health and Counseling Services

Forsyth Building, Suite 135
617.373.2772
UHCS@neu.edu
www.northeastern.edu/uhcs

The University Health and Counseling Services team is eager to serve you. We hope that you will use our center as a resource to help stay healthy, physically and mentally, and for care when you are ill or injured, depressed or stressed.

## Husky Card Services

4 Speare Commons
617.373.8740
HuskyCard@neu.edu

Husky Card Services prints Husky Cards, the official identification card of Northeastern University. The Husky Card is used for many purposes, including access to locations, parking, laundry, printing, vending machines, dining services, off- and on-campus vendors, and library book checkout.

Students who are registered for courses on the Boston campus of Northeastern University can come to the Husky Card Services office to obtain their card. A government-issued photo ID must be presented when receiving your Husky Card.

Students who have registered for courses at the Charlotte and Seattle campuses may contact their campus to obtain a Husky Card.

Students who are registered in online courses only are eligible to have their Husky Cards mailed to them. If you are an online student and would like a Husky Card mailed to you, send an email to HuskyCard@neu.edu with your name, Northeastern University ID number, address, and college/degree. Once we have this information, we will open the photo upload option through your myNEU account, which will allow you to upload a photo. Once your photo is submitted, it will take up to **two**

**weeks** for the photo to be approved and the Husky Card to be mailed to you. Allow more time for international mail.

## Parking

Student Financial Services
354 Richards Hall
617.373.7010
www.northeastern.edu/parking

Parking spaces in the university lots and garages are filled on a first-come, first-served basis. To park in a university lot or garage, students must have a valid parking permit displayed on their vehicles. A parking permit does not guarantee a parking space.

New students may purchase a day-parking permit. Only eligible students will receive a permit. To be eligible, students must be registered for a class or on co-op. The cost of the permit will be charged to the student's tuition account.

Overnight parking permits are limited.

To apply for a parking permit, visit the self-service tab on myNEU and select "Apply for Parking."

To park in a handicap space, individuals must purchase a parking decal and display a state-issued handicap license plate, placard, or hangtag. Handicap parking spaces are located throughout campus.

Operators of vehicles driven or parked on university property are responsible for knowing and complying with university driving and parking regulations.

Refer to the parking website for more information.

## Public Safety

*Public Safety Division Administrative Offices*
100 Columbus Place
617.373.2696
www.northeastern.edu/publicsafety

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

*Personal Safety Escort Service*
617.373.2121
www.northeastern.edu/publicsafety/services/escort.html

The Public Safety Division's mission is to provide a comprehensive program of police, security, fire safety, and emergency medical services to help ensure the campus remains a safe and pleasant place to live, work, and learn.

The University Police Department is the largest and most visible unit of the division and consists of professionally trained officers charged with the protection of life and property and the prevention and detection of crime on campus. University police officers have the same authority as municipal police officers and enforce both the Massachusetts laws and university regulations. Regulations mandate that students show their university ID cards whenever requested to do so by any university police officer. For more information, visit www.northeastern.edu/publicsafety.

The Public Safety Division takes pride in its comprehensive plan to minimize crime and protect the safety of the Northeastern community. But the division needs students' help and urges students to take responsibility for creating and maintaining a safe and secure environment. For tips on safety around campus and in the neighborhood, pick up a brochure or visit the website.

Fire egress drills are held each semester in all residence halls to familiarize residents and staff with the alarm system and the evacuation routes. Special fire safety and evacuation training is provided for students, faculty, researchers, and staff in high-risk laboratories. All building occupants are required to participate when an egress drill is held. For tips on fire safety, pick up a brochure or visit the website.

The Personal Safety Escort Service provides a door-to-door escort from one on-campus location to another whenever personal safety is a concern. After receiving your call, the university police dispatcher will assign an officer or cooperative education cadet within ten to fifteen minutes (if necessary, the dispatcher will advise you of any expected delays).

A special, nighttime off-campus escort service runs from dusk to dawn to transport students who reside within approximately one mile of the campus from the campus to their residence after dark. The only destination this service will take you to is your residence. A van stops at Snell Library and the Ruggles Public Safety Substation on the hour from 7:00 p.m. to 6:00 a.m. to pick up students.

If you are sexually assaulted, either by a stranger or an acquaintance, get to a safe place, then telephone the university police and a friend or family member. A university police officer who is a state-certified sexual assault investigator will meet with you and address your physical and emotional needs, as well as inform you of your rights and options regarding filing charges against the perpetrator. The police will provide you with important information about on-campus as well as off-campus counseling services as well as other options regarding changing your residence or class schedule.

If the sexual assault took place off campus, the University Police Department can still provide emergency medical treatment, transportation to a medical facility, and counseling referrals. However, the criminal investigation of such cases is the responsibility of the police department that has jurisdiction in the locale where the assault took place, and university police will assist you with making contact with the appropriate agency.

## John A. and Marcia E. Curry Student Center

434 Curry Student Center
617.373.2642
www.northeastern.edu/curry

This campus "living room" serves as a hub of student activity. It is the crossroads of community life at Northeastern, offering cultural, social, and recreational programs and services.

The center offers ATM machines, an art gallery, the afterHOURS late-night club, food court and cafeteria, game room, lounge space, meeting rooms, Starbucks Coffee, student organization offices, a TV viewing area, and WRBB-FM.

Student center facilities may be reserved by recognized student organizations and university departments. The university reserves the right to limit the use of its facilities when the general public is involved.

## We Care

104 Ell Hall
617.373.4384
we_care@neu.edu
www.northeastern.edu/wecare

We Care is a program that assists students experiencing unexpected challenges maintaining their academic progress. We Care works with the student to coordinate among university offices and to offer appropriate on- and off-campus referrals to support successfully resolving issues.

# College Expenses

## TUITION AND FEES

### Tuition

| Graduate Program | Cost per Credit Hour |
|---|---|
| Applied Behavior Analysis | $ 1,013 |
| Arts, Media and Design | 1,300 |
| Audiology (AuD) (per term) | 11,466 |
| Audiology (AuD) clinical | 8,518 |
| Bouvé College of Health Sciences | 1,335 |
| Business Administration, including online graduate programs | 1,476 |
| College of Professional Studies—Doctorate in Education | 730 |
| College of Professional Studies—Graduate on campus and online (excluding MEd and MAT) | 615 |
| College of Professional Studies—MEd and MAT quarter programs | 505 |
| Computer and Information Science | 1,410 |
| Engineering | 1,422 |
| Executive MBA (full program) | 94,500 |
| Health Informatics | 1,165 |
| Marine Biology | 1,170 |
| MS in Accounting | 1,476 |
| MS/MBA (full program) | 63,236 |
| Nurse Anesthetist clinical (in addition to tuition) | 3,334 |
| Nursing, direct entry (per term) | 15,986 |
| Physical Therapy—postbaccalaureate direct entry (DPT) (per semester) | 15,220 |
| Physical Therapy—postbaccalaureate direct entry (DPT) clinical (per semester) | 10,574 |
| Physician Assistant (per term) | 13,165 |
| RN to BSN online | 735 |
| School of Technological Entrepreneurship | 1,476 |
| Science | 1,325 |
| Social Sciences and Humanities | 1,270 |
| Dissertation (flat rate) | Equivalent to 1.5 times the college per-credit-hour rate listed above |
| Master's or doctoral continuation fee (flat rate) | Equivalent to the college per-credit-hour rate listed above |

### Fees

| Item | Fee |
|---|---|
| Student center fee (per term, Boston campus only) | $ 70 full-time<br>10 part-time |
| College of Professional Studies student center fee (per quarter, Boston campus only) | 8.25 |
| Student recreation fee (per term) | 46 full-time<br>15 part-time |
| College of Professional Studies student recreation fee (per quarter, Boston campus only) | 10 |
| Student activities fee (per year, Boston campus only) | 14 |
| Health and counseling fee | 225 |
| Health plan fee (yearly, optional) | Visit the NUSHP website: www.northeastern.edu/nushp |
| Parking (optional, per semester) | Visit the parking website: www.northeastern.edu/parking/fees |
| International student fee | 250 |

## STUDENT REFUNDS

### Refund Policies

Inquiries about credit balances should be directed to Student Accounts. Refund requests for credit balances are made via the self-service tab on the student's myNEU portal. 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/Alternative Loan and/or payment plan payment(s), we need to have the borrower or bill payer complete the Refund Authorization form prior to releasing the funds requested.

### 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 a notification of withdrawal to the registrar's office.

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 registrar's office. 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

Leaves are granted when a student cannot complete the current academic period for health or personal reasons but is confident that he or she will reenroll; see page 20 for additional information about leaves of absence. Northeastern's medical and emergency leave policy states that all ***tuition*** paid for such periods of leave will be held by the university and applied to future charges. Outstanding balances (including unpaid balances) for the academic semester in which leave is taken are still due the university during that semester. Financial aid recipients should contact the graduate financial aid office to understand the effects on aid received. Medical leave information is available at www.northeastern.edu/uhcs/access/medical_leave.html. Students who take leaves should be aware that more than six months on leave will cause many student loans to go into repayment.

### Disability Resource Center Tuition Adjustments

Students who are registered with Northeastern's Disability Resource Center (DRC) and are approved for reduced course loads may be eligible to petition the center for tuition adjustments directly related to their documented disability. Students who take leaves should be aware that more than six months on leave will cause many student loans to go into repayment. Further information is available from the DRC.

### State-Specific Refund Policies

For refund information for Maryland, Oregon, and Wisconsin residents, visit www.northeastern.edu/financialaid/studentaccounts/MarylandWisconsinRefund.html.

## FINANCIAL AID ASSISTANCE

### Student Financial Services

354 Richards Hall
617.373.5899
617.373. 2897 (College of Professional Studies)
sfs@neu.edu
www.northeastern.edu/financialaid

Northeastern University is eager to assist students in developing a plan for financing a Northeastern education. Through a variety of options—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 Office of Student Financial Services on the Web at www.northeastern.edu/financialaid or call 617.373.5899 for additional information.

### Federal Financial Aid

For many students, financial aid is a major element in making Northeastern University affordable. The Office of Student Financial Services is committed to working with you to identify federal financial aid options that can help make a Northeastern education affordable. To take advantage of federal financial aid programs, students must submit the Free Application for Federal Student Aid (FAFSA) form. Meeting priority filing dates will allow the review of your eligibility for all available financial aid programs. The priority deadline for graduate students is March 1. For information regarding your financial aid application, visit the myNEU Web Portal (www.myneu.neu.edu), click on the self-service tab, and select "My Financial Aid Status."

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

- Be enrolled in at least 6 semester hours per term for federal financial aid, unless you are on a co-op, clinical rotation, or residency or are enrolled in a full-time stand-alone course listed on www.northeastern.edu/registrar/ref-udc-fulltime.pdf
  *Note:* Although some programs may consider students enrolled in 4 credits to have half-time status, in order to qualify for federal financial aid, students must be enrolled in a minimum of 6 credits.
- Be citizens or eligible noncitizens of the United States
- Be matriculated in a degree-granting program
- Have received 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

## How to Apply

File the FAFSA by March 1 in order to be considered for all available federal aid. Northeastern's FAFSA school code is 002199.

You will need your Department of Education PIN to electronically sign your FAFSA online. If you do not have one or have forgotten your PIN, go to PIN.ed.gov to obtain one before starting the FAFSA online.

## 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 who have met the March 1 priority filing deadline are awarded throughout the summer.

## Typical Graduate Financial Aid Award

Students who file FAFSA will be eligible to receive up to $20,500 in a Federal Unsubsidized Stafford Loan, assuming that all eligibility requirements have been met.

For more information about Stafford loans, visit www.northeastern.edu/financialaid/loans/stafford.html.

## 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 www.northeastern.edu/financialaid/grants-scholarships/graduate.html.

## Federal Perkins Loans, 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 serves as the lender, and the loan is made with government funds. Repayment is made to Northeastern. For Perkins and nursing loans, there is a 9-month grace period prior to repayment following graduation, withdrawal, or a drop below half-time status. The grace period is 12 months for Health Professions Student Loans. 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. To be eligible for the Federal Nursing Student Loan, applicants must be enrolled full-time in the School of Nursing in the Bouvé College of Health Sciences.

## 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 Free Application for Federal Student Aid (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 Stafford Loans, the Federal Direct Graduate PLUS Loan requires credit approval by the direct loan servicer. Application requests are submitted to Student Financial Services. Students have up to 25 years to repay the grad PLUS loan. The grad PLUS loan can be consolidated with federal Stafford and Perkins loans upon graduation.

Grad 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 then reenroll above half-time status will need to request their loans be deferred again through their assigned direct loan servicer.

Graduate students with myNEU access can apply for a graduate PLUS loan through the student portal by clicking on the "Federal Graduate PLUS Loan Application" link under the self-service tab. Students that do not have portal access or have trouble applying via the portal should download, print, and complete the paper application that can be found at: www.northeastern.edu/financialaid/loans/plus.html#plusgrad.

## Supplemental Student Loans

There are a number of attractive 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 at www.northeastern.edu/financialaid/loans/supplemental.html. 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, origination, disbursement, or repayment fees and the quality of customer service.

## General Financial Policies and Procedures

### FINANCIAL AID POLICIES

Student Financial Services reserves the right to adjust a student's initial offer of assistance based upon information brought to the office's attention subsequent to extension of the offer, including things such as outside scholarships or revised family financial data.

### APPEAL/CHANGE IN CIRCUMSTANCES

If the student feels that the aid process does not accurately reflect his or her situation, or if family circumstances change during the year, the student should notify his or her graduate student financial services counselor 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 outside sources of financial aid may require that financial aid offered by Northeastern needs to be adjusted.

### REAPPLICATION PROCESS

Students must reapply for financial aid each year by filing the FAFSA. To receive priority consideration for aid, the federal processor must receive the FAFSA by March 1. File the FAFSA online at www.fafsa.ed.gov.

Students should not wait to file an income tax return before completing the FAFSA but use estimated information.

### SATISFACTORY ACADEMIC PROGRESS

To continue receiving financial aid, graduate students need to maintain the academic requirements for satisfactory progress set forth by their college. Refer to www.northeastern.edu/financialaid/policies/sap.html for more information about how satisfactory progress affects financial aid.

### VERIFICATION

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

## BILL PAYMENT

### Student Financial Services

354 Richards Hall
617.373.2270
617.373.8222 (fax)
studentaccounts@neu.edu

Full payment of tuition and other related charges are 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 above phone and email address.

### Payment of Tuition

Full payment of tuition, residence hall fees, and other related charges is due before 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:

- Check or money order, payable to Northeastern University.
- International Funds Transfer (IFT) through Western Union Business Solutions. International students may pay student account balances in the currency of their choice and initiate payments electronically through their bank on myNEU.
- Funds wired directly to the university's bank. Reference: Northeastern University, student's name, and student account number (NUID). If needed, the SWIFT# is BOFAUS3N. Verify with your bank if they assess wire processing fees and adjust your wire payment accordingly.
- Through the monthly payment plan. Call 800.635.0120 or visit www.tuitionpaymentplan.com/enroll.
- Supplemental loans. Review options at www.northeastern.edu/financialaid.

Bills must be paid promptly. 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.

### Discrepancies in Your Bill

Discrepancies in your bill should be addressed in writing to Student Financial Services. Include your name, account number, dollar amount in question, date of invoice, and any other information you believe is relevant. Address correspondence to Student Financial Services, 354 Richards Hall, 360 Huntington Avenue, Boston, MA 02115, or email studentaccounts@neu.edu. If there is a billing problem, pay the undisputed part of the bill to avoid responsibility for any late fees.

## Late Fees

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

In those situations where the tuition is paid directly to the university by a third party, the student must provide Student Accounts with a purchase order or a written statement of intent to pay by the third party. 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. Address correspondence to Student Financial Services/Third Party, 354 Richards Hall, 360 Huntington Avenue, Boston, MA 02115; email thirdparty@neu.edu; or fax 617.373.8222.

## 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.

## Tuition and Fees and Default Policy

Tuition rates, all fees, rules and regulations, and 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 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.

## Mandatory Student Health Plan

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. Under SHIP a part-time student is defined as one who is enrolled in at least 75 percent of the full-time curriculum. (CPS graduate students—7 credits, part-time graduate students—6 credits).

Students who have comparable health plan coverage may waive the Northeastern University Student Health Plan (NUSHP) by completing a waiver on the myNEU Web Portal (www.myneu.neu.edu) by the designated deadline date each academic year. For deadlines and additional information, visit www.northeastern.edu/nushp.

# Academic Policies and Procedures

## 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 International Student and Scholar Institute (ISSI) 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. Find ISSI contact information at www.northeastern.edu/issi.

### 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.

### University Leave of Absence Policies

#### GENERAL POLICY

Students who wish to take a leave of absence are encouraged to apply for the leave by submitting a petition through the myNEU Web Portal (www.myneu.neu.edu) one month prior to the start of the semester during which they plan to take the leave.

The usual limit for a leave of absence is one and one-half academic semesters (a semester plus a half semester). International students must contact the ISSI (www.northeastern.edu/issi) regarding specific leave of absence procedures. A leave of absence, (general, medical, or emergency) if approved, will take into account the following conditions:

- Students who do not return at the end of the leave will be withdrawn and must submit a petition for subsequent readmission to the program.
- Students must return to classes, not cooperative education (co-op).
- Students must be currently enrolled in academic courses or co-op. If a student is withdrawn for any reason, a request for a 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.
- Students in university housing should refer to Residental Life and Housing for policy information.
- Students' enrollment status cannot include more than one academic year of consecutive nonclass enrollments.
- After the eleventh week of the semester, a student may apply for a leave of absence only for medical reasons or due to military deployment.
- Students who take leaves should be aware that more than six months on leave will cause many student loans to go into repayment. Students should see their financial aid counselor for

more information on how their loans may be affected by a leave of absence.

### RETURNING FROM A GENERAL LEAVE OF ABSENCE

Students returning from an approved leave of absence may be required to submit to their college's student services office a notification of intent to return. It should be submitted no later than one month prior to the start of the semester in which they intend to return. Students are required to preregister for courses 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 semester in which they will graduate. International students returning from a leave of absence should contact the ISSI regarding SEVIS procedures three to four months prior to anticipated return time.

### LEAVE OF ABSENCE DUE TO MILITARY DEPLOYMENT

When a student in the Reserves or in the National Guard is called to active duty, the student must notify his or her college dean's office and provide proof of deployment prior to being deployed. The proof may be faxed, mailed, or hand-carried to the college dean's office. It may take the form of general orders cut by the company commander.

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

- Excuse tuition for that term. Any payment made will be credited to the student's account.
- Place a "W" on the student's transcript for each class enrollment.

If a student is called to active duty 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 of a tour of duty, he or she will notify the college dean's office. The college dean's office will assist the student with registration.

### 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 co-op. Medical leave petitions must be initiated at University Health and Counseling Services (UHCS). Students are not allowed to take courses for credit toward their degree at Northeastern while on medical leave of absence. International students must contact the ISSI (www.northeastern.edu/issi) regarding medical leave of absence procedures. Students can petition their college for an exception to take courses elsewhere based on extenuating circumstances.

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 attend classes on the Northeastern campus for the semester they wish to return from medical leave of absence.

More specific information about the medical leave and reentry process, along with the application for leave, can be found at www.northeastern.edu/uhcs/access.

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.

The university's medical leave of absence and emergency leave policy states that all ***tuition*** charged for the term in which the leave has been granted will be held by the university and applied toward future tuition charges in the same academic program. Outstanding balances (including unpaid balances) for the academic term in which the leave is taken are still due the university. Tuition adjustments are made depending on the timing of the leave. The adjustments would follow the same schedule as the official withdrawal adjustments. See page 15 for the schedule for "Official Withdrawal Adjustments." Financial aid recipients must contact their financial aid counselor to understand the effects on aid received.

If the leave extends more than six months, student loans may go into repayment. Students enrolled in the Northeastern University Student Health Plan (NUSHP) will remain enrolled in the plan for the plan year, ending August 31.

Emergency leave petitions are available in college academic student services offices and specify the conditions and procedures under which such leaves may be granted.

### MEDICAL WITHDRAWAL

Permanent departure from the university due to the diagnosis of a major medical illness or injury, or psychiatric illness, necessitates a petition for medical withdrawal. The procedure follows that for the MLOA.

## University Withdrawal

Students seeking to withdraw from the university for any reason should contact the student services office of their college.

Students may be withdrawn from the university for financial, disciplinary, academic, or health reasons. In the last case, a committee will review the recommendations of the director of health services to determine whether the student should withdraw. The student has an opportunity to present his or her case to the committee. Withdrawals are made only when it is determined that the student is a danger to himself or herself, or to other members of the university community, or when the student has demonstrated behavior detrimental to the educational mission of the university. International students must contact the ISSI regarding any compliance issues implications deriving from university withdrawal.

## University-Sponsored 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 international travel in pursuit of teaching, research, consulting, service, cocurricular activities, and work intended to advance learning and the interests of the university. As a result, the university supports standards and expectations associated with international travel that are designed to reduce personal and university risk.

To ensure the safety of our students, you are required to comply with the university international travel policy when traveling abroad on university-sponsored travel. Such travel may include teaching, research, co-op, service, field studies, and volunteer and administrative work.

In order to provide assistance and support to you while traveling abroad, the university maintains a travel registry. In advance of any planned international travel, all students are required to enter their travel plans along with other requested information into the travel registry. To access the registry, go to myneu.neu@edu, "Services and Links," and register your travel. Students are responsible for familiarizing themselves with the university international travel policy and are encouraged to visit the international travel website for guidance.

## 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) × 0.750. For example, a 4-credit quarter course is equivalent to a 3-credit semester course.

### SEMESTER PROGRAMS

Traditional semester hours apply.

## STUDENT RECORDS AND TRANSCRIPTS

### 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 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 International Student and Scholar Institute 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 International Student and Scholar Institute (ISSI) 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 ISSI, 405 Ell Hall, prior to engaging each and every time in any form of employment.

## Grading System

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 | |
| F | 0.000 | Failure |
| I | | Incomplete |
| IP | | In progress |
| 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.

*Note:* In the CPS, the incomplete, or I, grade may be given only when the student was approved to make up a single key requirement of a course, such as a paper or major report. The student and instructor must complete an Incomplete-Grade Contract (www.northeastern.edu/registrar/form-inc-grade.pdf) before the end of the course. The completed contract should be sent to the Office of Academic and Student Support Services for the signature from the Office of the Dean: 50 Nightingale Hall; fax 617.373.5545; email cpsadviser@neu.edu. The university has a one-year-limit policy to make up incomplete grades. Students have access to their online course materials in Blackboard for up to one year.

The IP grade is intended for courses that extend over several semesters. 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 GPA. If the IP grade is never changed, the course does not count toward graduation requirements.

## 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 myNEU Web Portal (www.myneu.neu.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 myNEU Web Portal (www.myneu.neu.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 myNEU Web Portal (www.myneu.neu.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 myNEU Web Portal (www.myneu.neu.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 state how and when the pass/fail system may be used.

## Clearing an Incomplete or Changing Other Grades

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 can 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. The period for clearing an incomplete grade and 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.

To clear an incomplete grade, a student must obtain an Incomplete-Grade Contract (www.northeastern.edu/registrar/form-inc-grade.pdf) on which the precise agreement for clearing an incomplete grade is specified and that is signed by the student and the instructor. The student must make an appointment with the instructor to arrange for clearing the incomplete grade. He or she

must then complete the form, sign the agreement, and obtain the instructor's signature; leave a copy with the instructor, take one copy to the college academic student services office, and retain a copy as a personal receipt. 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 course work must be completed within one calendar year from the end of the semester in which the course was offered.)

Commencing with grades given in the fall of 1986, the university policy is that any grade outstanding for twelve 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 registrar for implementation.

## Repeating Courses

When the appropriate course is available, courses may be repeated 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 followed by the word "Repeat." Consult your academic advisor before repeating a course. Students are required to pay normal tuition charges for all repeated course work.

## Substituting Courses

In some cases, it may not be possible to repeat a course if a student wishes to do so. In certain, 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. Consult your academic advisor before enrolling in any proposed substitute course. Students are required to pay normal tuition charges for all substitute course work.

## Audit Policy

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 course work 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.

## 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 the course work is a prerequisite for future course work. Deficiencies can 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.

## 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 can be found on page 27.

## 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 page 23 for a complete list of grades and numerical equivalents.

## Minimum Cumulative Grade-Point Average

Grades submitted to satisfy, in whole or in part, the requirements for any graduate degree or certificate of advanced study must yield a cumulative grade-point average 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 grade-point average 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 grade-point average.

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," page 27.

## Grade Reports

Grades are available to students approximately three days after the end of each semester via the myNEU Web Portal (www.myneu.neu.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 myNEU Web Portal (www.myneu.neu.edu) and may also order official transcripts through myNEU. For further information on transcript requests, visit www.northeastern.edu/registrar/trans_request.html. All questions concerning transcript requests should be directed to 617.373.2199, (TTY) 617.373.5360.

## Northeastern University Course Numbering

**UNDERGRADUATE**

| | |
|---|---|
| 0001–0999 | **Orientation and basic**<br>No degree credit |
| 1000–1999 | **Introductory level (first year)**<br>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)**<br>Normally designed for sophomores and above but in some cases open to freshman majors in the department |
| 3000–3999 | **Upper-intermediate level (junior year)**<br>Designed primarily as courses for juniors; prerequisites are normally required, and these courses are prerequisites for advanced courses |
| 4000–4999 | **Advanced level (senior year)**<br>Designed primarily for juniors and seniors; also includes specialized courses such as research, capstone, and thesis |

**GRADUATE**

| | |
|---|---|
| 0001–0999 | **Orientation and basic**<br>No degree credit |
| 5000–5999 | **First-level graduate**<br>Courses primarily for graduate students and qualified undergraduate students with permission |
| 6000–6999 | **Second-level graduate**<br>Generally for master's and clinical doctorate only |
| 7000–7999 | **Third-level graduate**<br>Master's- and doctoral-level courses; includes master's thesis |
| 8000–8999 | **Clinical/research/readings**<br>Includes comprehensive exam preparation |
| 9000–9999 | **Doctoral research and dissertation** |

## 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 the 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.

## FINAL EXAMINATIONS AND RELATED POLICIES ON OTHER EXAMS AND FINAL TERM PAPERS/PROJECTS

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.

## GRADUATION REQUIREMENTS

All eligible degree candidates must complete the graduation application by the applicable deadline. Before you apply to graduate through your myNEU account, we recommend you take the time to review your current program information, i.e., degree, major, minor, and concentration. To review this information, log in to your myNEU account; under the "Self-Service" tab click "Student Self-Service."

## 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.

### 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.

Northeastern directory information includes the following:

- College and major
- Dean's List or other recognition lists
- Graduation degree(s) and honors
- Dates of attendance
- Sports activity participation, such as for soccer, showing weight and height of team members
- A playbill, showing your role in a drama or music production

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

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 forty-five 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.
5. Information concerning the following items about individual students is public and the offices listed below have the most accurate and up-to-date information:
   - **Office of the Registrar**
     (271 Huntington Avenue)
     Full name, major field of study, dates of attendance, class year, degrees and awards received, most recent previous educational institution attended
   - **Department of Athletics**
     (219 Cabot Physical Education Center)
     Participation in formally recognized university athletics, weight and height of members of athletic teams
   - **Campus Activities**
     (434 Curry Student Center)
     Participation in officially recognized university activities and student organizations

### Additional Information

Additional information can be obtained at the following website:

www.ed.gov/policy/gen/guid/fpco/ferpa/index.html

or by writing to:

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

### FERPA and the USA Patriot Act

The USA Patriot Act preempts FERPA, described above. The act provides federal law enforcement agencies access to otherwise confidential student records upon the presentation of specified authority. The act also says that the university cannot notify the individual whose records or information is being sought that the request has been made. All requests for student information made under the authority of the USA Patriot Act are handled by the Office of University Counsel, 115 Churchill Hall.

## STUDENT RIGHT-TO-KNOW ACT

For information about the Student Right-to-Know Act, visit www.northeastern.edu/registrar/right-to-know.html.

## CODE OF STUDENT CONDUCT

The Code of Student Conduct is online at www.northeastern.edu/osccr/code-of-student-conduct.

## APPEALS POLICIES AND PROCEDURES

### Graduate Student Appeals 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.

### 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 teaching prerogatives. Nonetheless, the university believes it is essential to provide an appeals mechanism to students who believe that they were erroneously, capriciously, 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 student handbook or *Faculty Handbook.* Issues concerning admission or readmission into a program cannot be appealed beyond the college level.

Before invoking the appeals procedures, students are always 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 process is described in the appeals section that follows.

### 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, whose website can be found at www.ori.dhhs.gov.) Possible incidences of misconduct are to be reported immediately to the vice provost for graduate education, who will initiate the appropriate procedures. Findings of scientific or research misconduct cannot be appealed through the process below.

### Nonacademic Appeals

It is the policy of the university that all students shall be treated with respect and that all evaluations of their employment performance will be fair, consistent, and objective. This includes claims of misinterpretation or inequitable application of any employment provision of the student handbook. The student is always encouraged to speak informally to his or her supervisor

about any determination about which he or she has questions prior to invoking the appeals procedures.

If the student chooses to pursue an appeal, the process is described in the appeals section that follows.

## Appeal of Final Grades

It is the policy of the university that all students will be treated fairly in 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 teaching prerogatives. Nonetheless, the university believes it is essential to provide an appeals mechanism to students who believe that they were erroneously, capriciously, 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 university's undergraduate or graduate catalog, student handbook, or *Faculty Handbook.* However, graduate student issues involving admission or readmission in a program cannot be appealed beyond the college level.

In most cases, students should first 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 satisfied with the outcome of this discussion, or if the student is not comfortable discussing the issue with the instructor, the student should request a meeting with the department chair, or a person named by the chair, to attempt a department-level resolution of the appeal. If these informal attempts to resolve the issue fail, the student can enter the formal procedure at the college level as follows.

### STEP 1

A student may appeal an academic determination by submitting a written statement (the Statement) that specifies the details of the action or judgment. This Statement should include when the problem occurred, who was involved, the basis of the appeal, and the resolution sought by the student. For students in the College of Professional Studies (CPS), the Statement is submitted to the school official designated by the Vice President for Professional and Continuing Studies. Graduate students (other than CPS) should submit the Statement to the graduate coordinator in the department (where one exists). If there is no department-level coordinator, the appeal should proceed to Step 2. All appeals of grades should be initiated and resolved before the student graduates. If a student wishes to dispute a grade in his or her final term, this must be done within forty-five calendar days of graduation. If the appeal concerns a cooperative education determination, it is submitted to the dean of the college in which the student is enrolled. The Statement must specify the details of the action or judgment and the basis for the appeal. All parties shall cooperate and act expeditiously in processing the appeal to completion.

Though students are always entitled to seek the advice of legal counsel, students may not be represented by a lawyer in the informal or formal academic appeal procedures. A student may consult with the Vice Provost for Graduate Education, Vice President for Professional and Continuing Studies (in the case of CPS students), or their designees at any point in this procedure for advice or assistance. The dean, vice president, or provost may take whatever steps they deem reasonably appropriate to achieve voluntary resolution of the problem at any stage of these procedures.

The Statement should be submitted within twenty-eight working days (or twenty working days [four calendar weeks] for CPS students) of the day when the student learns of the academic determination in question. For course grade appeal in the CPS, the Statement must be submitted within twenty days after grades are posted to the student academic record. Grades are typically available the Tuesday after the term ends and are viewable through the student's myNEU account.

If a student feels that he or she has been the victim of harassment or of discrimination prohibited by law or by university policy, he or she should consult with the Office of Institutional Diversity and Equity as soon as he or she becomes aware of alleged prohibited harassment or discrimination and is not required to wait until a term grade or determination is received before seeking advice or redress. If the Office of Institutional Diversity and Equity is advised of such alleged prohibited conduct as part of an academic appeal (see below), the appeal shall be pursued and investigated first through the Office of Institutional Diversity and Equity. In such cases, the student should submit the appeal to the appropriate dean(s) described in this step, with a copy also given to the Office of Institutional Diversity and Equity. Following a resolution of the sexual harassment/discrimination issues, any remaining academic issues will be addressed, at the request of the student, according to the academic appeals procedures.

### STEP 2

The dean or CPS vice president shall respond to the student in writing, including specific instructions for the student to seek an informal resolution to the matter, unless such course of action, as outlined by the student in his or her Statement, is demonstrably futile. These directions shall include discussing the matter with the person whom the student identifies as involved in the matter. If the student is not satisfied with the informal resolution, the dean or CPS vice president shall discuss the matter with the department chair (where one exists), graduate coordinator, consultant, program director, or associate dean (as appropriate) or equivalent supervisor and the dean of the college in which the faculty member involved in the matter serves, who shall attempt to effect an informal resolution. The student shall also have the right to discuss the matter with the chair (where one exists) or equivalent supervisor in which department the faculty member involved in the matter serves.

If the appeal involves allegations of prohibited harassment or discrimination, the dean shall consult with the Office of

Institutional Diversity and Equity before making this response and shall, as part of this response, explain the role that the Office of Institutional Diversity and Equity will play in steps 2 and 3 of this procedure.

A copy of this response shall be sent to the department chair or equivalent supervisor of the appropriate unit.

### STEP 3

If the appeal cannot be resolved informally within thirty calendar days of the student's original submission of his or her Statement to the dean or CPS vice president, or if he or she is not satisfied with the disposition of the matter at Step 2, the student may proceed with the appeal through his or her college's or school's established academic appeals procedure. The dean or the academic standing committee, as applicable, must provide the student and the involved faculty member with a written report of the finding(s) and decision.

This step involves a review by an academic standing committee making the recommendation to the dean or CPS vice president. The student may obtain a copy of the operating rules of the academic standing committee from the dean of the college involved.

In appeals involving allegations of prohibited harassment or discrimination, the dean or academic standing committee shall receive a report of the findings of the investigation of the Office of Institutional Diversity and Equity for incorporation into its own report on matters left unresolved by that finding that were referred to it. The dean/CPS vice president or committee shall be without authority to reverse or modify the Office of Institutional Diversity and Equity finding(s) or resolution.

### STEP 4

If the student or the involved faculty member is not satisfied with the dean's or CPS vice president's disposition of the matter or if the appeal is not resolved within thirty calendar days after originally submitted to the dean or CPS vice president pursuant to Step 1, he or she may further pursue the matter by requesting in writing within fourteen calendar days that the university convene an academic appeals resolution committee to review the issue. Students may obtain information on this process in either the Office of the Vice President for Student Affairs (104 Ell) or the Office of the Provost (110 CH). This committee has been designated as the final authority on these matters. This request must be made within fourteen calendar days of the finding of the academic standing committee in Step 3.

***1. Academic Appeals Resolution Committee***

The academic appeals resolution committee includes:

- The Vice Provost for Graduate Education or a designee.
- The student's faculty advisor will be appointed by the appropriate vice provost except in cases where no specific advisor exists, or where the faculty advisor is involved in the dispute. In those cases, a faculty member from the student's major college, department, or area of specialization will be appointed.
- Two faculty members appointed by the Faculty Senate Agenda Committee (if the appeal is based on a Cooperative Education determination, one of the faculty members shall be a member of the Cooperative Education faculty, but not from the student's area of study) and a representative of the Office of Institutional Diversity and Equity (if the appeal had at any point involved a matter of sexual harassment/discrimination).
- The chair shall be elected from among the committee's three faculty members but cannot be the student's faculty advisor.

***2. Preliminary Matters***

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.

***3. Investigation***

The academic appeals resolution committee shall investigate the matter under appeal as quickly as possible by studying the relevant documents, interviewing the parties (especially the student and the involved faculty member), and taking any other action it deems appropriate. At no time shall the committee be bound by rules of evidence but shall at all times conduct itself in a matter 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 and testify 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 resolutions committee.

***4. Authority to Act***

The academic appeals resolution committee has been designated as the final authority on these 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 academic standing committee or dean/CPS vice president, in which case no further appeal is available, or granting such relief to the student as the appeals resolution committee deems appropriate.

a. The academic appeals resolution committee may not determine a resolution that contradicts the prior findings or actions of the Office of Institutional Diversity and Equity with respect to elements of this appeal.
b. In the event of a tie vote, the action of the academic standing committee or dean/CPS vice president shall be considered upheld.

***5. Resolution***

All direct parties to the appeal, including but not limited to the student, the CPS vice president or provost, the dean, the department chair or equivalent supervisors, graduate coordinator or equivalent supervisor, and the faculty member shall be promptly informed in writing of the decisions and actions taken (i.e., the Report) during this academic appeals procedure.

***6. Report***

A written Report of the appeal and its resolution shall be submitted by the chair of the academic appeals resolution committee to the student, the involved faculty member, the Faculty Senate Agenda Committee, the vice president for student affairs, the appropriate vice provost, the registrar, and the dean or CPS vice president, as appropriate.

***7. Action***

The dean(s) or CPS vice president or his or her designee in the involved college(s) shall take whatever action is necessary to implement fully the resolution of the academic appeals resolution committee. This includes reporting the change of grade to the registrar.

***8. Appeal***

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 once adjudicated.

## 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 discuss the matter with the director of the Disability Resource Center and other persons identified by the director, or with the director of the Office of Institutional Diversity and Equality, to resolve the matter in a prompt and equitable manner. If such discussions do not resolve the matter, the student may then initiate a grievance by taking the steps outlined below.

1. All grievances made by students on the basis of being disabled are considered as being made to the president of the university.
2. In the case of a grievance, the student should discuss the objection with the individual responsible for the office or department where the objection was initially raised.
3. If not satisfied, the student should discuss the objection with the dean of the college or director under which the department falls.
4. If the grievance is not satisfactorily resolved, the student should complete a grievance form and file a written request for a formal hearing with the Grievance Committee for Disabled Students. The request should be filed with the vice president for student affairs. Upon receipt of a written request for a formal hearing, the grievance committee (including one faculty member from the student's college, one faculty member not from the student's college, one representative from the Disability Resource Center, a representative from the Office of Institutional Diversity and Equality, the vice president for student affairs or a designee, and another administrator not from student affairs) must hold a hearing within three calendar weeks. The grievance committee must allow a full and fair opportunity for the presentation of evidence relevant to the reason(s) for the hearing request and must render a decision in writing to the requesting student within one week of the conclusion of the hearing. The director of the Office of Institutional Diversity and Equality is compliance officer for Section 504 of the Rehabilitation Act of 1973.

#### 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 of Institutional Diversity and Equality. Copies of the sexual harassment grievance procedure can be obtained from the Office of Institutional Diversity and Equality, 424 Columbus Place.

#### 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, 202 Ell Hall.

## 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 Residential Life, and the Center for Counseling and Student Development 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

Essential to the mission of Northeastern University is the commitment to the principles of intellectual honesty and integrity. Academic integrity is important for two reasons. First, independent and original scholarship ensures that students derive the most from their educational experience and the pursuit of knowledge. Second, academic dishonesty violates the most fundamental values of an intellectual community and depreciates the achievements of the entire university community.

Accordingly, Northeastern University views academic dishonesty as one of the most serious offenses that a student can commit while in college. The following is a broad overview of what constitutes academic dishonesty but is not meant to be an all-encompassing definition.

***Cheating***

Defined as intentionally using or attempting to use unauthorized materials, information, or study aids in any academic exercise. Examples:

- Unauthorized use of notes, text, or other aids during an examination
- Copying from another student's examination, research paper, case write-up, lab report, homework, computer disc, and so on
- Talking during an examination
- Handing in the same paper for more than one course without the explicit permission of the instructor
- Perusing a test before it is given
- Hiding notes in a calculator for use during an examination

***Fabrication***

Defined as intentional and unauthorized falsification, misrepresentation, or invention of any information, data, or citation in an academic exercise. Examples:

- Making up the data for a research paper
- Altering the results of a lab experiment or survey
- Listing a citation for a source not used
- Stating an opinion as a scientifically proven fact

***Plagiarism***

Defined as intentionally or knowingly representing the words or ideas of another as one's own in any academic exercise without providing proper documentation of source by way of a footnote, endnote, or intertextual note. The following sources demand notation:

- Word-for-word quotation from a source, including another student's work
- Paraphrase: using the ideas of others in your own words
- Unusual or controversial facts—facts not apt to be found in many places
- Interviews, radio and television programs, and telephone conversations

***Unauthorized collaboration***

This refers to instances when students, each claiming sole authorship, submit separate reports that are substantially similar to one another. While several students may have the same source material (as in case write-ups), the analysis, interpretation, and reporting of the data must be each individual's.

***Participation in academically dishonest activities***
Examples:

- Stealing an examination
- Purchasing a prewritten paper through a mail-order or other service, including via the Internet
- Selling, loaning, or otherwise distributing materials for the purpose of cheating, plagiarism, or other academically dishonest acts
- Alteration, theft, forgery, or destruction of the academic work of other students, library materials, laboratory materials, or academic records including transcripts, course registration cards, course syllabi, and examination/course grades
- Intentionally missing an examination or assignment deadline to gain an unfair advantage

***Facilitating academic dishonesty***
Defined as intentionally or knowingly helping or attempting to violate any provision of this policy. Examples:

- Inaccurately listing someone as coauthor of a paper, case write-up, or project who did not contribute
- Sharing with another student a take-home examination, homework assignment, case write-up, lab report, and so on, without expressed permission from the instructor
- Taking an examination or writing a paper for another student

All members of the Northeastern University community—students, faculty, and staff—share the responsibility to bring forward known acts of apparent academic dishonesty. Any member of the academic community who witnesses an act of academic dishonesty should report it to the appropriate faculty member or to the director of the Office of Student Conduct and Conflict Resolution. The charge will be investigated and if sufficient evidence is presented, the case will be referred to the Northeastern University Student Judicial Hearing Board. If found responsible for an academic dishonesty violation, a minimum sanction of deferred suspension will follow. If found responsible for a second violation, the student will be expelled from the university.

## APPROPRIATE USE OF COMPUTER AND NETWORK RESOURCES POLICY

The information systems of Northeastern University are intended for the use of authorized members of the Northeastern community in the conduct of their academic and administrative work. To protect the integrity of computer resources against unauthorized or improper use, and to protect authorized users from the effects of unauthorized or improper usage, the university reserves the right, with or without notice, to monitor, record, limit, or restrict any account holder's usage. The university may also monitor, record, inspect, copy, remove, or otherwise alter any data, file, or system resources. The university reserves the right to periodically check these systems and to take any other action necessary to protect the computer and network facilities. The university also retains access rights to all files and electronic mail on its computing and network facilities. Anyone using these systems or networks expressly consents to such monitoring.

Any unauthorized, inappropriate, illegal, or illegitimate use of the university's computing resources, or failure to comply with these guidelines, shall constitute a violation of university policy and will subject the violator to disciplinary action by the university and may result in legal action. When a violation is identified, the appropriate system manager or unit head will undertake a review and initiate action in accordance with university policy. In addition, the university may require restitution for any use of computer or network services that violate these guidelines. The university may also provide evidence of possible illegal or criminal activity to law enforcement authorities.

Notwithstanding any other provision of this policy, authorization to access the information systems of Northeastern University ends at the termination of employment, the end of a recognized role or relationship, or the loss of sponsorship. Students may continue to use their Northeastern electronic mail account for up to six months after graduation. Any questions about this policy or the applicability of this policy to a particular situation should be referred to the information technology security manager or the director of internal audit. The university's information systems consist of all networking wiring, equipment, networks, security devices, servers, computer systems, computers, computer laboratory equipment, workstations, Internet connections, and all other intermediary equipment, services, and facilities. These assets are the property of Northeastern University.

1. Access to and use of Northeastern information systems is a privilege granted by the university to its faculty, staff, and students. Access for up to one academic year for others, including "sponsored" individuals whose relationship with Northeastern is a result of a university-recognized affiliation or relationship, must be approved by the authorizing unit's dean or vice president. Such access may not be renewed without the written approval of the senior vice president for administration and finance.
   The university retains sole discretion over the extent to which access privileges are granted.
2. Users may only use those computer accounts that have been authorized by the university for their use. Use of another person's account, security devices, and/or the presentation of false or misleading information or credentials for the purpose of obtaining access to information systems is prohibited.
3. Users are responsible for all use of information systems conducted under their user ID(s) and are expected to take all precautions including password security and file protection measures to prevent use of their accounts and files by unauthorized persons. Sharing of passwords is prohibited.
4. Users may not offer, provide, lend, rent, or sell access to university information systems. Users may not provide access to individuals outside the university community.

5. Use of university information systems for hosting non-university activities must have the explicit written authorization of the senior vice president for administration and finance prior to the use.
6. While the university attempts to protect electronic communication and files from unauthorized access, this cannot be guaranteed. Users may not access, copy, or move files including, but not limited to, programs, data, and electronic mail that belong to another account without prior authorization from the account holder. Files may not be moved to other computer sites without permission from the holder of the account under which the files reside.
7. Users may not use remote resources such as printer and file systems, regardless of location on or off the Northeastern network, unless the administrator of the remote resource has first granted permission.
8. Northeastern information systems may be used for lawful purposes only. Users must not use their accounts or Northeastern information systems for unlawful purposes including, but not limited to, the installation of fraudulently or illegally obtained software; illegal dissemination of licensed software; sharing of content where the disseminator does not hold lawful intellectual property rights; propagating chain letters, pyramid, Ponzi, other unlawful or deceptive schemes; or for any purpose contrary to local, state, and/or federal law.
9. Use of university information systems must comply with the provisions of copyright law and fair use. Copyright law limits the right of a user to copy, edit, or transmit electronically another's intellectual property, including written materials, images, sounds, music, and performances, even in an educational context, without permission, except in compliance with the fair use doctrine exception.
10. Users are responsible for the timeliness, accuracy, and content/consequences of their Web pages. Posting of personal, family, or other identifying information is at the sole discretion of the user. Users are advised to exercise discretion when posting personal information to minimize the risk to personal privacy and safety.
11. University information systems may not be used for commercial purposes, except only as permitted with explicit prior written approval of university counsel and the senior vice president for administration and finance.
12. Internet use must comply with the terms of service stipulated by our Internet service provider(s). These policies are incorporated by reference. In addition, the acceptable use, terms of service, and/or other policies of the system(s) also bind users of the Internet connection and resources to which they connect. At the time of writing, the Internet service provider for Northeastern University is Genuity (www.genuity.com).
13. Users may not use information systems irresponsibly, wastefully, or in a manner that adversely affects the work or equipment of others at Northeastern or on the Internet.
14. The university strives to maintain the security and privacy of all electronic communications and content passed on the Northeastern network and, therefore, will not arbitrarily or frivolously review or inspect user files or electronic mail. However, all electronic communications and content presented to and/or passed on the Northeastern network, including that presented to and/or passed to and from the Internet connection(s), may be monitored, examined, saved, read, transcribed, stored, or retransmitted in the course of daily operations by any duly authorized employee or agent of Northeastern University in the exercise of their duties or by law enforcement authorities who are called upon to assist the university in investigating possible wrongdoing. Electronic communications and content may be examined by automated means. Further, Northeastern reserves the right to reject from the network electronic communications and content deemed not in compliance with policies governing the use of information systems at the university. By accessing Northeastern information systems, users give Northeastern permission to conduct each of the operations described above.
15. The confidentiality of any message or material should not be assumed. Even when a message or material is deleted, it may still be possible to retrieve and read that message or material. Further, the use of passwords for security does not guarantee confidentiality. Messages read in HTML may identify the reader to the sender. Aside from the right of the university to retrieve and read any electronic communications or content, such messages or materials should be treated as confidential by other students or employees and accessed only by the intended recipient. Without prior authorization, students and employees are not permitted to retrieve or read electronic mail messages that are not sent to them.
16. All users are required to honor and observe the rules of confidentiality and protection of privacy when accessing and using any information that resides on Northeastern information systems and/or any information that pertains to university programs, students, faculty, and staff. All disclosures of student information must comply with the provisions of the Family Educational Rights and Privacy Act (FERPA) of 1974 (see page 26).
17. Northeastern reserves the right at any time, without prior notice or permission from the user or users of a computer or other Northeastern-owned computing device, to copy or have copied, any and all information from the data-storage mechanisms of such devices, as may be required at the sole discretion of the university, in connection with investigations of possible wrongdoing.
18. The Appropriate Use of Computer and Network Resources Policy specifically prohibits the use of Northeastern University's information systems to:
    - Harass, threaten, defame, slander, or intimidate any individual or group.

- Generate and/or spread intolerant or hateful material, which in the sole judgment of the university is directed against any individual or group, based on race, religion, national origin, ethnicity, age, gender, marital status, sexual orientation, veteran status, or disability.
- Transmit or make accessible material, which in the sole judgment of the university is offensive, violent, pornographic, annoying, or harassing, including use of Northeastern information systems to access and/or distribute obscene or sexually explicit material unrelated to university-sanctioned work or bona fide scholarship.
- Generate unsolicited electronic mail such as chain letters, unsolicited job applications, or commercial announcements.
- Generate falsely identified messages or message content, including use of forged content of any description.
- Transmit or make accessible password information.
- Attempt to access and/or access information systems and/or resources for which authority has not been granted by the system owner(s).
- Capture, decipher, or record user IDs and/or passwords.
- Intercept electronic communications not intended for the recipient.
- Probe by any means, the security mechanisms of any resource on the Northeastern network, or on any other network through a connection to the Northeastern network.
- Disclose or publish, by any means, the security vulnerabilities of or the means to defeat or disable the security mechanisms of any resource connected to or part of the Northeastern University network.
- Alter, degrade, damage, or destroy data.
- Transmit computer viruses or malicious/destructive code of any description.
- Conduct illegal, deceptive, or fraudulent activity.
- Obtain, use, or retransmit copyrighted information without permission of the copyright holder.
- Place bets, wagers, or operate games of chance.
- Tax, overload, impede, interfere with, damage, or degrade the normal functionality, performance, or integrity of any device, service, or function of Northeastern information systems, content, components, or the resources of any other electronic system, network, service, or property of another party, corporation, institution, or organization.

The above enumeration is not all-inclusive. If there is a question as to whether a specific use is appropriate or acceptable under this policy, the university's sole determination shall prevail.

19. Use of Northeastern University information systems must comply with all applicable local, state, and federal laws, including, but not limited to, the following, which are incorporated by reference:
    - Massachusetts General Laws Chapter 266, Subsections 33(a) and 120(f), which impose sanctions for, among other acts, destroying electronically processed and stored data or gaining unauthorized access to a database or computer system.
    - United States Code, Title 18, Computer Fraud and Abuse Act, which imposes sanctions for, among other acts, knowingly accessing a computer without authorization or in excess of authorized access, knowingly causing damage to protected computers, or trafficking in password information.
    - United States Code, Title 18, Electronic Communications Privacy Act, which imposes sanctions for, among other acts, interception of wire, oral, or electronic communications.

## 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; or (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 vice president 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 university administrative and classroom buildings are smoke free and tobacco free. The policy relates to all campuses. The only university facilities not covered by this policy are residence halls and apartment buildings. 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, 20 Dodge Hall.

## 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.

# STUDENTS' 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.

## Academic Rights

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 must recognize certain rights, which are set down in this document. (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 "Appeals Policies and Procedures" on page 27.)

***Course-Related Rights***

**Article 1** Students have the right to instructors who attend scheduled classes on time.

**Article 2** Students have the right to view work they submit to satisfy course requirements after it is graded.

**Article 3** Students have the right to adequate access to instructors.

**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.

**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 student teacher course evaluations.

***Rights to University Academic Services***

**Article 7** Students have the right to adequate access to effective academic services, as described in the student handbook and other university publications, provided by the university.

**Article 8** Students have the right to an environment conducive to learning. (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 while 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. 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 he or she has been subject to any violation of the principles stated herein, the student should follow the appropriate complaint resolution procedure in "Appeals Policies and Procedures" on page 27. The Student Government Association, if requested by the student, will monitor the progress of any student academic grievances.)

**Article 9** Disabled students have the right to be treated in a nondiscriminatory fashion in accordance with the policies described in university publications and consonant state and federal laws.

***Scheduling Rights***

**Article 10** Students have the right to nonconflicting final exam schedules.

**Article 11** Students have the right to final exam schedules in accordance with established university policy.

**Article 12** Students have the right to be excused from academic commitments for a religious observance.

***General Academic Rights***

**Article 13** Students have the right to be informed, in a timely fashion, of proposed or actual university action to be taken against them.

**Article 14** 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 Federal Educational Rights and Privacy Act.

**Article 15** Students have the right to be free from harassment by other members of the university community.

**Article 16** Students have the right to the redress of academic grievances.

## Student Responsibilities

It is each student's responsibility to:

1. Contribute to a climate of open inquiry and honesty in all aspects of the university's academic life.
2. Commit sufficient time and effort for study and the use of library, studio, and computational facilities in connection with each course.
3. Contribute to the classroom/laboratory/studio learning environment through discussion and active participation.
4. Acquire the necessary prerequisites for full participation in each academic course.
5. Attend scheduled classes regularly and on time.
6. Obtain help with problems encountered in a given course by seeking out faculty and teaching assistants outside class time.
7. Respect the concept of academic freedom of each faculty member.
8. Assist the university in its self-evaluation by responding honestly and conscientiously.

# *Curriculum and Graduation Requirements by Program*

# College of Arts, Media and Design

www.northeastern.edu/camd

**ELIZABETH HUDSON, PHD,** *Dean*

**Alan J. Zaremba, PhD,** *Associate Dean for Undergraduate Programs*
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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. 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 artist outreach in underserved communities to "serious" game design for health and security; from green building innovation to sustainable urban design; from international entertainment and media to provocative performances in "found spaces"; from incisive data visualization that changes how we view the world to cutting-edge journalism—our faculty and students are involved in a wealth of academic experiences, creative enterprises, and professional endeavors.

At CAMD, we take our mission and vision very seriously. We deliver an outstanding graduate education in traditional areas while exploring new approaches to this generation's transformative questions. The "space between our disciplines" is intellectually rich, educationally vibrant, and professionally productive. Our interdisciplinary degree options provide a strong foundation of use-inspired, experientially informed course work and research opportunities. Our programs produce graduates equipped to engage the international marketplace and shape global culture.

Take a moment to introduce yourself to the faculty and graduate coordinators in your field of interest. Become familiar with the many events offered across CAMD and the campus. Stop by CAMD's graduate programs website often (www.northeastern.edu/camd/academics/graduate), where you'll find current news and links to services such as the registrar's office. Familiarize yourself with the university's graduate school website (www.northeastern.edu/graduate) to explore numerous links to graduate resources, policies, and student organizations.

We look forward to getting to know you and to incorporating your individual education and career interests into the graduate community of CAMD.

## General Information

Five units in the College of Arts, Media and Design offer programs at the graduate level: architecture, Art + Design, game design, journalism, and music.

The degrees include:

- Master of Architecture
- Master of Arts in Journalism
- Master of Design for Sustainable Urban Environments
- Master of Fine Arts—Information Design and Visualization
- Master of Fine Arts—Studio Art and Inter-Arts
- Master of Science in Game Science and Design
- Master of Science in Music Industry Leadership

## Master's Degree Policies

CAMD graduate studies sets minimum standards for all students to fulfill. Departments and programs may have additional requirements that exceed those of the college (departmental handbooks can be found at www.northeastern.edu/camd/academics/graduate/current-students).

A candidate for the master's degree must complete a minimum of 30 semester hours of graduate-level course work 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 course work. See the university's policy on academic standing on page 25 ("Minimum Cumulative Grade-Point Average").

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.

## Student Aid Awards

Only those students who are registered in degree programs are eligible for awards. 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. Graduate Student Scholarships (GSS) are 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. Receipt of financial support administered by CAMD graduate studies requires that all students receiving awards will generally have a 3.000 GPA. Students whose cumulative GPA is below 3.000 will be reviewed by their departments and by CAMD graduate studies and may have their funding terminated on recommendation of their department or by decision of CAMD graduate studies in consultation with their department. Renewals of awards depend on the student making satisfactory academic progress toward the degree and satisfactory performance of any duties required by the award.

## Leave of Absence

Full-time students who are not involved in any academic endeavor for a period of time are required to petition the Coordinator of Student Services, through their department, for a leave of absence by completing the Leave-of-Absence Request Form; see page 20 for additional information about leaves of absence. CAMD graduate studies will not accept retroactive leave requests. Note that if a student is requesting a leave for medical reasons, information on medical leaves appears on page 21. Students should contact University Health and Counseling Services at 617.373.2772 (www. northeastern.edu/ uhcs/forms). Leaves of absence generally are not approved for more than one calendar year at a time. International students should consult with an advisor at the International Student and Scholar Institute 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 (1) degree completion or (2) 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 course work, 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 of the school permit, the student is expected to meet the most recent requirements. However, if it can be 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 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 Master's 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 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 9 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 9 semester hours over time. Students interested in taking more than 9 semester hours must make a formal application to the degree program. Use the Internal Admission Application Notification form available through www.northeastern.edu/camd/graduate. 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).

## SCHOOL OF ARCHITECTURE

**www.northeastern.edu/camd/architecture/academics/graduate**

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Northeastern offers a Master of Architecture degree accredited by the National Architectural Accreditation Board. The director of the program is Professor Tim Love.

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.

There are multiple ways that this degree can be completed:

### One-Year Program

A Master of Architecture degree is offered as a one-year completion to the five-year Northeastern Bachelor of Science (BS) degree (with a major in architecture). Students who complete the five-year degree at Northeastern with a 2.500 minimum overall grade-point average (GPA) apply for admission to this one-year, 32-semester-hour program. Northeastern students may also avail themselves of the financial benefit of the Double Husky Scholarship. Students with an accredited BArch from a five-year program are also eligible to apply.

## Two-Year Program

Students who have earned a BS in Architecture (or equivalent) from another institution may apply for entry to the two-year MArch program, which is 68 semester hours. A portfolio is required for applicants to this program.

## Three-Year Program

Students with an undergraduate degree in a discipline other than architecture may apply to the 3¼-year MArch 1 program. The program requires three years and a summer to complete. Students spend an optional semester at the school's Berlin program and may enroll in two four-month internships, with placement assistance by the co-op office. After completing an accelerated introductory curriculum, graduate students in the three-year program merge into the existing curriculum for the MArch program. A portfolio is preferred but not required for applicants to this program.

## MArch—Master of Architecture—One-Year Program

Complete all courses and requirements listed below unless otherwise indicated.

### YEAR 1, FALL SEMESTER

18 semester hours required

| | | |
|---|---|---|
| ARCH 6330 | Seminar in Modern Architecture | 4 SH |
| ARCH 6430 | Case Studies 1 | 4 SH |
| ARCH 7130 | Master's Research Studio | 6 SH |

Complete one additional ARCH course.

### YEAR 1, SPRING SEMESTER

| | | |
|---|---|---|
| ARCH 6340 | Graduate Topics in Architecture | 4 SH |
| ARCH 6440 | Case Studies 2 | 4 SH |
| ARCH 7140 | Master's Degree Project | 6 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

32 total semester hours required
Minimum 3.000 GPA required

## MArch—Master of Architecture—Two-Year Program

Complete all courses and requirements listed below unless otherwise indicated.

### GENERAL REQUIREMENTS

***Studio***

| | | |
|---|---|---|
| ARCH 5110 | Housing and Aggregation | 6 SH |
| ARCH 5120 | Comprehensive Design Studio | 6 SH |
| ARCH 7130 | Master's Research Studio | 6 SH |

***Case Study***

| | | |
|---|---|---|
| ARCH 6430 | Case Studies 1 | 4 SH |
| ARCH 6440 | Case Studies 2 | 4 SH |

***Building and Environment***

| | | |
|---|---|---|
| ARCH 5210 | Environmental Systems | 4 SH |
| ARCH 5220 | Integrated Building Systems | 4 SH |

***Topics and Seminar***

| | | |
|---|---|---|
| ARCH 5310 | Design Tactics and Operations | 4 SH |
| ARCH 6340 | Graduate Topics in Architecture | 4 SH |
| ARCH 6330 | Seminar in Modern Architecture | 4 SH |

### RESEARCH PROJECT

| | | |
|---|---|---|
| ARCH 7140 | Master's Degree Project | 6 SH |

### ELECTIVES

Complete 8–16 semester hours of ARCH courses. Electives outside architecture may be taken in consultation with your faculty advisor.

### PROGRAM CREDIT/GPA REQUIREMENTS

60 total semester hours required
Minimum 3.000 GPA required

## MArch—Master of Architecture—Three-Year Program

Complete all courses and requirements listed below unless otherwise indicated.

### OPTIONS

This program has two options:

- Boston option
- Berlin option

Differences in requirements are noted below.

### GENERAL REQUIREMENTS

***Modernity and the City***

*Note:* Students in the Boston option should complete ARCH 2340; students in the Berlin option should complete ARCH 3361.

| | | |
|---|---|---|
| ARCH 2330 | Architecture, Modernity, and the City, 1800 to 1910 | 4 SH |
| ARCH 2340 | Architecture, Modernity, and the City, 1910 to 1980 | 4 SH |
| or ARCH 3361 | Architecture and Urbanism Abroad | 4 SH |

***Structures***

| | | |
|---|---|---|
| ARCH 2230 | Structural Systems | 4 SH |
| with ARCH 2231 | Recitation for ARCH 2230 | 0 SH |
| ARCH 2240 | Architectonic Systems | 4 SH |

***Communication***

| | | |
|---|---|---|
| ARCH 3450 | Advanced Architectural Communication | 4 SH |

***Studio***

*Note:* Students in the Boston option should complete ARCH 2140; students in the Berlin option should complete ARCH 3155.

| | | |
|---|---|---|
| ARCH 2140 | Urban Institutions | 6 SH |
| or ARCH 3155 | Studio Abroad | 6 SH |
| ARCH 5110 | Housing and Aggregation | 6 SH |
| ARCH 5120 | Comprehensive Design Studio | 6 SH |
| ARCH 6100 | Graduate Skills Studio | 4 SH |
| ARCH 6200 | Graduate Studio 1: Architectural Design | 6 SH |
| ARCH 7130 | Master's Research Studio | 6 SH |

***Case Study***

| | | |
|---|---|---|
| ARCH 6110 | Graduate Architectural History Case Studies | 4 SH |
| ARCH 6430 | Case Studies 1 | 4 SH |
| ARCH 6440 | Case Studies 2 | 4 SH |

***Building, Design, and Environment***

| | | |
|---|---|---|
| ARCH 5210 | Environmental Systems | 4 SH |
| ARCH 5310 | Design Tactics and Operations | 4 SH |
| ARCH 5220 | Integrated Building Systems | 4 SH |

***Topics and Seminar***

Complete the repeatable ARCH 6340 twice and complete ARCH 6330:

| | | |
|---|---|---|
| ARCH 6340 | Graduate Topics in Architecture | 4 SH |
| ARCH 6330 | Seminar in Modern Architecture | 4 SH |

## RESEARCH PROJECT

| | | |
|---|---|---|
| ARCH 7140 | Master's Degree Project | 6 SH |

## ELECTIVES

***Required Electives***

Complete 8 semester hours of ARCH courses.

***Additional Elective or Topics***

Complete 4 semester hours of ARCH courses. Electives outside architecture may be taken in consultation with your faculty advisor. *Note:* Students in the Berlin option should complete the following course:

| | | |
|---|---|---|
| ARCH 3362 | Seminar Abroad | 4 SH |

## PROGRAM CREDIT/GPA REQUIREMENTS

104 total semester hours required
Minimum 3.000 GPA required

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

Complete all courses and requirements listed below unless otherwise indicated.

## OPTIONS

This program has two options:

- Boston option
- Berlin option

Differences in requirements are noted below.

## PREREQUISITES

Complete a minimum of 10 semester hours from the following courses. Consult your faculty advisor regarding any additional required courses.

***Modernity and the City***

*Note:* Students in the Boston option should complete ARCH 2340; students in the Berlin option should complete ARCH 3361.

| | | |
|---|---|---|
| ARCH 2330 | Architecture, Modernity, and the City, 1800 to 1910 | 4 SH |
| ARCH 2340 | Architecture, Modernity, and the City, 1910 to 1980 | 4 SH |
| or ARCH 3361 | Architecture and Urbanism Abroad | 4 SH |

***Structures***

| | | |
|---|---|---|
| ARCH 2230 | Structural Systems | 4 SH |
| with ARCH 2231 | Recitation for ARCH 2230 | 0 SH |
| ARCH 2240 | Architectonic Systems | 4 SH |

***Studio***

*Note:* Students in the Boston option should complete ARCH 2140; students in the Berlin option should complete ARCH 3155.

| | | |
|---|---|---|
| ARCH 2140 | Urban Institutions | 6 SH |
| or ARCH 3155 | Studio Abroad | 6 SH |
| ARCH 6100 | Graduate Skills Studio | 4 SH |
| ARCH 6200 | Graduate Studio 1: Architectural Design | 6 SH |

***Case Study***

| | | |
|---|---|---|
| ARCH 6110 | Graduate Architectural History Case Studies | 4 SH |

## GENERAL REQUIREMENTS

***Communication***

| | | |
|---|---|---|
| ARCH 3450 | Advanced Architectural Communication | 4 SH |

***Studio***

| | | |
|---|---|---|
| ARCH 5110 | Housing and Aggregation | 6 SH |
| ARCH 5120 | Comprehensive Design Studio | 6 SH |
| ARCH 7130 | Master's Research Studio | 6 SH |

***Case Study***

| | | |
|---|---|---|
| ARCH 6430 | Case Studies 1 | 4 SH |
| ARCH 6440 | Case Studies 2 | 4 SH |

***Building, Design, and Environment***

| | | |
|---|---|---|
| ARCH 5210 | Environmental Systems | 4 SH |
| ARCH 5310 | Design Tactics and Operations | 4 SH |
| ARCH 5220 | Integrated Building Systems | 4 SH |

***Topics and Seminar***

| | | |
|---|---|---|
| ARCH 6340 | Graduate Topics in Architecture *(repeatable course to be taken twice)* | 4 SH |
| ARCH 6330 | Seminar in Modern Architecture | 4 SH |

## RESEARCH PROJECT

| | | |
|---|---|---|
| ARCH 7140 | Master's Degree Project | 6 SH |

## ELECTIVES

***Required Electives***

Complete 8 semester hours of ARCH courses.

***Additional Elective or Topics***

Complete 4 semester hours of ARCH courses. Electives outside architecture may be taken in consultation with your faculty advisor. *Note:* Students in the Berlin option should complete the following course:

| | | |
|---|---|---|
| ARCH 3362 | Seminar Abroad | 4 SH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

78 total semester hours required
Minimum 3.000 GPA required

## 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, dialog, 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 prepares students to be innovative and entrepreneurial designers able to combine economic, environmental, and social priorities to make next-generation public spaces and systems.

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

The one-year 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, pro-seminars, and urban ecology and technology workshops complemented by interdisciplinary electives.

## MDes in Sustainable Urban Environments—One-Year Program

Complete all courses and requirements listed below unless otherwise indicated.

**CORE**

***Studio***

| | | |
|---|---|---|
| SUEN 7130 | Master's Research Studio: Design and the Resilient City | 6 SH |
| SUEN 7140 | Master's Research Studio: Master's Project | 6 SH |

***Proseminar***

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| SUEN 7320 | Pro-Seminar: Issues in Designed Urban Environments | 4 SH |

***Technology***

| | | |
|---|---|---|
| SUEN 7230 | Urban Ecologies and Technologies 1 | 4 SH |
| SUEN 7240 | Urban Ecologies and Technologies 2 | 4 SH |

**ELECTIVES**

Complete 8 semester hours in the following subject areas: SUEN, ARCH, PPUA, and LPSC
Electives in other disciplines may be taken in consultation with your faculty advisor.

**PROGRAM CREDIT/GPA REQUIREMENTS**

36 total semester hours required
Minimum 3.000 GPA required

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

The two-year 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.

## MDes in Sustainable Urban Environments—Two-Year Program

Complete all courses and requirements listed below unless otherwise indicated.

**CORE**

***Studio***

| | | |
|---|---|---|
| SUEN 6110 | Graduate Studio 1: Sustainable Urban Sites | 6 SH |
| SUEN 6120 | Graduate Studio 2: Sustainable Urban Systems | 6 SH |
| SUEN 7130 | Master's Research Studio: Design and the Resilient City | 6 SH |
| SUEN 7140 | Master's Research Studio: Master's Project | 6 SH |

***Cities: Design and Planning***

| | | |
|---|---|---|
| SUEN 6310 | Cities, Nature, and Design in Contemporary History and Theory | 4 SH |
| SUEN 7320 | Pro-Seminar: Issues in Designed Urban Environments | 4 SH |
| SUEN 6340 | Topics in Urban Environmental Design | 4 SH |
| LPSC 7312 | Cities, Sustainability, and Climate Change | 3 SH |
| LPSC 8400 | Planning Module in Urban Law and Policy | 1 SH |

***Technology***

| | | |
|---|---|---|
| SUEN 6210 | Implementation and Visualization for Urban Environments 1 | 4 SH |
| SUEN 6220 | Implementation and Visualization for Urban Environments 2 | 4 SH |
| SUEN 7230 | Urban Ecologies and Technologies 1 | 4 SH |
| SUEN 7240 | Urban Ecologies and Technologies 2 | 4 SH |

## ELECTIVES

Complete 8 semester hours in the following subject areas:
SUEN, ARCH, PPUA, LPSC
Electives in other disciplines may be taken in consultation with your faculty advisor.

## PROGRAM CREDIT/GPA REQUIREMENTS

64 total semester hours required
Minimum 3.000 GPA required

# ART + DESIGN

**www.northeastern.edu/camd/artdesign/academics/graduate**

NATHAN I. FELDE, MS
*Professor and Chair*

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Northeastern University offers a Master of Fine Arts (MFA) in Studio Art in conjunction with the School of the Museum of Fine Arts, Boston (SMFA), one of the most distinguished art schools in the United States. Rigorous and highly selective, the two-year MFA degree program seeks to prepare you for a career as a working artist or a teacher at the college level. The curriculum integrates practical and critical skills across diverse media and disciplines. You will have an opportunity to hone your practice through individual innovation, creative collaborations, informal mentorship, and academic discourse. MFA students are enrolled at both Northeastern University and the SMFA and graduate in two years with an MFA degree from Northeastern.

The MFA in Studio Art is a professional program that is both rigorous and highly selective. It seeks to prepare students for careers as working artists or as university professors (the MFA is considered a terminal degree in its field). The curriculum integrates practical and critical skills across diverse media and disciplines; students hone their practice through individual innovation, creative collaborations, informal mentorships, and academic discourse.

In this degree program you will complete 44 semester hours of studio work and graduate seminars at SMFA and 16 hours of art history and academic electives (typically four courses) at Northeastern. You will have your own semiprivate studio space and access to SMFA faculty and equipment. A final thesis exhibition is required. The SMFA is part of the Museum of Fine Arts, Boston, one of the most comprehensive art museums in the world with a collection of nearly 450,000 works of fine art.

The department also offers a Master of Fine Arts (MFA) in Information Design and Visualization, a two-year interdisciplinary program that focuses on the analytical and visual communication of information. Graduates will be professionals in visualization who can collaborate as equals with communicators in other fields—people who are able not only to think visually but also to produce effective, meaningful visual information.

Students gain an understanding of the principles of translating data and information into visual, physical, and virtual forms. They learn to integrate theoretical, visual, and technical aspects of structuring and representing data to offer diverse audiences increased access to socially relevant issues. The curriculum is built upon an established undergraduate program in graphic, information, and interaction design. Participants have the

unique advantage of study at a major research university known for interdisciplinary collaboration that is situated in Boston, a global center for biotech, financial, public policy, education, technological, scientific, and social science applications of information design and data visualization.

The program seeks applicants from diverse fields of study—not just visual communications—who are interested in information visualization and communication of information through visual and analytical means. Practicing professionals and recent undergraduates in a variety of fields (architecture, graphic design, journalism, communications, business, the humanities, and sciences) who desire a fluency in information design should apply.

Graduates will be professional information designers able to collaborate effectively in this dynamic and burgeoning field of practice and research. They will be prepared to work in design firms, research firms, corporations, and institutions and government and urban agencies. The program intends to produce professionals skilled in design principles and practices needed to assume leadership roles in an evolving interdisciplinary field. Students will also be well positioned to pursue PhDs and academic careers.

## MFA in Information Design and Visualization

Complete all courses and requirements listed below unless otherwise indicated.

### YEAR 1

***Fall Term Required Courses***

| | | |
|---|---|---|
| ARTG 5100 | Information Design Studio 1—Principles | 4 SH |
| ARTG 5110 | Information Design History | 4 SH |
| ARTG 5130 | Visual Communication for Information Design | 4 SH |
| ARTG 5330 | Visualization Technologies | 4 SH |

***Spring Term Required Courses***

| | | |
|---|---|---|
| ARTG 5120 | Information Design Research Methods | 4 SH |
| ARTG 6100 | Information Design Studio 2—Dynamic Mapping and Models | 4 SH |
| ARTG 6110 | Information Design Theory and Critical Thinking | 4 SH |

***Information Design Elective***

Complete one of the following courses (4 semester hours):

| | | |
|---|---|---|
| ARTG 5310 | Visual Cognition | 4 SH |
| ARTG 5130 | Visual Communication for Information Design | 4 SH |
| ARTG 5310 | Visual Cognition | 4 SH |
| ARTG 5320 | Statistics Basics for Designers | 4 SH |
| ARTG 6310 | Design for Behavior and Experience | 4 SH |
| ARTG 6320 | Design of Information-Rich Environments | 4 SH |
| ARTG 6330 | Information Design Mapping Strategies | 4 SH |
| ARTG 6900 | Special Topics in Information Design | 4 SH |
| ARTG 7996 | Thesis Continuation | 0 SH |

### YEAR 2

***Fall Term Required Courses***

| | | |
|---|---|---|
| ARTG 6200 | Information Design Studio 3—Synthesis | 4 SH |
| ARTG 7100 | Information Design Thesis Seminar | 4 SH |

***Spring Term Required Course***

| | | |
|---|---|---|
| ARTG 7990 | Thesis | 8 SH |

***Information Design Electives***

Complete two of the following courses (8 semester hours):

| | | |
|---|---|---|
| ARTG 5310 | Visual Cognition | 4 SH |
| ARTG 5130 | Visual Communication for Information Design | 4 SH |
| ARTG 5310 | Visual Cognition | 4 SH |
| ARTG 5320 | Statistics Basics for Designers | 4 SH |
| ARTG 6310 | Design for Behavior and Experience | 4 SH |
| ARTG 6320 | Design of Information-Rich Environments | 4 SH |
| ARTG 6330 | Information Design Mapping Strategies | 4 SH |
| ARTG 6900 | Special Topics in Information Design | 4 SH |
| ARTG 7996 | Thesis Continuation | 0 SH |

***Open Elective***

Complete one of the following courses (4 semester hours). In consultation with your faculty advisor, you may select a course of interest in another discipline:

| | | |
|---|---|---|
| ARTG 5310 | Visual Cognition | 4 SH |
| ARTG 5130 | Visual Communication for Information Design | 4 SH |
| ARTG 5310 | Visual Cognition | 4 SH |
| ARTG 5320 | Statistics Basics for Designers | 4 SH |
| ARTG 6310 | Design for Behavior and Experience | 4 SH |
| ARTG 6320 | Design of Information-Rich Environments | 4 SH |
| ARTG 6330 | Information Design Mapping Strategies | 4 SH |
| ARTG 6900 | Special Topics in Information Design | 4 SH |
| ARTG 7996 | Thesis Continuation | 0 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

60 total semester hours required
Minimum 3.000 GPA required

## MFA in Interdisciplinary Arts

Complete all courses and requirements listed below unless otherwise indicated.

### REQUIREMENTS

***Art History Electives***

Complete three of the following courses (12 semester hours):

| | | |
|---|---|---|
| ARTH 5100 | Contemporary Art Theory and Criticism | 4 SH |
| ARTH 5300 | Postmodernism: Theory and Practice in the Visual Arts | 4 SH |
| ARTH 5400 | Contemporary Visual Culture | 4 SH |

| | | |
|---|---|---|
| ARTH 5902 | Special Topics in Art and Design History | 4 SH |
| ARTH 6XXX | (pending approval) | |

***Seminars***

Requires 12–16 semester hours. *Note:* Students may elect to take ARTD 6500 again or an additional studio elective.

PUBLIC SPHERE

| | | |
|---|---|---|
| ARTD 5001 | Arts in the Public Sphere Seminar 1 | 2 SH |
| ARTD 5002 | Arts in the Public Sphere Seminar 2 | 2 SH |
| ARTD 6001 | Arts in the Public Sphere Seminar 3 | 2 SH |
| ARTD 6002 | Arts in the Public Sphere Seminar 4 | 2 SH |

PUBLIC PRACTICE

| | | |
|---|---|---|
| ARTD 6500 | (pending approval) | |

***Studio Electives***

Requires 20–24 semester hours. *Note:* Students may elect to take an additional studio elective or ARTD 6500 again.

| | | |
|---|---|---|
| ARCH 5XXX | (pending approval) | |
| ARTD 5101 | Interactive Media Arts 1 | 4 SH |
| ARTD 5202 | Photographic Media in Cultural Context | 4 SH |
| ARTD 6101 | Interactive Media Arts 2 | 4 SH |
| ARTD 6201 | Interactive Mobile Art Apps | 4 SH |
| ARTG 5100 | Information Design Studio 1—Principles | 4 SH |
| ARTG 5300 | (pending approval) | |
| ARTG 6100 | Information Design Studio 2—Dynamic Mapping and Models | 4 SH |
| ARTH 6976 | Directed Study | 1 to 4 SH |
| ARTS 5100 | Visual Ideation | 4 SH |
| MUSI 5XXX | (pending approval) | |
| THTR 6XXX | (pending approval) | |

## RESEARCH, THESIS, AND EXHIBITION

***Research***

| | | |
|---|---|---|
| ARTD 5301 | Independent Research Project 1 | 4 SH |
| ARTD 6301 | Independent Research Project 2 | 4 SH |

***Thesis and Exhibition***

| | | |
|---|---|---|
| ARTE 7100 | Thesis Proposal | 4 SH |
| ARTE 7990 | Thesis | 4 SH |

## PROGRAM CREDIT/GPA REQUIREMENTS

60 total semester hours required
Minimum 3.000 GPA required

# MFA in Studio Arts—School of the Museum of Fine Arts

Complete all courses and requirements listed below unless otherwise indicated.

## STUDIO ARTS REQUIREMENTS

***Required Courses***

Complete 8 semester hours from the following courses:

| | | |
|---|---|---|
| ARTG 5100 | Information Design Studio 1—Principles | 4 SH |
| ARTG 6100 | Information Design Studio 2—Dynamic Mapping and Models | 4 SH |
| ARTS 6000 | Studio | 4 SH |

***Nonstudio Arts Electives***

Complete 8 semester hours in the ARTH or ARTS subject areas.

***School of the Museum of Fine Arts Courses***

Complete 44 semester hours of SMFA courses.

## PROGRAM CREDIT/GPA REQUIREMENTS

60 total semester hours required
Minimum 3.000 GPA required

# GAME DESIGN

**www.northeastern.edu/camd/gamedesign**

MAGY SEIF EL-NASR, PHD
*Professor and Director*

100 Meserve Hall
617.373.5242
Dara-Lynn Pelechatz, *Administrative Officer*, d.pelechatz@neu.edu

The game design program offers a Master of Science in Game Science and Design. The degree is joint between the College of Arts, Media and Design and the College of Computer and Information Science. This MS degree is focused on the science and design of game development. The degree will weave the design and technology necessary to build a game but focus on the playability and analytics to make the product successful, thus creating a coherent vision enabling students to understand the process of creating successful game products in a player-centric environment.

The degree offers three concentrations:

- Game analytics: focusing on data analysis of gameplay and other game data to make the game successful
- Game user research: focusing on gauging the user experience to enable designers to develop an enjoyable game experience
- Game design and development: focusing on the design or technical side of game development

## ADMISSIONS REQUIREMENTS

Applicants must submit an official application, including the following documents: official transcripts, a statement of purpose projecting their career goals, a description of any experience in the games field and/or a portfolio if available, official GRE General Test, and three letters of recommendation. International students must also submit official scores of the TOEFL examination. Acceptance to the MS in Game Science and Design program is granted upon recommendation from the master's admissions committee after review of the completed application.

Applicants will be expected to have a minimum 3.000 undergraduate GPA. International applicants must have a minimum TOEFL score of 100 (Internet based) or 250 (computer based) or a minimum IELTS of 6.0.

We will consider applications from students who hold a bachelor's degree from any of the following fields or closely related fields:

- Computer science
- Information science
- Informatics
- Engineering
- Human computer interaction
- Psychology
- Social science
- Interaction design
- Game design

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.

## DEGREE REQUIREMENT

This is a two-year, 34-semester-hour degree consisting of the following requirements:

### MS in Game Science and Design

Complete all courses and requirements listed below unless otherwise indicated.

*Note:* The MS in game science and design requires a concentration. Choose from:

- Game analytics
- Game user research
- Game design and development

Consult your college administrator for additional information.

## GENERAL REQUIREMENTS

| | | |
|---|---|---|
| GSND 5110 | Game Design and Analysis | 4 SH |
| GSND 5111 | Seminar for GSND 5110 | 1 SH |
| GSND 5122 | Business Models in the Game Industry | 1 SH |
| GSND 5130 | Usability and Empirical User Research | 4 SH |
| or DSSH 6301 | Introduction to Computational Statistics | 4 SH |

## CONCENTRATION OPTIONS

Complete one of the following concentrations. *Note:* In consultation with your faculty advisor, you may complete another related course offered.

***Game Analytics***

Complete three of the following courses:

| | | |
|---|---|---|
| GSND 6350 | Game Analytics | 4 SH |
| DSCS 6020 | Collecting, Storing, and Retrieving Data | 4 SH |
| DSCS 6030 | Introduction to Data Mining/Machine Learning | 4 SH |
| DSSH 6302 | Information Design and Visual Analytics | 4 SH |

***Game User Research***

Complete three of the following courses:

| | | |
|---|---|---|
| CS 5340 | Computer/Human Interaction | 4 SH |
| GSND 6320 | Psychology of Play | 4 SH |
| GSND 6330 | Game User Research | 4 SH |
| GSND 6340 | Advanced Game User Research | 4 SH |

***Game Design and Development***

Complete three of the following courses:

| | | |
|---|---|---|
| CS 5150 | Game Artificial Intelligence | 4 SH |
| CS 5850 | Building Game Engines | 4 SH |
| GSND 6240 | Exploratory Concept Design | 4 SH |
| GSND 6250 | Spatial and Temporal Design | 4 SH |

**PROJECT/THESIS**

| | |
|---|---|
| GSND 7122 | (pending approval) |

**ELECTIVE REQUIREMENTS**

Complete two courses from concentration lists above.

**PROGRAM CREDIT/GPA REQUIREMENTS**

34 total semester hours required
Minimum 3.000 GPA required

## Graduate Certificate in Game Analytics

The ability to analyze vast amounts of data has become critical as "big data" has rapidly become a competitive space across multiple industries from games to healthcare, urban planning, and social media.

In the game industry, data-driven techniques for analyzing game data have become a strategic necessity. The game development process has shifted from "design, develop, release" to "design, develop, release, and continuously fine-tune based on analytics." All free-to-play games on mobile, tablets, touch devices, and Web-delivered platforms use analytics to develop strategies for monetization and assessment.

As game companies have realized the importance of data analytics in the process of design and production, they dramatically increased the demand for qualified game analysts. Northeastern's unique Graduate Certificate in Game Analytics is a one-year, 20-credit-hour (five courses) program developed to meet this need.

**ADMISSIONS REQUIREMENTS**

Students are considered based on their application package, which includes the following documents:

- Statement of purpose projecting career goals and/or relevant work experience
- A description of any experience in the games field and/or a portfolio, if available
- Transcripts of undergraduate degree with a minimum GPA of 3.000
- General GRE scores
- Minimum TOEFL score of 100 (Internet based) or 250 (computer based) or IELTS score of 6.0 for international students who have a bachelor's degree from a non–English-speaking country
- Three letters of reference from individuals who understand the student's potential for graduate study

Acceptance is based on an assessment of the student's ability to succeed in the advanced course work of the program.

All admitted students will meet with 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 throughout the course work.

**DEGREE REQUIREMENT**

This is a one-year, 20-semester-hour certificate program consisting of the following requirements:

## Graduate Certificate in Game Analytics

Complete all courses and requirements listed below unless otherwise indicated.

**DATA SCIENCE CORE**

| | | |
|---|---|---|
| DSCS 6020 | Collecting, Storing, and Retrieving Data | 4 SH |
| DSCS 6030 | Introduction to Data Mining/Machine Learning | 4 SH |
| DSSH 6302 | Information Design and Visual Analytics | 4 SH |

**GAME SCIENCE AND DESIGN CORE**

| | | |
|---|---|---|
| GSND 5110 | Game Design and Analysis | 4 SH |
| GSND 6350 | Game Analytics | 4 SH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

20 total semester hours required
Minimum 3.000 GPA required

## SCHOOL OF JOURNALISM

**www.northeastern.edu/camd/journalism**

JONATHAN KAUFMAN, MA
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Welcome to the graduate program at Northeastern University's School of Journalism. Our school offers a master of arts in two tracks—professional and media innovation. Our master's program offers a chance to study in Boston with a small and dedicated faculty of specialists with years of experience and contacts at the highest levels of American journalism.

You can study the newest developments in digital media with Jeff Howe, the Wired magazine writer who coined the term "crowdsourcing." Those focusing on broadcast and visual journalism can study with Alan Schroeder, a three-time Emmy Award-winning producer. You are introduced to digital journalism with Dan Kennedy, a well-respected columnist, media critic, author, and creator of the blog Media Nation.

Our tracks offer students opportunities for hands-on training in all aspects of journalism study in preparation for careers as reporters, editors, or multimedia producers. Our program is also suited for anyone who will work in communication fields where information gathering and writing for general audiences is needed.

Full-time students can complete the program in a year by enrolling in classes during the two summer semesters. Students who participate in Northeastern University's nationally recognized cooperative education program will take longer to graduate. It is also possible to enroll part-time. Students have up to seven years to fulfill the requirements of the program.

### MA in Journalism

Complete all courses and requirements listed below unless otherwise indicated.

#### CORE COURSE

| | | |
|---|---|---|
| JRNL 6340 | Fundamentals of Digital Journalism | 4 SH |

#### TRACKS

Complete one of the following two tracks:

***Professional Track***

REQUIRED COURSES

| | | |
|---|---|---|
| JRNL 6200 | Enterprise Reporting 1 | 4 SH |
| JRNL 6201 | Enterprise Reporting 2 | 4 SH |
| JRNL 6202 | Perspective on Journalism Ethics | 4 SH |
| JRNL 6966 | Practicum | 1 to 4 SH |

ELECTIVES

Complete four courses (16 semester hours) in the following ranges. Electives in other disciplines may be taken in consultation with your faculty advisor:

JRNL 5309 to JRNL 6305
JRNL 6310 to JRNL 7976

***Media Innovation Track***

REQUIRED COURSES

| | | |
|---|---|---|
| JRNL 6306 | Media Innovation Studio 1—Fundamentals | 3 SH |
| JRNL 6307 | Media Innovation Studio 2—Intermediate | 3 SH |
| JRNL 6308 | Media Innovation Studio 3—Advanced | 3 SH |

ELECTIVES

Complete five courses (20 semester hours) in the following ranges. Electives in other disciplines may be taken in consultation with your faculty advisor:

ARTG 5100 to ARTG 6900
ARTE 5901 to ARTE 6211
ARTH 5100 to ARTH 6901
Any courses in the following subject areas: ACCT, ENTR, FINA, HRMG, INTB, MECN, MKTG, MGMT, SCHM, and STRT
CS 5010 to CS 5976
CS 6110 to CS 6810
CS 7170 to CS 7880

#### PROGRAM CREDIT/GPA REQUIREMENTS

33 total semester hours required
Minimum 3.000 GPA required

# MUSIC

**www.northeastern.edu/camd/music**

DANIEL STRONG GODFREY, PHD
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The Master of Science in Music Industry Leadership (MMIL) program is an intensive one-year leadership program designed for individuals who want to manage the next generation of music companies. The MMIL offers advanced education in the areas of music management, leadership, research, and entrepreneurship with opportunities for immediate and ongoing application to each student's unique professional aspiration.

The Master of Science program focuses on the core scholarly areas of music industry. Students specialize in one of four curricula pathways: professional, research, entrepreneurship, and practice. Courses seek to provide a solid foundation in music industry theory and analysis while offering students the opportunity to apply the foundational skills to an area of personal interest. Elective courses emphasize the creation and sustainability of music organizations in a rapidly evolving environment. Using an active-learning approach, the program focuses on developing music executives intellectually and ethically, while providing them with a keen appreciation for the complexities of managing in the creative industries. This approach focuses on long-term skill sets that enhance the potential of graduates within a fluid and ever-changing field. The program also emphasizes global leadership qualities that provide a broader vision of the music industry on an international level.

The JD/MS in Music Industry Leadership is a dual-degree program that offers students four opportunities for real-world, experiential learning at the intersection of law and music business. Candidates for the JD/MS program must independently apply and gain admission to the School of Law and the College of Arts, Media and Design. Admission to one school does not ensure admission to the other. Candidates may apply to both schools prior to matriculation at the law school, or students may wait until they are enrolled in the School of Law before seeking admission to the College of Arts, Media and Design. During either the first or second year of law school, students may apply to the MS program during the winter or spring for enrollment the following September. Students enrolled in law school who are interested in pursuing this dual degree should contact the Office of Academic and Student Affairs and Professor Kara Swanson, JD/MS faculty advisor, during the fall or winter of their first or second year for further information.

## Curriculum

The MMIL offers students three curriculum options for degree completion. A minimum of 32 semester hours and nine courses (not including the intensive reporting seminar), with a GPA of 3.000, are required for graduation. Each option is designed to highlight a student's strength and longer-term goals. Consultation with the graduate coordinator prior to degree Commencement is required to establish a student's ideal curricula pathway.

## MS in Music Industry Leadership

Complete all courses and requirements listed below unless otherwise indicated.

### CORE COURSES

| | | |
|---|---|---|
| MUSI 6000 | Management of Music Organizations | 3 SH |
| MUSI 6100 | Music Industry Research Methodology | 3 SH |
| MUSI 6200 | Financial Management in the Music Industry | 3 SH |
| MUSI 6300 | Intellectual Property for Music Management | 3 SH |
| MUSI 6400 | Marketing Strategies in the Music Industry | 3 SH |

### OPTIONS

Complete one of the following four options:

***Professional Option***

BUSINESS AND MUSIC ELECTIVES

Complete 17 semester hours from any courses in the following subject areas:

ACCT, ENTR, FINA, HRMG, INTB, MECN, MKTG, MGMT, SCHM, and STRT

MUSI 6000 to MUSI 7976

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

***Entrepreneurship Option***

CAPSTONE PROJECT

| | | |
|---|---|---|
| MUSI 7980 | Capstone | 4 SH |

BUSINESS AND MUSIC ELECTIVES

Complete 13 semester hours from any courses in the following subject areas:

ACCT, ENTR, FINA, HRMG, INTB, MECN, MKTG, MGMT, SCHM, and STRT

MUSI 6000 to MUSI 7976

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

***Practice Option***

CO-OP WORK EXPERIENCE

| | | |
|---|---|---|
| MUSI 6964 | Co-op Work Experience | 0 SH |

BUSINESS AND MUSIC ELECTIVES
Complete 17 semester hours from any courses in the following subject areas: Any courses in the following subject areas: ACCT, ENTR, FINA, HRMG, INTB, MECN, MKTG, MGMT, SCHM, and STRT
MUSI 6000 to MUSI 7976
Electives in other disciplines may be taken in consultation with your faculty advisor.

***Research Option***

MUSIC ELECTIVES
Complete 9 semester hours from the following courses:
MUSI 6000 to MUSI 7976
Electives in other disciplines may be taken in consultation with your faculty advisor.

THESIS
Requires 8 semester hours:

| | | |
|---|---|---|
| MUSI 7990 | Thesis | 1 to 8 SH |

**PROGRAM CREDIT/GPA REQUIREMENTS**
32 total semester hours required
Minimum 3.000 GPA required

## JD/MS in Music Industry Leadership

Over the course of 45 months, the program enrolls students successively in the School of Law and the College of Arts, Media and Design. JD/MS candidates must complete the first and last years of the program in the School of Law. The year of music industry courses in the College of Arts, Media and Design may be taken during either the second or third year.

## NEC/NU Joint Certificate Programs in Music Performance

The School of Continuing Education at the New England Conservatory (NEC) and the Department of Music at Northeastern University (NU) jointly offer a General Certificate of Merit in Music Performance (24 credits) and a Professional Studies Certificate in Music Performance (48 credits). These programs are geared toward Northeastern undergraduate and graduate students who are interested in improving their abilities to perform on an instrument or voice in the classical or jazz styles.

The certificate in music performance is *in addition to* the student's Northeastern undergraduate or graduate degree—it is an entirely separate and distinct credential. Credits for courses toward the music performance certificate are accumulated and billed separately from credits toward Northeastern undergraduate or graduate degree programs and are not eligible for financial aid.

Courses are offered at NEC (predominantly related to music performance) and at NU (predominantly related to music history and music theory). NEC courses are scheduled during evenings and weekends.

## NEC/NU Joint Certificate Program— General Certificate of Merit in Music Performance

**NORTHEASTERN UNIVERSITY REQUIREMENTS**
Complete 11 credits of course work at Northeastern University as indicated below.

***Music Theory and Musicianship Placement***
All students must take a theory placement exam. Students who do not place into MUSC 1201 or MUSI 1203 must first take the following course:

| | | |
|---|---|---|
| MUSC 1119 | Fundamentals of Western Music Theory | 4 SH |

Credits for MUSC 1119 do not count toward the certificate.

***Music Theory and Musicianship***
Complete 5 credits of course work in music theory and musicianship by completing the following two courses. Music theory and musicianship courses should be taken concurrently:

| | | |
|---|---|---|
| MUSC 1201 | Music Theory 1 | 4 SH |
| with MUSC 1241 | Musicianship 1 | 1 SH |

*Note:* Music majors with a concentration in music industry may substitute the following courses:

| | | |
|---|---|---|
| MUSI 1203 | Music Theory for Music Industry 1 | 4 SH |
| with MUSC 1241 | Musicianship 1 | 1 SH |

***Music History***
Complete 4 credits in music history by completing one course from the following list:

| | | |
|---|---|---|
| MUSC 1104 | Survey of African-American Music | 4 SH |
| MUSC 1105 | Music of the USA | 4 SH |
| MUSC 1111 | Rock Music | 4 SH |
| MUSC 1112 | Jazz | 4 SH |
| MUSC 1121 | Medieval and Renaissance Music | 4 SH |
| MUSC 1122 | Music of the Baroque Era | 4 SH |
| MUSC 1123 | Music of the Classical Era | 4 SH |
| MUSC 1124 | Music of the Romantic Era | 4 SH |
| MUSC 1125 | Twentieth-Century Music | 4 SH |

*Note:* Since the following course is repeatable, music majors and combined majors may count the credits for the *second time* they take this course toward the music performance certificate:

| | | |
|---|---|---|
| MUSC 3550 | Historical Traditions: Special Topics | 4 SH |

***Ensembles***
Complete 2 credits in music ensembles by completing two courses from the following list:

| | | |
|---|---|---|
| MUSC 1904 | Chorus | 1 SH |
| MUSC 1905 | Band | 1 SH |
| MUSC 1906 | Orchestra | 1 SH |
| MUSC 1907 | Wind Ensemble | 1 SH |
| MUSC 1911 | Jazz Ensemble | 1 SH |
| MUSC 1912 | Rock Ensemble | 1 SH |
| MUSC 1913 | Blues/Rock Ensemble | 1 SH |
| MUSC 1914 | Create Your Own Music | 1 SH |
| MUSC 1915 | Chamber Ensemble | 1 SH |
| MUSC 1916 | Contemporary Music Ensemble | 1 SH |
| MUSC 1917 | Jazz Choir and Combo | 1 SH |
| MUSC 1918 | World Music Ensemble | 1 SH |

| | | |
|---|---|---|
| MUSC 1919 | Fusion Ensemble | 1 SH |
| MUSC 1920 | Pep Band | 1 SH |
| MUSC 1921 | World Fusion Ensemble | 1 SH |

## NEW ENGLAND CONSERVATORY REQUIREMENTS

Complete 13 credits of course work at New England Conservatory School of Continuing Education as indicated below.

***Private Studio Instruction***

Complete 8 credits of (repeatable) private studio instruction with New England Conservatory School of Continuing Education faculty. These credits may be accumulated in units of 2, 3, or 4 credits per semester. All private lessons require audition by NEC/NU faculty in order to assign private teacher placement. After being placed with a private teacher, and working with their certificate advisor, students must confirm with that teacher the length and number of lessons they will receive.

| | | |
|---|---|---|
| MPNC 1102 | Music Instruction | 2 SH |
| MPNC 1103 | Music Instruction | 3 SH |
| MPNC 1104 | Music Instruction | 4 SH |

***Music Technology***

Complete 1 semester hour in music technology by completing the following course:

| | | |
|---|---|---|
| MPNC 1201 | Contemporary Music Production and Technology 1 | 1 SH |

***Electives***

Complete 3 credits of elective course work from the following list:

| | | |
|---|---|---|
| MPNC 1301 | Build Your Voice: Art/Skillful Singing | 1 SH |
| MPNC 1401 | Jazz Ear Training 1 | 1 SH |
| MPNC 1411 | Jazz Theory 1 | 1.5 SH |
| MPNC 1421 | Finale Chart Writing | 1 SH |
| MPNC 1451 | Jazz History 1 | 1 SH |
| MPNC 1501 | Introduction to Music-in-Education | 2 SH |
| MPNC 1612 | Group Piano Class | 1 SH |
| MPNC 1621 | The Art of Musical Sight-Reading | 2 to 4 SH |
| MPNC 1622 | The Art of Practice and Performance | 1 SH |
| MPNC 1623 | Developing Perfect Pitch 1 | 1 SH |
| MPNC 1631 | The Accidental Music Teacher: From Musical Artist to Creative Educator | 1.5 SH |
| MPNC 1642 | Sight-Singing for Singers | 1 SH |
| MPNC 1801 | Introduction to Composition 1 | 1 SH |
| MPNC 1802 | Contemporary Improvisation: Skill Building | 2 to 4 SH |
| MPNC 1803 | Contemporary Improvisation: Music of the World—The African Diaspora | 1.5 SH |
| MPNC 1901 | Art and Soul of Cinema: An Appreciation of Film Music | 1.5 SH |
| MPNC 1911 | Latin American Classical Traditions 1 | 1 SH |
| MPNC 2401 | Jazz Ear Training 2 | 1 SH |
| MPNC 2411 | Jazz Theory 2 | 1.5 SH |
| MPNC 2431 | Jazz Composition and Analysis | 1.5 SH |
| MPNC 2451 | Jazz History 2 | 1 SH |
| MPNC 2511 | Music-in-Education Seminar | 2 SH |
| MPNC 2512 | Models for Teaching and Learning for Music-in-Education | 2 SH |
| MPNC 2525 | Art and Science of Assessing Music Learning | 2 SH |
| MPNC 2526 | Music, Brain Development, and Learning | 2 SH |
| MPNC 2547 | Cross-Cultural Alternatives for Music-in-Education | 2 SH |
| MPNC 2548 | Teaching and Learning with Music Technology | 2 SH |
| MPNC 2556 | Improvisation in Music Education | 2 SH |
| MPNC 2561 | String Pedagogy | 2 SH |
| MPNC 2571 | Performing Artists in Schools | 2 SH |
| MPNC 2601 | Music Production for Media | 1 SH |
| MPNC 2612 | Piano Pedagogy | 2 SH |
| MPNC 2623 | Developing Perfect Pitch 2 | 1 SH |
| MPNC 2624 | Advanced Perfect Pitch | 1 SH |
| MPNC 2644 | Bach/Handel Arias for Singers | 1.5 SH |
| MPNC 2801 | Introduction to Composition 2 | 1 SH |
| MPNC 2911 | Latin American Classical Traditions 2 | 1 SH |
| MPNC 3401 | Jazz Ear Training 3 | 1 SH |
| MPNC 3411 | Jazz Theory 3 | 1.5 SH |
| MPNC 3431 | Jazz Arranging | 1.5 SH |
| MPNC 3611 | Piano Interpretation/Performance Seminar | 1 SH |
| MPNC 3631 | Eighteenth-Century Tonal Counterpoint | 2 to 4 SH |
| MPNC 3633 | Modal Counterpoint | 2 to 4 SH |
| MPNC 3641 | Dramatic Coaching of Songs and Arias | 1 SH |
| MPNC 3643 | Vocal Repertoire: Coaching and Performance | 1.5 SH |
| MPNC 3801 | Composition Seminar 1 | 1.5 SH |
| MPNC 3802 | Composition Seminar 2 | 1.5 SH |
| MPNC 4401 | Jazz Ear Training 4 | 1 SH |
| MPNC 4411 | Jazz Theory 4 | 1.5 SH |
| MPNC 4581 | Music-in-Education Guided Internship | 2 SH |
| MPNC 4591 | Music-in-Education Portfolio | 0 SH |

***Ensemble***

Complete 1 credit in music ensemble by completing one course from the following list:

| | | |
|---|---|---|
| MPNC 1712 | Baroque Ensemble | 1 SH |
| MPNC 1713 | NEC Voices: A New Choral Experience | 1.5 SH |
| MPNC 1714 | Renaissance Ensemble | 1 SH |
| MPNC 1716 | Contemporary Improvisation Ensemble: Walking between Worlds | 1.5 SH |
| MPNC 1721 | Guitar Ensemble 1 | 1 SH |
| MPNC 1731 | Jazz Ensemble | 1.5 SH |
| MPNC 1741 | Chamber Music Ensemble | 1 SH |
| MPNC 1742 | Chamber Music Duo | 1 SH |
| MPNC 1751 | Vocal Chamber Music | 1.5 SH |

| | | |
|---|---|---|
| MPNC 1771 | Improvisation and Composition Ensemble | 1.5 SH |
| MPNC 1781 | Medieval Folk Roots Ensemble | 1.5 SH |
| MPNC 3642 | Opera Ensemble Skills | 1 SH |

## NEC/NU Joint Certificate Program—Professional Studies Certificate in Music Performance

### NORTHEASTERN UNIVERSITY REQUIREMENTS

Complete 22 credits of course work at Northeastern University as indicated below.

***Music Theory and Musicianship Placement***

All students must take a theory placement exam. Students who do not place into MUSC 1201 or MUSI 1203 must first take the following course:

| | | |
|---|---|---|
| MUSC 1119 | Fundamentals of Western Music Theory | 4 SH |

Credits for MUSC 1119 do not count toward the certificate.

***Music Theory and Musicianship***

Complete 10 credits of course work in music theory and musicianship by completing the four following courses. Music theory and musicianship courses should be taken concurrently:

| | | |
|---|---|---|
| MUSC 1201 | Music Theory 1 | 4 SH |
| with MUSC 1241 | Musicianship 1 | 1 SH |
| MUSC 1202 | Music Theory 2 | 4 SH |
| with MUSC 1242 | Musicianship 2 | 1 SH |

*Note:* Music majors with a concentration in music industry may substitute the following courses:

| | | |
|---|---|---|
| MUSI 1203 | Music Theory for Music Industry 1 | 4 SH |
| with MUSC 1241 | Musicianship 1 | 1 SH |
| MUSI 1204 | Music Theory for Music Industry 2 | 4 SH |
| with MUSC 1242 | Musicianship 2 | 1 SH |

***Music History***

Complete 4 credits in music history by completing one course from the following list:

| | | |
|---|---|---|
| MUSC 1104 | Survey of African-American Music | 4 SH |
| MUSC 1105 | Music of the USA | 4 SH |
| MUSC 1111 | Rock Music | 4 SH |
| MUSC 1112 | Jazz | 4 SH |
| MUSC 1121 | Medieval and Renaissance Music | 4 SH |
| MUSC 1122 | Music of the Baroque Era | 4 SH |
| MUSC 1123 | Music of the Classical Era | 4 SH |
| MUSC 1124 | Music of the Romantic Era | 4 SH |
| MUSC 1125 | Twentieth-Century Music | 4 SH |

*Note:* Since the following course is repeatable, music majors and combined majors may count the credits for the *second time* they take this course toward the music performance certificate:

| | | |
|---|---|---|
| MUSC 3550 | Historical Traditions: Special Topics | 4 SH |

***Ensembles***

Complete 6 credits in music ensembles by completing six courses from the following list:

| | | |
|---|---|---|
| MUSC 1904 | Chorus | 1 SH |
| MUSC 1905 | Band | 1 SH |
| MUSC 1906 | Orchestra | 1 SH |
| MUSC 1907 | Wind Ensemble | 1 SH |
| MUSC 1911 | Jazz Ensemble | 1 SH |
| MUSC 1912 | Rock Ensemble | 1 SH |
| MUSC 1913 | Blues/Rock Ensemble | 1 SH |
| MUSC 1914 | Create Your Own Music | 1 SH |
| MUSC 1915 | Chamber Ensemble | 1 SH |
| MUSC 1916 | Contemporary Music Ensemble | 1 SH |
| MUSC 1917 | Jazz Choir and Combo | 1 SH |
| MUSC 1918 | World Music Ensemble | 1 SH |
| MUSC 1919 | Fusion Ensemble | 1 SH |
| MUSC 1920 | Pep Band | 1 SH |
| MUSC 1921 | World Fusion Ensemble | 1 SH |

***Recital Preparation and Performance***

Complete 2 credits in recital preparation and performance by completing the following two courses:

| | | |
|---|---|---|
| MUSC 3410 | Recital 1 | 1 SH |
| MUSC 4622 | Recital 2 | 1 SH |

### NEW ENGLAND CONSERVATORY REQUIREMENTS

Complete 26 credits of course work at New England Conservatory School of Continuing Education as indicated below.

***Private Studio Instruction***

Complete 16 credits of (repeatable) private studio instruction with New England Conservatory School of Continuing Education faculty. These credits may be accumulated in units of 2, 3, or 4 credits per semester. All private lessons require audition by NEC/NU faculty in order to assign private teacher placement. After being placed with a private teacher, and working with their certificate advisor, students must confirm with that teacher the length and number of lessons they will receive.

| | | |
|---|---|---|
| MPNC 1102 | Music Instruction | 2 SH |
| MPNC 1103 | Music Instruction | 3 SH |
| MPNC 1104 | Music Instruction | 4 SH |

***Music Technology***

Complete 1 semester hour in music technology by completing the following course:

| | | |
|---|---|---|
| MPNC 1201 | Contemporary Music Production and Technology 1 | 1 SH |

***Electives***

Complete 7 credits of elective course work from the following list:

| | | |
|---|---|---|
| MPNC 1301 | Build Your Voice: Art/Skillful Singing | 1 SH |
| MPNC 1401 | Jazz Ear Training 1 | 1 SH |
| MPNC 1411 | Jazz Theory 1 | 1.5 SH |
| MPNC 1421 | Finale Chart Writing | 1 SH |
| MPNC 1451 | Jazz History 1 | 1 SH |
| MPNC 1501 | Introduction to Music-in-Education | 2 SH |
| MPNC 1612 | Group Piano Class | 1 SH |
| MPNC 1621 | The Art of Musical Sight-Reading | 2 to 4 SH |

| | | |
|---|---|---|
| MPNC 1622 | The Art of Practice and Performance | 1 SH |
| MPNC 1623 | Developing Perfect Pitch 1 | 1 SH |
| MPNC 1631 | The Accidental Music Teacher: From Musical Artist to Creative Educator | 1.5 SH |
| MPNC 1642 | Sight-Singing for Singers | 1 SH |
| MPNC 1801 | Introduction to Composition 1 | 1 SH |
| MPNC 1802 | Contemporary Improvisation: Skill Building | 2 to 4 SH |
| MPNC 1803 | Contemporary Improvisation: Music of the World—The African Diaspora | 1.5 SH |
| MPNC 1901 | Art and Soul of Cinema: An Appreciation of Film Music | 1.5 SH |
| MPNC 1911 | Latin American Classical Traditions 1 | 1 SH |
| MPNC 2401 | Jazz Ear Training 2 | 1 SH |
| MPNC 2411 | Jazz Theory 2 | 1.5 SH |
| MPNC 2431 | Jazz Composition and Analysis | 1.5 SH |
| MPNC 2451 | Jazz History 2 | 1 SH |
| MPNC 2511 | Music-in-Education Seminar | 2 SH |
| MPNC 2512 | Models for Teaching and Learning for Music-in-Education | 2 SH |
| MPNC 2525 | Art and Science of Assessing Music Learning | 2 SH |
| MPNC 2526 | Music, Brain Development, and Learning | 2 SH |
| MPNC 2547 | Cross-Cultural Alternatives for Music-in-Education | 2 SH |
| MPNC 2548 | Teaching and Learning with Music Technology | 2 SH |
| MPNC 2556 | Improvisation in Music Education | 2 SH |
| MPNC 2561 | String Pedagogy | 2 SH |
| MPNC 2571 | Performing Artists in Schools | 2 SH |
| MPNC 2601 | Music Production for Media | 1 SH |
| MPNC 2612 | Piano Pedagogy | 2 SH |
| MPNC 2623 | Developing Perfect Pitch 2 | 1 SH |
| MPNC 2624 | Advanced Perfect Pitch | 1 SH |
| MPNC 2644 | Bach/Handel Arias for Singers | 1.5 SH |
| MPNC 2801 | Introduction to Composition 2 | 1 SH |
| MPNC 2911 | Latin American Classical Traditions 2 | 1 SH |
| MPNC 3401 | Jazz Ear Training 3 | 1 SH |
| MPNC 3411 | Jazz Theory 3 | 1.5 SH |
| MPNC 3431 | Jazz Arranging | 1.5 SH |
| MPNC 3611 | Piano Interpretation/Performance Seminar | 1 SH |
| MPNC 3631 | Eighteenth-Century Tonal Counterpoint | 2 to 4 SH |
| MPNC 3633 | Modal Counterpoint | 2 to 4 SH |
| MPNC 3641 | Dramatic Coaching of Songs and Arias | 1 SH |
| MPNC 3643 | Vocal Repertoire: Coaching and Performance | 1.5 SH |
| MPNC 3801 | Composition Seminar 1 | 1.5 SH |
| MPNC 3802 | Composition Seminar 2 | 1.5 SH |
| MPNC 4401 | Jazz Ear Training 4 | 1 SH |
| MPNC 4411 | Jazz Theory 4 | 1.5 SH |
| MPNC 4581 | Music-in-Education Guided Internship | 2 SH |
| MPNC 4591 | Music-in-Education Portfolio | 0 SH |

***Ensembles***

Complete 2 credits in ensembles by completing two courses from the following list:

| | | |
|---|---|---|
| MPNC 1712 | Baroque Ensemble | 1 SH |
| MPNC 1713 | NEC Voices: A New Choral Experience | 1.5 SH |
| MPNC 1714 | Renaissance Ensemble | 1 SH |
| MPNC 1716 | Contemporary Improvisation Ensemble: Walking between Worlds | 1.5 SH |
| MPNC 1721 | Guitar Ensemble 1 | 1 SH |
| MPNC 1731 | Jazz Ensemble | 1.5 SH |
| MPNC 1741 | Chamber Music Ensemble | 1 SH |
| MPNC 1742 | Chamber Music Duo | 1 SH |
| MPNC 1751 | Vocal Chamber Music | 1.5 SH |
| MPNC 1771 | Improvisation and Composition Ensemble | 1.5 SH |
| MPNC 1781 | Medieval Folk Roots Ensemble | 1.5 SH |
| MPNC 3642 | Opera Ensemble Skills | 1 SH |

# D'Amore-McKim School of Business

www.damore-mckim.northeastern.edu/grad

**HUGH G. COURTNEY, PHD,** *Dean*

**Peggy L. Fletcher, MBA,** *Associate Dean of Finance and Administration*
**Kate E. Klepper, MBA,** *Associate Dean of Graduate Programs*
**Emery A. Trahan, PhD,** *Senior Associate Dean and Dean of Faculty*
**Mario J. Maletta, PhD,** *Senior Associate Dean of Academic Programs*

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617.373.5992
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*Graduate School of Professional Accounting*
412 Dodge Hall
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*Online Business Programs*
350 Dodge Hall
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*Graduate Certificate Programs*
360 Huntington Ave., Building 236-502
617.373.3282
gradcertificates@neu.edu

Modern business faces many challenges from unprecedented political change and the effects of foreign policy, high technology, affirmative action regulations, and new economic policies. These challenges have increased the demand for highly trained individuals equipped to analyze and address our economy's complex social and legal problems.

Programs in the D'Amore-McKim School of Business (DMSB) are designed for students who are preparing to take on managerial responsibility. These programs seek to help students develop the ability to recognize and solve business and organizational problems and understand the role of business in the community, the nation, and the world. The college's goals are to help students develop ideals that are ethically sound and socially desirable; cultivate an awareness of the social, political, and economic developments to which businesses must adapt; develop sound judgment and effective communication skills; and develop their individual interests and talents.

## MASTER OF SCIENCE

Master of Science programs offer students the opportunity for in-depth study in a particular functional business area. Depending on a student's prior academic background, certain prerequisite courses of study may apply.

Designed for undergraduate accounting majors, the Master of Science in Accounting seeks to give you the advanced accounting knowledge and skills you need to sit for the CPA exam. No prior work experience is required.

With an MS in Taxation, you have an opportunity to learn to analyze the Internal Revenue Code, expand your professional network, and advance your career in taxation. Courses begin three times per year: in fall, spring, and summer.

Northeastern's MS in Finance program emphasizes the skills that are essential for a successful career in finance. You can pursue study in either corporate finance or investments.

Northeastern's MS in International Business (MSIB) is designed for globally focused individuals who want to begin careers in international business.

The Master of Science in Innovation is a one-year cohort program for working professionals who want to dive into innovation as it applies to products, services, operations, and processes. The program begins in September.

The Master of Science in Technological Entrepreneurship is an intensive one-year (September to June) 10-course sequence that seeks to teach you the skills you need to know to effectively integrate technology and business.

### MS in Business Analytics

This is a two-year master's degree (31 semester hours) that is structured around four interdisciplinary core courses. After completion of the core, the student will be able to select from courses specific to the MS in Business Analytics.

Students may apply directly to the Master of Science in Business Analytics, or they may apply after successful completion of the Data Science Certificate. In both cases, students will complete the required interdisciplinary core courses before continuing study in business analytics.

#### THE REQUIRED INTERDISCIPLINARY CORE

The four interdisciplinary core courses in data science/analytics serve as a foundation for the professional master's degree in business analytics.

The goal of the core is to provide foundational knowledge in data science/analytics that is applicable to any discipline. Students who complete the core can apply these principles to data-driven decision making in their own discipline.

The four required core courses (16 SH) were developed by an interdisciplinary committee comprised of active researchers who utilize big data. These faculty, many who have interdisciplinary appointments, are from the College of Computer and Information Science, the College of Social Sciences and the Humanities, the D'Amore McKim School of Business, and the College of Arts, Media and Design. The faculty reviewed content of existing master's programs to design the core. The four courses are:

- Introduction to Computational Statistics (pending approval)
- Collecting, Storing, and Retrieving Data (pending approval)
- Data Mining and Machine Learning (pending approval)
- Information Design and Visual Analytics (pending approval)

Following successful completion of the shared core courses, students in the business analytics program would take the following courses:

- Introduction to Business Analytics (pending approval)
- New Media and Digital Marketing Analytics (pending approval)
- Advanced Enterprise Data Practice (pending approval)
- Business Analytics Strategic Capstone (pending approval)
- Business Analytics Elective (pending approval)

### MSA—Master of Science in Accounting

Complete all courses and requirements listed below unless otherwise indicated.

#### GENERAL REQUIREMENTS

***Accounting***

| | | |
|---|---|---|
| ACCT 6203 | Business Entity Taxation | 3 SH |
| ACCT 6204 | Financial Reporting for Integrated Multinational Enterprises | 3 SH |
| ACCT 6229 | Accounting for Foreign Currency Transactions | 1 SH |

***Ethics***

| | | |
|---|---|---|
| ACCT 6253 | Ethics in the Accounting Profession | 3 SH |

***Financial Reporting***

| | | |
|---|---|---|
| ACCT 6207 | Contemporary and Emerging Issues in Financial Reporting | 3 SH |
| ACCT 6216 | Financial Reporting for Governments and Nonprofit Entities | 2 SH |

#### TRACKS

Complete one of the following tracks:

***Audit Track***

REQUIRED COURSE WORK

| | | |
|---|---|---|
| ACCT 6205 | Professional Environment of the Audit and Assurance Industry | 3 SH |
| ACCT 6217 | Corporate Governance, Ethics, and Financial Reporting | 3 SH |
| ACCT 6254 | Accounting Research and Communication | 3 SH |

ELECTIVES

*Note:* An alternative course may be substituted for one of the courses listed below with the approval of the program administrator.

| | | |
|---|---|---|
| ACCT 6255 | Forensic Accounting | 3 SH |
| ACCT 6256 | Internal Auditing | 3 SH |

***Taxation Track***

REQUIRED COURSE WORK

| | | |
|---|---|---|
| ACCT 6231 | Corporations and Shareholders | 3 SH |
| ACCT 6235 | Partners and Partnerships | 3 SH |
| ACCT 6257 | Tax Research and Communication | 3 SH |

ELECTIVES

Complete two of the following courses. *Note:* An alternative course may be substituted for one of the electives listed below with the approval of the program administrator.

| | | |
|---|---|---|
| ACCT 6239 | State and Local Taxation | 3 SH |
| ACCT 6240 | International Taxation: Inbound Transactions | 3 SH |
| ACCT 6246 | Retirement Plans | 3 SH |
| ACCT 6248 | Income Taxation of Trusts and Estates | 3 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

30 total semester hours required
Minimum 3.000 GPA required

## MSA—Master of Science in Accounting—Online Program

Complete all courses and requirements listed below unless otherwise indicated.

### GENERAL REQUIREMENTS

***Accounting***

| | | |
|---|---|---|
| ACCT 6203 | Business Entity Taxation | 3 SH |
| ACCT 6204 | Financial Reporting for Integrated Multinational Enterprises | 3 SH |
| ACCT 6229 | Accounting for Foreign Currency Transactions | 1 SH |

***Ethics***

| | | |
|---|---|---|
| ACCT 6253 | Ethics in the Accounting Profession | 3 SH |

***Financial Reporting***

| | | |
|---|---|---|
| ACCT 6207 | Contemporary and Emerging Issues in Financial Reporting | 3 SH |
| ACCT 6216 | Financial Reporting for Governments and Nonprofit Entities | 2 SH |

### TRACKS

Complete one of the following tracks:

***Audit Track***

REQUIRED COURSE WORK

| | | |
|---|---|---|
| ACCT 6205 | Professional Environment of the Audit and Assurance Industry | 3 SH |
| ACCT 6217 | Corporate Governance, Ethics, and Financial Reporting | 3 SH |
| ACCT 6254 | Accounting Research and Communication | 3 SH |

ELECTIVES

*Note:* An alternative course may be substituted for one of the courses listed below with the approval of the program administrator.

| | | |
|---|---|---|
| ACCT 6255 | Forensic Accounting | 3 SH |
| ACCT 6256 | Internal Auditing | 3 SH |

***Taxation Track***

REQUIRED COURSE WORK

| | | |
|---|---|---|
| ACCT 6231 | Corporations and Shareholders | 3 SH |
| ACCT 6235 | Partners and Partnerships | 3 SH |
| ACCT 6257 | Tax Research and Communication | 3 SH |

ELECTIVES

Complete two of the following courses. *Note:* An alternative course may be substituted for one of the electives listed below with the approval of the program administrator.

| | | |
|---|---|---|
| ACCT 6239 | State and Local Taxation | 3 SH |
| ACCT 6240 | International Taxation: Inbound Transactions | 3 SH |
| ACCT 6246 | Retirement Plans | 3 SH |
| ACCT 6248 | Income Taxation of Trusts and Estates | 3 SH |

### GPA REQUIREMENT

| Semester hours completed | Minimum GPA required |
|---|---|
| 6–11 | 2.500 |
| 12–23 | 2.990 |
| 24 or more | 3.000 |

### PROGRAM CREDIT/GPA REQUIREMENTS

30 total semester hours required
Minimum 3.000 GPA required

## MST—Master of Science in Taxation

Complete all courses and requirements listed below unless otherwise indicated.

### REQUIRED TAXATION COURSES

| | | |
|---|---|---|
| ACCT 6230 | Federal Tax Issues and Analysis | 3 SH |
| ACCT 6231 | Corporations and Shareholders | 3 SH |
| ACCT 6232 | Estate and Gift Taxation | 3 SH |
| ACCT 6233 | Tax Research Methodology | 1.5 SH |
| ACCT 6234 | Tax Practice, Procedure, and Ethics | 1.5 SH |
| ACCT 6235 | Partners and Partnerships | 3 SH |

### TAXATION ELECTIVES

Complete five courses (15 semester hours) in the following range: ACCT 6236 to ACCT 6261

### PROGRAM CREDIT/GPA REQUIREMENTS

30 total semester hours required
Minimum 3.000 GPA required

## MST—Master of Science in Taxation—Online Program

Complete all courses and requirements listed below unless otherwise indicated.

### REQUIRED TAXATION COURSES

***Core Courses***

| | | |
|---|---|---|
| ACCT 6230 | Federal Tax Issues and Analysis | 3 SH |
| ACCT 6231 | Corporations and Shareholders | 3 SH |
| ACCT 6232 | Estate and Gift Taxation | 3 SH |
| ACCT 6235 | Partners and Partnerships | 3 SH |
| ACCT 6292 | Tax Research, Practice, and Ethics | 3 SH |

### TAXATION ELECTIVES

Complete five of the following courses:

| | | |
|---|---|---|
| ACCT 6239 | State and Local Taxation | 3 SH |
| ACCT 6240 | International Taxation: Inbound Transactions | 3 SH |
| ACCT 6241 | International Taxation: Outbound Transactions | 3 SH |
| ACCT 6243 | Advanced Flow-Through Entities | 3 SH |
| ACCT 6246 | Retirement Plans | 3 SH |
| ACCT 6248 | Income Taxation of Trusts and Estates | 3 SH |
| ACCT 6249 | Financial Planning for Investments | 3 SH |
| ACCT 6250 | Financial Planning for Insurance | 3 SH |
| ACCT 6264 | Planning for Estate Tax Issues | 3 SH |
| ACCT 6265 | Tax Accounting for Income Taxes | 3 SH |

### GPA REQUIREMENT

| Semester hours completed | Minimum GPA required |
|---|---|
| 6–11 | 2.500 |
| 12–23 | 2.990 |
| 24 or more | 3.000 |

### PROGRAM CREDIT/GPA REQUIREMENTS

30 total semester hours required
Minimum 3.000 GPA required

## MSF—Master of Science in Finance

Complete all courses and requirements listed below unless otherwise indicated.

### FALL TERM

| | | |
|---|---|---|
| FINA 6201 | Financial Theory and Policy | 3 SH |
| FINA 6202 | Analysis of Financial Institutions and Markets | 3 SH |
| FINA 6205 | Financial Strategy | 3 SH |
| FINA 6206 | Finance Seminar | 3 SH |

### TERM GPA REQUIREMENT

A GPA of 2.500 or higher is required at the end of fall term.

### SPRING TERM

| | | |
|---|---|---|
| FINA 6203 | Investment Analysis | 3 SH |
| FINA 6204 | International Finance Management | 3 SH |
| FINA 6211 | Financial Risk Management | 3 SH |
| FINA 6219 | Portfolio Management | 3 SH |

### TERM GPA REQUIREMENT

A GPA of 2.990 or higher is required at the end of spring term.

### SUMMER TERM

Complete the following two courses (6 semester hours):

| | | |
|---|---|---|
| FINA 6292 | Advanced Topics in Finance | 3 SH |
| FINA 7976 | Directed Study | 1 to 4 SH |

### TERM GPA REQUIREMENT

A GPA of 3.000 or higher is required at the end of summer term.

### PROGRAM CREDIT/GPA REQUIREMENTS

30 total semester hours required
Minimum 3.000 GPA required

## MSF—Master of Science in Finance—Evening/Part-Time Program

Complete all courses and requirements listed below unless otherwise indicated.

### REQUIRED FINANCE COURSES

| | | |
|---|---|---|
| FINA 6201 | Financial Theory and Policy | 3 SH |
| FINA 6202 | Analysis of Financial Institutions and Markets | 3 SH |
| FINA 6203 | Investment Analysis | 3 SH |
| FINA 6204 | International Finance Management | 3 SH |
| FINA 6205 | Financial Strategy | 3 SH |
| FINA 6206 | Finance Seminar | 3 SH |

### FINANCE ELECTIVES

***Finance Electives***

Complete three FINA courses (9 semester hours).

***Business Elective***

Complete one course (3 semester hours) in one of the following subject areas. Note that this course may be a finance course: ACCT, ENTR, FINA, HRMG, INTB, MECN, MKTG, MGMT, SCHM, or STRT.

### GPA REQUIREMENT

| Semester hours completed | Minimum GPA required |
|---|---|
| 6–11 | 2.500 |
| 12 or more | 3.000 |

### PROGRAM CREDIT/GPA REQUIREMENTS

30 total semester hours required
Minimum 3.000 GPA required

## MSF—Master of Science in Finance—Online Program

Complete all courses and requirements listed below unless otherwise indicated.

### REQUIRED FINANCE COURSES

| | | |
|---|---|---|
| FINA 6201 | Financial Theory and Policy | 3 SH |
| FINA 6202 | Analysis of Financial Institutions and Markets | 3 SH |
| FINA 6203 | Investment Analysis | 3 SH |
| FINA 6204 | International Finance Management | 3 SH |
| FINA 6205 | Financial Strategy | 3 SH |
| FINA 6206 | Finance Seminar | 3 SH |

### FINANCE ELECTIVES

Complete four courses (12 semester hours) in the following range: FINA 6211 to FINA 6219

### GPA REQUIREMENT

| Semester hours completed | Minimum GPA required |
|---|---|
| 6–11 | 2.500 |
| 12–23 | 2.990 |

### PROGRAM CREDIT/GPA REQUIREMENTS

30 total semester hours required
Minimum 3.000 GPA required

## MS in Innovation

Complete all courses and requirements listed below unless otherwise indicated.

### REQUIRED COURSES

***Finance***

| | | |
|---|---|---|
| ACCT 6280 | Planning and Budgeting for Innovation | 3 SH |
| BUSN 6280 | How Executives Shape and Lead Innovation and Enterprise Growth | 3 SH |
| ENTR 6217 | Lean Innovation | 3 SH |
| FINA 6284 | Financing Innovation and Growth | 3 SH |

***Management***

| | | |
|---|---|---|
| HRMG 6280 | The Human Side of Innovation | 3 SH |
| HRMG 6281 | Leading and Implementing Innovation in Organizations | 3 SH |
| MGMT 6280 | Innovation for Next-Generation Products and Systems | 3 SH |
| MGSC 6281 | Service Innovation and Management | 3 SH |

***Marketing***

| | | |
|---|---|---|
| MKTG 6280 | Gaining Customer Insight | 3 SH |
| MKTG 6283 | Marketing and Selling Innovation | 3 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

30 total semester hours required
Minimum 3.000 GPA required

## MSIB—Master of Science in International Business

Complete all courses and requirements listed below unless otherwise indicated.

### REQUIRED INTERNATIONAL BUSINESS COURSES

***Core***

| | | |
|---|---|---|
| FINA 6204 | International Finance Management | 3 SH |
| FINA 6209 | Introduction to International Accounting and Finance | 3 SH |
| INTB 6200 | Managing the Global Enterprise | 3 SH |
| INTB 6226 | Becoming a Global Leader | 3 SH |
| MECN 6203 | Global Managerial Economics | 3 SH |
| MKTG 6206 | International Marketing | 3 SH |
| SCHM 6213 | Global Supply Chain Management | 3 SH |

***International Field Study***

| | | |
|---|---|---|
| INTB 6230 | International Field Study | 3 SH |

### INTERNATIONAL BUSINESS ELECTIVES

Complete 6 semester hours in the following subject areas: ACCT, ENTR, FINA, HRMG, INTB, MECN, MKTG, MGMT, SCHM, and STRT.

### GPA REQUIREMENT

| Semester hours completed | Minimum GPA required |
|---|---|
| 6–11 | 2.500 |
| 12–23 | 2.990 |

### PROGRAM CREDIT/GPA REQUIREMENTS

30 total semester hours required
Minimum 3.000 GPA required

## MS in International Management

In collaboration with the International Partnership of Business Schools (IPBS), the Master of Science in International Management is designed to prepare students for careers in global economy. The MIM offers an opportunity to study in two continents, in two very different countries, with very different educational systems. Students who study for their first or second semesters at Northeastern University take the courses listed below. Students who study at Northeastern University during the fall semester earn the Master of Science in International Management from the partner university where they study during their second semester. Students who study at Northeastern University during the spring semester earn the Northeastern University Master of Science in International Management.

Complete all courses and requirements listed below unless otherwise indicated.

### FALL SEMESTER

***Finance and Statistics***

| | | |
|---|---|---|
| FINA 6209 | Introduction to International Accounting and Finance | 3 SH |
| MECN 6203 | Global Managerial Economics | 3 SH |
| MGSC 6209 | Business Statistics | 3 SH |

***Management***

| | | |
|---|---|---|
| INTB 6201 | International Business Management | 3 SH |

***Marketing***

| | | |
|---|---|---|
| MKTG 6206 | International Marketing | 3 SH |

**SPRING SEMESTER**

***Management***

| | | |
|---|---|---|
| FINA 6204 | International Finance Management | 3 SH |
| INTB 6217 | Creating Sustainable Competitive Advantage through Global Innovation | 3 SH |
| INTB 6226 | Becoming a Global Leader | 3 SH |
| INTB 6260 | Advanced Topics in Global Management and Strategy | 3 SH |
| SCHM 6213 | Global Supply Chain Management | 3 SH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

30 total semester hours required
Minimum 3.000 GPA required

## MS in Technological Entrepreneurship

Complete all courses and requirements listed below unless otherwise indicated.

**REQUIRED COURSES**

***Entrepreneurship***

| | | |
|---|---|---|
| ENTR 6200 | Enterprise Growth and Innovation | 3 SH |
| ENTR 6212 | Business Planning for New Ventures | 3 SH |
| ENTR 6218 | Business Model Design and Innovation | 3 SH |
| ENTR 6219 | Financing Ventures from Early Stage to Exit | 3 SH |

***Technology***

| | | |
|---|---|---|
| TECE 6222 | Emerging and Disruptive Technologies | 3 SH |
| TECE 6230 | Entrepreneurial Marketing and Selling | 3 SH |
| TECE 6250 | Lean Design and Development | 3 SH |
| TECE 6300 | Managing a Technology-Based Business | 3 SH |
| TECE 6340 | The Technical Entrepreneur as Leader | 3 SH |

***Elective***

Complete one course (3 semester hours) in one of the following subject areas: ACCT, ENTR, FINA, HRMG, INTB, MECN, MKTG, MGMT, SCHM, or STRT.

**GPA REQUIREMENT**

| Semester hours completed | Minimum GPA required |
|---|---|
| 6–11 | 2.500 |
| 12–23 | 2.990 |
| 24 or more | 3.000 |

**PROGRAM CREDIT/GPA REQUIREMENTS**

30 total semester hours required
Minimum 3.000 GPA required

## MASTER OF BUSINESS ADMINISTRATION

Northeastern University's full-time MBA is a 24-month program designed to enable you to increase your knowledge of business, gain real-world experience, and position yourself for career advancement.

Northeastern's part-time MBA is a flexible, program that allows you to complete your degree on your own timetable, set your own schedule, and specialize in an area that meets your career goals.

The high-tech MBA emphasizes the *business* of innovation. You can go beyond the status quo, studying how to identify opportunities for growth and drive change to products, systems, and processes within your organization.

The executive MBA is a 16-month, part-time program for seasoned professionals ready to expand their knowledge of global business and hone their leadership skills.

As a student in the online MBA program, you have an opportunity to build on your current career success, expand your managerial skills, and put new learning to use in your place of work. This program is offered completely online.

### MBA—Full-Time Program

Complete all courses and requirements listed below unless otherwise indicated.

#### CONCENTRATION OPTIONS

Complete one of the following concentrations:

- Entrepreneurship
- Healthcare management
- Finance—corporate or investment track
- Marketing
- Operations and supply chain management

#### CONCENTRATION

Complete 15 semester hours in one of the following five concentrations:

***Concentration in Entrepreneurship***

BUSINESS PLANNING

| | | |
|---|---|---|
| ENTR 6212 | Business Planning for New Ventures | 3 SH |

ELECTIVES

Complete four of the following courses:

| | | |
|---|---|---|
| ENTR 6214 | Social Enterprise | 3 SH |
| ENTR 6218 | Business Model Design and Innovation | 3 SH |
| ENTR 6219 | Financing Ventures from Early Stage to Exit | 3 SH |
| ENTR 6220 | Family Business Leadership and Governance | 3 SH |
| ENTR 6223 | Cross-Cultural Innovation Management | 3 SH |
| ENTR 6293 | Design Thinking for Market-Driven Innovation | 3 SH |
| FINA 6260 | Entrepreneurial Finance, Innovation Valuation, and Private Equity | 3 SH |
| MGMT 6210 | Law for Managers and Entrepreneurs | 3 SH |
| TECE 6222 | Emerging and Disruptive Technologies | 3 SH |
| TECE 6230 | Entrepreneurial Marketing and Selling | 3 SH |
| TECE 6230 | Entrepreneurial Marketing and Selling | 3 SH |
| TECE 6300 | Managing a Technology-Based Business | 3 SH |
| TECE 6340 | The Technical Entrepreneur as Leader | 3 SH |

***Concentration in Healthcare Management***

INVESTMENT ANALYSIS

| | | |
|---|---|---|
| HRMG 6220 | Health Organization Management | 3 SH |
| STRT 6220 | Strategic Management for Healthcare Organizations | 3 SH |

ADDITIONAL COURSES

| | | |
|---|---|---|
| HINF 5101 | Introduction to Health Informatics and Health Information Systems | 3 SH |
| HINF 6205 | Creation and Application of Medical Knowledge | 3 SH |
| SCHM 6223 | Managing Healthcare Supply Chain | 3 SH |

***Concentration in Marketing***

MARKETING RESEARCH

| | | |
|---|---|---|
| MKTG 6210 | Marketing Research | 3 SH |

ELECTIVES

Complete four of the following courses:

| | | |
|---|---|---|
| MKTG 6212 | International Marketing | 3 SH |
| MKTG 6214 | New Product Development | 3 SH |
| or TECE 6250 | Lean Design and Development | 3 SH |
| MKTG 6216 | Market Focused Strategy | 3 SH |
| MKTG 6218 | Marketing in Service Sector | 3 SH |
| MKTG 6222 | Digital Marketing | 3 SH |
| MKTG 6223 | Brand and Advertising Management | 3 SH |
| MKTG 6224 | B2B and Strategic Sales | 3 SH |
| MKTG 6226 | Consumer Behavior | 3 SH |
| MKTG 6260 | Special Topics in Marketing | 3 SH |
| MGMT 6210 | Law for Managers and Entrepreneurs | 3 SH |

***Concentration in Finance***

INVESTMENT ANALYSIS

| | | |
|---|---|---|
| FINA 6203 | Investment Analysis | 3 SH |

TRACK

Complete one of the following two tracks:

CORPORATE FINANCE TRACK

Complete FINA 6205 or FINA 6260, and complete three of the remaining courses:

| | | |
|---|---|---|
| FINA 6205 | Financial Strategy | 3 SH |
| or FINA 6260 | Entrepreneurial Finance, Innovation Valuation, and Private Equity | 3 SH |
| FINA 6204 | International Finance Management | 3 SH |
| FINA 6205 | Financial Strategy | 3 SH |
| FINA 6211 | Financial Risk Management | 3 SH |
| FINA 6213 | Investment Banking | 3 SH |

| | | |
|---|---|---|
| FINA 6214 | Mergers and Acquisitions | 3 SH |
| FINA 6215 | Business Turnarounds | 3 SH |
| FINA 6216 | Valuation and Value Creation | 3 SH |
| FINA 6217 | Real Estate Finance and Investment | 3 SH |
| FINA 6221 | Entrepreneurial Finance | 3 SH |
| FINA 6222 | Risk Management and Insurance | 3 SH |

INVESTMENTS TRACK

Complete FINA 6211 or FINA 6219, and complete three of the remaining courses:

| | | |
|---|---|---|
| FINA 6211 | Financial Risk Management | 3 SH |
| or FINA 6219 | Portfolio Management | 3 SH |
| FINA 6204 | International Finance Management | 3 SH |
| FINA 6211 | Financial Risk Management | 3 SH |
| FINA 6213 | Investment Banking | 3 SH |
| FINA 6214 | Mergers and Acquisitions | 3 SH |
| FINA 6216 | Valuation and Value Creation | 3 SH |
| FINA 6217 | Real Estate Finance and Investment | 3 SH |
| FINA 6219 | Portfolio Management | 3 SH |
| FINA 6260 | Entrepreneurial Finance, Innovation Valuation, and Private Equity | 3 SH |
| FINA 6360 | Fund Management for Analysts | 1 SH |
| FINA 6361 | Fund Management for Managers | 1 SH |

***Concentration in Operations and Supply Chain Management***

GLOBAL SUPPLY CHAIN MANAGEMENT

| | | |
|---|---|---|
| SCHM 6213 | Global Supply Chain Management | 3 SH |

ELECTIVES

Complete four of the following courses (12 semester hours):

| | | |
|---|---|---|
| SCHM 6211 | The Transportation Industries | 3 SH |
| SCHM 6212 | Executive Roundtable in Supply Chain Management | 3 SH |
| SCHM 6214 | Strategic Sourcing | 3 SH |
| SCHM 6215 | IT Applications in Supply Chain Management | 3 SH |
| SCHM 6216 | Market-Driven Supply Chains | 3 SH |
| SCHM 6218 | Offshore Outsourcing | 3 SH |
| SCHM 6221 | Sustainability and Supply Chain Management | 3 SH |
| SCHM 6222 | Managing Emerging Issues in Supply Chain Management | 3 SH |
| SCHM 6223 | Managing Healthcare Supply Chain | 3 SH |
| MGMT 6210 | Law for Managers and Entrepreneurs | 3 SH |
| MGMT 6214 | Negotiations | 2 or 3 SH |

## TERM 1—FALL

***Management***

| | | |
|---|---|---|
| BUSN 6200 | Career Management | 0 SH |
| MGSC 6205 | Management of Information Resources | 2 SH |

***Financial Reporting***

| | | |
|---|---|---|
| ACCT 6208 | Financial Reporting and Managerial Decision Making | 4 SH |

***Marketing***

| | | |
|---|---|---|
| MKTG 6208 | Marketing and Customer Value | 4 SH |

***Economics***

| | | |
|---|---|---|
| MECN 6208 | Economics for Managerial Decision Making | 2 SH |

***Human Resources***

| | | |
|---|---|---|
| HRMG 6208 | Effective Organizational and Human Behavior | 3 SH |

## TERM GPA REQUIREMENT

A GPA of 3.000 or higher is required at the end of term 1.

## TERM 2—SPRING

***Analysis***

| | | |
|---|---|---|
| MGSC 6207 | Data Analysis for Decision Making | 2 SH |
| STRT 6208 | Strategic Decisions for Growth | 3 SH |

***Management***

Requires 10 semester hours:

| | | |
|---|---|---|
| BUSN 6200 | Career Management | 0 SH |
| BUSN 6207 | Developing Critical Skills in Real Time | 2 SH |
| ENTR 6208 | Innovation and Enterprise Growth | 2 or 3 SH |
| FINA 6208 | Financial Management for Value Creation | 4 SH |
| SCHM 6208 | Managing the Supply Chain | 2 SH |

## TERM GPA REQUIREMENT

A GPA of 3.000 or higher is required at the end of term 2.

## TERM 3—SUMMER

***International Field Study***

| | | |
|---|---|---|
| INTB 6230 | International Field Study | 3 SH |

## TERM GPA REQUIREMENT

A GPA of 3.000 or higher is required at the end of term 3.

## TERM 4 OR TERM 5

***Management***

| | | |
|---|---|---|
| INTB 6208 | Global Management | 3 SH |

## TERM GPA REQUIREMENT

A GPA of 3.000 or higher is required at the end of term 4 and term 5.

## MBA ELECTIVES

Complete 9 semester hours in the following subject areas: ACCT, ENTR, FINA, HRMG, INTB, MECN, MKTG, MGMT, SCHM, and STRT.

## PROGRAM CREDIT/GPA REQUIREMENTS

60 total semester hours required
Minimum 3.000 GPA required

# MBA—Evening/Part-Time Program

Complete all courses and requirements listed below unless otherwise indicated.

## CONCENTRATION OPTIONS

This major requires a concentration. Complete one of the following:

- Marketing
- Finance
- Supply chain management
- Healthcare
- Corporate renewal
- International business
- Entrepreneurship
- Technical entrepreneurship
- Mutual fund management

Consult your college administrator for more information.

## REQUIRED COURSES

***Accounting***

| | | |
|---|---|---|
| ACCT 6200 | Financial Reporting and Managerial Decision Making 1 | 3 SH |
| ACCT 6201 | Financial Reporting and Managerial Decision Making 2 | 1.5 SH |

***Management***

| | | |
|---|---|---|
| HRMG 6200 | Managing People and Organizations | 3 SH |
| INTB 6200 | Managing the Global Enterprise | 3 SH |
| MGSC 6204 | Managing Information Resources | 1.5 SH |
| MGSC 6206 | Management of Service and Manufacturing Operations | 3 SH |

***Marketing***

| | | |
|---|---|---|
| MKTG 6200 | Creating and Sustaining Customer Markets | 3 SH |
| MECN 6200 | Global Competition and Market Dominance | 3 SH |

***Analysis***

| | | |
|---|---|---|
| FINA 6200 | Value Creation through Financial Decision Making | 3 SH |
| MGSC 6200 | Information Analysis | 3 SH |
| STRT 6200 | Strategic Decision Making in a Changing Environment | 3 SH |

***Entrepreneurship***

| | | |
|---|---|---|
| ENTR 6200 | Enterprise Growth and Innovation | 3 SH |

## CONCENTRATION

Complete one of the following concentrations:

***Concentration in Finance***

REQUIRED COURSE WORK

| | | |
|---|---|---|
| FINA 6200 | Value Creation through Financial Decision Making | 3 SH |
| FINA 6205 | Financial Strategy | 3 SH |

RESTRICTED ELECTIVES

Complete two of the following courses:

| | | |
|---|---|---|
| FINA 6204 | International Finance Management | 3 SH |
| FINA 6213 | Investment Banking | 3 SH |
| FINA 6214 | Mergers and Acquisitions | 3 SH |
| FINA 6215 | Business Turnarounds | 3 SH |
| FINA 6216 | Valuation and Value Creation | 3 SH |
| FINA 6221 | Entrepreneurial Finance | 3 SH |
| FINA 6222 | Risk Management and Insurance | 3 SH |
| FINA 6260 | Entrepreneurial Finance, Innovation Valuation, and Private Equity | 3 SH |

***Concentration in Marketing***

REQUIRED COURSE WORK

| | | |
|---|---|---|
| MKTG 6200 | Creating and Sustaining Customer Markets | 3 SH |

RESTRICTED ELECTIVES

Complete 9 semester hours from the following courses:

| | | |
|---|---|---|
| MKTG 6210 | Marketing Research | 3 SH |
| MKTG 6212 | International Marketing | 3 SH |
| MKTG 6214 | New Product Development | 3 SH |
| MKTG 6216 | Market Focused Strategy | 3 SH |
| MKTG 6218 | Marketing in Service Sector | 3 SH |
| MKTG 6222 | Digital Marketing | 3 SH |
| MKTG 6223 | Brand and Advertising Management | 3 SH |
| MKTG 6224 | B2B and Strategic Sales | 3 SH |
| MKTG 6226 | Consumer Behavior | 3 SH |
| MKTG 6260 | Special Topics in Marketing | 3 SH |

***Concentration in Supply Chain Management***

GLOBAL SUPPLY CHAIN MANAGEMENT

| | | |
|---|---|---|
| SCHM 6213 | Global Supply Chain Management | 3 SH |

RESTRICTED ELECTIVES

Complete 9 semester hours from the following courses:

| | | |
|---|---|---|
| SCHM 6211 | The Transportation Industries | 3 SH |
| SCHM 6212 | Executive Roundtable in Supply Chain Management | 3 SH |
| or SCHM 6222 | Managing Emerging Issues in Supply Chain Management | 3 SH |
| SCHM 6213 | Global Supply Chain Management | 3 SH |
| SCHM 6214 | Strategic Sourcing | 3 SH |
| SCHM 6215 | IT Applications in Supply Chain Management | 3 SH |
| SCHM 6221 | Sustainability and Supply Chain Management | 3 SH |
| SCHM 6223 | Managing Healthcare Supply Chain | 3 SH |

***Concentration in Heathcare***

REQUIRED COURSE WORK

| | | |
|---|---|---|
| HINF 5101 | Introduction to Health Informatics and Health Information Systems | 3 SH |
| STRT 6220 | Strategic Management for Healthcare Organizations | 3 SH |
| HRMG 6220 | Health Organization Management | 3 SH |

RESTRICTED ELECTIVE

| | | |
|---|---|---|
| HINF 5101 | Introduction to Health Informatics and Health Information Systems | 3 SH |
| or PHTH 5234 | Economic Perspectives on Health Policy | 3 SH |
| or PHTH 5232 | Evaluating Healthcare Quality | 3 SH |
| or SCHM 6223 | Managing Healthcare Supply Chain | 3 SH |

***Concentration in Corporate Renewal***

REQUIRED COURSE WORK

| | | |
|---|---|---|
| FINA 6200 | Value Creation through Financial Decision Making | 3 SH |

RESTRICTED ELECTIVES

Complete three of the following courses (9 semester hours):

| | | |
|---|---|---|
| ENTR 6214 | Social Enterprise | 3 SH |
| FINA 6215 | Business Turnarounds | 3 SH |
| FINA 6216 | Valuation and Value Creation | 3 SH |
| HRMG 6212 | Creating an Innovative Organization | 3 SH |
| HRMG 6213 | Leadership | 3 SH |
| HRMG 6218 | Great Companies | 3 SH |
| MGMT 6214 | Negotiations | 2 or 3 SH |
| MKTG 6216 | Market Focused Strategy | 3 SH |

***Concentration in International Business***

REQUIRED COURSE WORK

| | | |
|---|---|---|
| INTB 6200 | Managing the Global Enterprise | 3 SH |
| INTB 6212 | Cultural Aspects of International Business | 3 SH |

RESTRICTED ELECTIVES

Complete two of the following courses:

| | | |
|---|---|---|
| FINA 6204 | International Finance Management | 3 SH |
| INTB 6217 | Creating Sustainable Competitive Advantage through Global Innovation | 3 SH |
| INTB 6226 | Becoming a Global Leader | 3 SH |
| INTB 6230 | International Field Study | 3 SH |
| MKTG 6212 | International Marketing | 3 SH |
| SCHM 6213 | Global Supply Chain Management | 3 SH |

***Concentration in Entrepreneurship***

REQUIRED COURSE WORK

| | | |
|---|---|---|
| ENTR 6200 | Enterprise Growth and Innovation | 3 SH |

RESTRICTED ELECTIVES

Complete three of the following courses:

| | | |
|---|---|---|
| ENTR 6212 | Business Planning for New Ventures | 3 SH |
| ENTR 6214 | Social Enterprise | 3 SH |
| ENTR 6218 | Business Model Design and Innovation | 3 SH |
| ENTR 6219 | Financing Ventures from Early Stage to Exit | 3 SH |
| ENTR 6220 | Family Business Leadership and Governance | 3 SH |
| ENTR 6222 | Competing in Dynamic, Innovation-Driven Markets | 3 SH |
| ENTR 6223 | Cross-Cultural Innovation Management | 3 SH |
| ENTR 6293 | Design Thinking for Market-Driven Innovation | 3 SH |
| MGMT 6210 | Law for Managers and Entrepreneurs | 3 SH |
| MKTG 6214 | New Product Development | 3 SH |
| TECE 6300 | Managing a Technology-Based Business | 3 SH |

***Concentration in Technical Entrepreneurship***

REQUIRED COURSE WORK

| | | |
|---|---|---|
| ENTR 6200 | Enterprise Growth and Innovation | 3 SH |

RESTRICTED ELECTIVES

Complete three of the following courses:

| | | |
|---|---|---|
| ENTR 6212 | Business Planning for New Ventures | 3 SH |
| ENTR 6222 | Competing in Dynamic, Innovation-Driven Markets | 3 SH |
| FINA 6260 | Entrepreneurial Finance, Innovation Valuation, and Private Equity | 3 SH |
| TECE 6222 | Emerging and Disruptive Technologies | 3 SH |
| TECE 6250 | Lean Design and Development | 3 SH |
| TECE 6300 | Managing a Technology-Based Business | 3 SH |
| TECE 6340 | The Technical Entrepreneur as Leader | 3 SH |

***Concentration in Mutual Fund Management***

REQUIRED COURSE WORK

| | | |
|---|---|---|
| FINA 6200 | Value Creation through Financial Decision Making | 3 SH |
| FINA 6203 | Investment Analysis | 3 SH |
| FINA 6219 | Portfolio Management | 3 SH |

RESTRICTED ELECTIVE

| | | |
|---|---|---|
| FINA 6360 | Fund Management for Analysts | 1 SH |
| or FINA 6361 | Fund Management for Managers | 1 SH |

## ELECTIVES

A minimum of 15 elective semester hours is required. Additional courses may be required to reach the 60-semester-hour minimum required for this program.

MARKETING

| | | |
|---|---|---|
| MKTG 6210 | Marketing Research | 3 SH |
| MKTG 6212 | International Marketing | 3 SH |
| MKTG 6214 | New Product Development | 3 SH |
| MKTG 6216 | Market Focused Strategy | 3 SH |
| MKTG 6218 | Marketing in Service Sector | 3 SH |
| MKTG 6222 | Digital Marketing | 3 SH |
| MKTG 6223 | Brand and Advertising Management | 3 SH |
| MKTG 6224 | B2B and Strategic Sales | 3 SH |
| MKTG 6226 | Consumer Behavior | 3 SH |
| MKTG 6260 | Special Topics in Marketing | 3 SH |

FINANCE GROUP A

| | | |
|---|---|---|
| FINA 6203 | Investment Analysis | 3 SH |
| FINA 6204 | International Finance Management | 3 SH |
| FINA 6211 | Financial Risk Management | 3 SH |
| FINA 6212 | Fixed Income Securities and Risk | 3 SH |
| FINA 6213 | Investment Banking | 3 SH |
| FINA 6217 | Real Estate Finance and Investment | 3 SH |
| FINA 6218 | Personal Financial Planning | 3 SH |
| FINA 6219 | Portfolio Management | 3 SH |
| FINA 6222 | Risk Management and Insurance | 3 SH |

| | | |
|---|---|---|
| FINANCE GROUP B | | |
| FINA 6205 | Financial Strategy | 3 SH |
| FINA 6204 | International Finance Management | 3 SH |
| FINA 6213 | Investment Banking | 3 SH |
| FINA 6214 | Mergers and Acquisitions | 3 SH |
| FINA 6215 | Business Turnarounds | 3 SH |
| FINA 6216 | Valuation and Value Creation | 3 SH |
| FINA 6221 | Entrepreneurial Finance | 3 SH |
| FINA 6222 | Risk Management and Insurance | 3 SH |
| FINA 6260 | Entrepreneurial Finance, Innovation Valuation, and Private Equity | 3 SH |
| SUPPLY CHAIN MANAGEMENT | | |
| SCHM 6210 | Supply Chain Management | 3 SH |
| SCHM 6211 | The Transportation Industries | 3 SH |
| SCHM 6212 | Executive Roundtable in Supply Chain Management | 3 SH |
| or SCHM 6222 | Managing Emerging Issues in Supply Chain Management | 3 SH |
| SCHM 6213 | Global Supply Chain Management | 3 SH |
| SCHM 6214 | Strategic Sourcing | 3 SH |
| SCHM 6215 | IT Applications in Supply Chain Management | 3 SH |
| SCHM 6221 | Sustainability and Supply Chain Management | 3 SH |
| SCHM 6223 | Managing Healthcare Supply Chain | 3 SH |
| ENTREPRENEURSHIP | | |
| ENTR 6212 | Business Planning for New Ventures | 3 SH |
| ENTR 6214 | Social Enterprise | 3 SH |
| ENTR 6218 | Business Model Design and Innovation | 3 SH |
| ENTR 6219 | Financing Ventures from Early Stage to Exit | 3 SH |
| ENTR 6220 | Family Business Leadership and Governance | 3 SH |
| ENTR 6222 | Competing in Dynamic, Innovation-Driven Markets | 3 SH |
| ENTR 6223 | Cross-Cultural Innovation Management | 3 SH |
| ENTR 6293 | Design Thinking for Market-Driven Innovation | 3 SH |
| MGMT 6210 | Law for Managers and Entrepreneurs | 3 SH |
| MKTG 6214 | New Product Development | 3 SH |
| TECE 6300 | Managing a Technology-Based Business | 3 SH |
| TECHNICAL ENTREPRENEURSHIP | | |
| TECE 6222 | Emerging and Disruptive Technologies | 3 SH |
| TECE 6230 | Entrepreneurial Marketing and Selling | 3 SH |
| TECE 6250 | Lean Design and Development | 3 SH |
| TECE 6300 | Managing a Technology-Based Business | 3 SH |
| TECE 6340 | The Technical Entrepreneur as Leader | 3 SH |
| ENTR 6212 | Business Planning for New Ventures | 3 SH |
| ENTR 6222 | Competing in Dynamic, Innovation-Driven Markets | 3 SH |
| FINA 6260 | Entrepreneurial Finance, Innovation Valuation, and Private Equity | 3 SH |
| HEALTHCARE | | |
| HINF 5105 | The American Healthcare System | 3 SH |
| HRMG 6220 | Health Organization Management | 3 SH |
| STRT 6220 | Strategic Management for Healthcare Organizations | 3 SH |
| HINF 5101 | Introduction to Health Informatics and Health Information Systems | 3 SH |
| PHTH 5232 | Evaluating Healthcare Quality | 3 SH |
| PHTH 5234 | Economic Perspectives on Health Policy | 3 SH |
| SCHM 6223 | Managing Healthcare Supply Chain | 3 SH |
| MUTUAL FUND MANAGEMENT | | |
| FINA 6203 | Investment Analysis | 3 SH |
| FINA 6219 | Portfolio Management | 3 SH |
| FINA 6360 | Fund Management for Analysts | 1 SH |
| FINA 6361 | Fund Management for Managers | 1 SH |
| INTERNATIONAL BUSINESS | | |
| INTB 6212 | Cultural Aspects of International Business | 3 SH |
| FINA 6204 | International Finance Management | 3 SH |
| INTB 6217 | Creating Sustainable Competitive Advantage through Global Innovation | 3 SH |
| INTB 6226 | Becoming a Global Leader | 3 SH |
| INTB 6230 | International Field Study | 3 SH |
| MKTG 6212 | International Marketing | 3 SH |
| SCHM 6213 | Global Supply Chain Management | 3 SH |
| CORPORATE RENEWAL | | |
| ENTR 6214 | Social Enterprise | 3 SH |
| FINA 6215 | Business Turnarounds | 3 SH |
| FINA 6216 | Valuation and Value Creation | 3 SH |
| HRMG 6212 | Creating an Innovative Organization | 3 SH |
| HRMG 6213 | Leadership | 3 SH |
| HRMG 6218 | Great Companies | 3 SH |
| MGMT 6214 | Negotiations | 2 or 3 SH |
| MKTG 6214 | New Product Development | 3 SH |
| MKTG 6216 | Market Focused Strategy | 3 SH |

## GPA REQUIREMENT

| Semester hours completed | Minimum GPA required |
|---|---|
| 6–11 | 2.500 |
| 12–23 | 2.990 |
| 24 or more | 3.000 |

## PROGRAM CREDIT/GPA REQUIREMENTS

60 total semester hours required
Minimum 3.000 GPA required

## MBA—Executive Program

Complete all courses and requirements listed below unless otherwise indicated.

### YEAR 1—SPRING TERM

***Residency***

| | | |
|---|---|---|
| HRMG 6290 | Building High Performance Teams | 2 SH |
| MGMT 6293 | Developing an Executive Understanding of Business Law and Intellectual Property | 3 SH |
| MGMT 6296 | Managerial Communication and Presentations | 2 SH |

***Accounting***

| | | |
|---|---|---|
| ACCT 6290 | Interpreting and Evaluating Financial Statements | 3 SH |

***Management***

| | | |
|---|---|---|
| HRMG 6291 | Leveraging Organizational Development, Motivation, and Leadership for Organizational Effectiveness | 2 SH |
| MECN 6290 | How Economics and Politics Affect U.S. Businesses | 3 SH |

***Marketing***

| | | |
|---|---|---|
| MKTG 6290 | Creating and Sustaining Markets | 3 SH |

***Finance***

| | | |
|---|---|---|
| FINA 6290 | Financial Tools and Decision Making for Executives | 3 SH |

### TERM GPA REQUIREMENT

A GPA of 3.000 or higher is required at the end of year 1—spring term.

### YEAR 1—SUMMER TERM

***Residency 2***

***Management***

| | | |
|---|---|---|
| MGSC 6291 | Creating Value through Process Improvement | 2 SH |
| MGSC 6292 | Delivering Competitive Advantage through IT Strategy | 2 SH |
| SCHM 6290 | Sourcing, Making, and Delivering Goods in a Dynamic, Global Business Environment | 2 SH |

### TERM GPA REQUIREMENT

A GPA of 3.000 or higher is required at the end of year 1—summer term.

### YEAR 1—FALL TERM

***Strategy***

| | | |
|---|---|---|
| STRT 6291 | Changing the Strategic Viewpoint for Competitive Advantage | 2 SH |

***Accounting***

| | | |
|---|---|---|
| ACCT 6291 | Identifying Strategic Implications in Accounting Data | 3 SH |

***Management***

| | | |
|---|---|---|
| HRMG 6292 | Using Human Resource Management for Competitive Advantage | 2 SH |
| INTB 6290 | Managing in Diverse Cultures to Execute Global Strategy | 3 SH |

***Marketing***

| | | |
|---|---|---|
| MKTG 6293 | Leveraging Traditional and Digital Platforms for New Marketing Strategy | 2 SH |

***Finance***

| | | |
|---|---|---|
| FINA 6291 | Creating Value in a Global Business Environment | 3 SH |

***Residency 3***

| | | |
|---|---|---|
| INTB 6290 | Managing in Diverse Cultures to Execute Global Strategy | 3 SH |

### TERM GPA REQUIREMENT

A GPA of 3.000 or higher is required at the end of year 1—fall term.

### YEAR 2—SPRING TERM

***Marketing***

Complete the following three courses (6 semester hours):

| | | |
|---|---|---|
| INTB 6291 | Expanding Globally for New Competitive Advantage | 1.5 or 2 SH |
| INTB 6292 | Global Economic and Political Environments | 2 SH |
| MKTG 6292 | Best Practices for New Product and Services Development | 2 SH |

***Management***

| | | |
|---|---|---|
| MGMT 6293 | Developing an Executive Understanding of Business Law and Intellectual Property | 3 SH |
| MGMT 6295 | Leadership for High Performance and Organizational Change | 2 SH |
| HRMG 6294 | Hallmarks of Effective Leadership | 2 SH |

***Residency 4***

| | | |
|---|---|---|
| INTB 6294 | International Residency in China and Hong Kong | 3 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

60 total semester hours required
Minimum 3.000 GPA required

## MBA—Online Program

Complete all courses and requirements listed below unless otherwise indicated.

### REQUIRED COURSES

***Accounting***

| | | |
|---|---|---|
| ACCT 6272 | Financial Statement Preparation and Analysis | 2.25 SH |
| ACCT 6273 | Identifying Strategic Implications in Accounting Data | 2.25 SH |

***Management***

| | | |
|---|---|---|
| HRMG 6200 | Managing People and Organizations | 3 SH |
| INTB 6200 | Managing the Global Enterprise | 3 SH |
| MGSC 6204 | Managing Information Resources | 1.5 SH |
| MGSC 6206 | Management of Service and Manufacturing Operations | 3 SH |
| MGMT 6213 | Managing Ethics in the Workplace and Marketplace | 2 SH |

***Marketing***

| | | |
|---|---|---|
| MKTG 6200 | Creating and Sustaining Customer Markets | 3 SH |
| MECN 6200 | Global Competition and Market Dominance | 3 SH |

***Analysis***

| | | |
|---|---|---|
| FINA 6200 | Value Creation through Financial Decision Making | 3 SH |
| MGSC 6200 | Information Analysis | 3 SH |
| STRT 6200 | Strategic Decision Making in a Changing Environment | 3 SH |

***Entrepreneurship***

| | | |
|---|---|---|
| ENTR 6200 | Enterprise Growth and Innovation | 3 SH |

## ELECTIVES

Complete 15 semester hours of electives from the following specialization lists. No specialization is required. A specialization requires at least 9 semester hours (three courses) from the course list for that specialization. A dual specialization requires 15 semester hours (five courses)—the required course plus two courses from the course list for each discipline. Consult your program administrator for further details.

***Specializations***

A specialization requires at least 9 semester hours (three courses) from the course list for that specialization.

SPECIALIZATION IN FINANCE

| | | |
|---|---|---|
| FINA 6203 | Investment Analysis | 3 SH |
| FINA 6204 | International Finance Management | 3 SH |
| FINA 6205 | Financial Strategy | 3 SH |
| FINA 6213 | Investment Banking | 3 SH |
| FINA 6214 | Mergers and Acquisitions | 3 SH |
| FINA 6215 | Business Turnarounds | 3 SH |
| FINA 6216 | Valuation and Value Creation | 3 SH |
| FINA 6220 | Healthcare Finance | 3 SH |
| FINA 6225 | Entrepreneurial Finance for High Tech Companies | 3 SH |
| MECN 6205 | Sustainability and the Economics of Markets | 3 SH |

SPECIALIZATION IN HEALTHCARE MANAGEMENT

| | | |
|---|---|---|
| FINA 6220 | Healthcare Finance | 3 SH |
| MGSC 6221 | Introduction to Health Informatics and Health Information Systems | 3 SH |
| MGMT 6222 | Healthcare Industry | 3 SH |
| MGMT 6223 | Strategic Decision Making for Healthcare Professionals | 3 SH |

SPECIALIZATION IN HIGH-TECHNOLOGY MANAGEMENT

| | | |
|---|---|---|
| FINA 6225 | Entrepreneurial Finance for High Tech Companies | 3 SH |
| HRMG 6217 | Virtual, Vicious Teams: Building and Leading High-Performance Teams | 3 SH |
| MGMT 6283 | Business Law, Corporate Governance, and Intellectual Property Strategies | 3 SH |

SPECIALIZATION IN INNOVATION ENTREPRENEURSHIP

| | | |
|---|---|---|
| ENTR 6210 | Managing Operations in Early Stage Ventures | 3 SH |
| ENTR 6211 | Entrepreneurship: Services and Retail Business Creation | 3 SH |
| ENTR 6212 | Business Planning for New Ventures | 3 SH |
| ENTR 6216 | Global Social Entrepreneurship and Innovation | 3 SH |
| FINA 6225 | Entrepreneurial Finance for High Tech Companies | 3 SH |
| MKTG 6214 | New Product Development | 3 SH |

SPECIALIZATION IN INTERNATIONAL MANAGEMENT

| | | |
|---|---|---|
| ENTR 6216 | Global Social Entrepreneurship and Innovation | 3 SH |
| INTB 6212 | Cultural Aspects of International Business | 3 SH |
| INTB 6217 | Creating Sustainable Competitive Advantage through Global Innovation | 3 SH |
| FINA 6204 | International Finance Management | 3 SH |
| MKTG 6212 | International Marketing | 3 SH |
| SCHM 6213 | Global Supply Chain Management | 3 SH |

SPECIALIZATION IN MARKETING

| | | |
|---|---|---|
| MKTG 6210 | Marketing Research | 3 SH |
| MKTG 6212 | International Marketing | 3 SH |
| MKTG 6214 | New Product Development | 3 SH |
| MKTG 6216 | Market Focused Strategy | 3 SH |
| MKTG 6218 | Marketing in Service Sector | 3 SH |
| MKTG 6222 | Digital Marketing | 3 SH |
| MKTG 6223 | Brand and Advertising Management | 3 SH |

SPECIALIZATION IN SUPPLY CHAIN MANAGEMENT

| | | |
|---|---|---|
| SCHM 6210 | Supply Chain Management | 3 SH |
| SCHM 6211 | The Transportation Industries | 3 SH |
| SCHM 6213 | Global Supply Chain Management | 3 SH |
| SCHM 6220 | Growing and Protecting Business Value through the Supply Chain | 3 SH |
| SCHM 6221 | Sustainability and Supply Chain Management | 3 SH |

SPECIALIZATION IN SUSTAINABILITY

| | | |
|---|---|---|
| MECN 6205 | Sustainability and the Economics of Markets | 3 SH |
| MGMT 6225 | Sustainability and Leadership | 3 SH |

| | | |
|---|---|---|
| MGMT 6226 | Sustainability and the Business Environment | 3 SH |
| SCHM 6221 | Sustainability and Supply Chain Management | 3 SH |

***Dual Specializations***

A dual specialization requires 15 semester hours (five courses)—the required course plus two courses from the course list for each discipline.

SPECIALIZATION IN FINANCE AND HEALTHCARE MANAGEMENT

REQUIRED COURSE

| | | |
|---|---|---|
| FINA 6220 | Healthcare Finance | 3 SH |

FINANCE

| | | |
|---|---|---|
| FINA 6203 | Investment Analysis | 3 SH |
| FINA 6204 | International Finance Management | 3 SH |
| FINA 6205 | Financial Strategy | 3 SH |
| FINA 6213 | Investment Banking | 3 SH |
| FINA 6214 | Mergers and Acquisitions | 3 SH |
| FINA 6215 | Business Turnarounds | 3 SH |
| FINA 6216 | Valuation and Value Creation | 3 SH |
| FINA 6225 | Entrepreneurial Finance for High Tech Companies | 3 SH |
| MECN 6205 | Sustainability and the Economics of Markets | 3 SH |

HEALTHCARE MANAGEMENT

| | | |
|---|---|---|
| FINA 6220 | Healthcare Finance | 3 SH |
| MGSC 6221 | Introduction to Health Informatics and Health Information Systems | 3 SH |
| MGMT 6222 | Healthcare Industry | 3 SH |
| MGMT 6223 | Strategic Decision Making for Healthcare Professionals | 3 SH |

SPECIALIZATION IN FINANCE AND HIGH-TECHNOLOGY MANAGEMENT

REQUIRED COURSE

| | | |
|---|---|---|
| FINA 6225 | Entrepreneurial Finance for High Tech Companies | 3 SH |

FINANCE

| | | |
|---|---|---|
| FINA 6203 | Investment Analysis | 3 SH |
| FINA 6204 | International Finance Management | 3 SH |
| FINA 6205 | Financial Strategy | 3 SH |
| FINA 6213 | Investment Banking | 3 SH |
| FINA 6214 | Mergers and Acquisitions | 3 SH |
| FINA 6215 | Business Turnarounds | 3 SH |
| FINA 6216 | Valuation and Value Creation | 3 SH |
| FINA 6220 | Healthcare Finance | 3 SH |
| MECN 6205 | Sustainability and the Economics of Markets | 3 SH |

HIGH-TECHNOLOGY MANAGEMENT

| | | |
|---|---|---|
| HRMG 6217 | Virtual, Vicious Teams: Building and Leading High-Performance Teams | 3 SH |
| MGMT 6283 | Business Law, Corporate Governance, and Intellectual Property Strategies | 3 SH |

SPECIALIZATION IN FINANCE AND INNOVATION ENTREPRENEURSHIP

REQUIRED COURSE

| | | |
|---|---|---|
| FINA 6225 | Entrepreneurial Finance for High Tech Companies | 3 SH |

FINANCE

| | | |
|---|---|---|
| FINA 6203 | Investment Analysis | 3 SH |
| FINA 6204 | International Finance Management | 3 SH |
| FINA 6205 | Financial Strategy | 3 SH |
| FINA 6213 | Investment Banking | 3 SH |
| FINA 6214 | Mergers and Acquisitions | 3 SH |
| FINA 6215 | Business Turnarounds | 3 SH |
| FINA 6216 | Valuation and Value Creation | 3 SH |
| FINA 6220 | Healthcare Finance | 3 SH |
| MECN 6205 | Sustainability and the Economics of Markets | 3 SH |

INNOVATION ENTREPRENEURSHIP

| | | |
|---|---|---|
| ENTR 6210 | Managing Operations in Early Stage Ventures | 3 SH |
| ENTR 6211 | Entrepreneurship: Services and Retail Business Creation | 3 SH |
| ENTR 6212 | Business Planning for New Ventures | 3 SH |
| ENTR 6216 | Global Social Entrepreneurship and Innovation | 3 SH |
| MKTG 6214 | New Product Development | 3 SH |

SPECIALIZATION IN FINANCE AND INTERNATIONAL MANAGEMENT

REQUIRED COURSE

| | | |
|---|---|---|
| FINA 6204 | International Finance Management | 3 SH |

FINANCE

| | | |
|---|---|---|
| FINA 6203 | Investment Analysis | 3 SH |
| FINA 6205 | Financial Strategy | 3 SH |
| FINA 6213 | Investment Banking | 3 SH |
| FINA 6214 | Mergers and Acquisitions | 3 SH |
| FINA 6215 | Business Turnarounds | 3 SH |
| FINA 6216 | Valuation and Value Creation | 3 SH |
| FINA 6220 | Healthcare Finance | 3 SH |
| FINA 6225 | Entrepreneurial Finance for High Tech Companies | 3 SH |
| MECN 6205 | Sustainability and the Economics of Markets | 3 SH |

INTERNATIONAL MANAGEMENT

| | | |
|---|---|---|
| ENTR 6216 | Global Social Entrepreneurship and Innovation | 3 SH |
| INTB 6212 | Cultural Aspects of International Business | 3 SH |
| INTB 6217 | Creating Sustainable Competitive Advantage through Global Innovation | 3 SH |
| MKTG 6212 | International Marketing | 3 SH |
| SCHM 6213 | Global Supply Chain Management | 3 SH |

SPECIALIZATION IN FINANCE AND SUSTAINABILITY

REQUIRED COURSE

| | | |
|---|---|---|
| MECN 6205 | Sustainability and the Economics of Markets | 3 SH |

FINANCE

| | | |
|---|---|---|
| FINA 6203 | Investment Analysis | 3 SH |
| FINA 6204 | International Finance Management | 3 SH |
| FINA 6205 | Financial Strategy | 3 SH |
| FINA 6213 | Investment Banking | 3 SH |
| FINA 6214 | Mergers and Acquisitions | 3 SH |
| FINA 6215 | Business Turnarounds | 3 SH |
| FINA 6216 | Valuation and Value Creation | 3 SH |
| FINA 6220 | Healthcare Finance | 3 SH |
| FINA 6225 | Entrepreneurial Finance for High Tech Companies | 3 SH |

SUSTAINABILITY

| | | |
|---|---|---|
| MGMT 6225 | Sustainability and Leadership | 3 SH |
| MGMT 6226 | Sustainability and the Business Environment | 3 SH |
| SCHM 6221 | Sustainability and Supply Chain Management | 3 SH |

SPECIALIZATION IN HIGH-TECHNOLOGY MANAGEMENT AND INNOVATION ENTREPRENEURSHIP

REQUIRED COURSE

| | | |
|---|---|---|
| FINA 6225 | Entrepreneurial Finance for High Tech Companies | 3 SH |

HIGH-TECHNOLOGY MANAGEMENT

| | | |
|---|---|---|
| HRMG 6217 | Virtual, Vicious Teams: Building and Leading High-Performance Teams | 3 SH |
| MGMT 6283 | Business Law, Corporate Governance, and Intellectual Property Strategies | 3 SH |

INNOVATION ENTREPRENEURSHIP

| | | |
|---|---|---|
| ENTR 6210 | Managing Operations in Early Stage Ventures | 3 SH |
| ENTR 6211 | Entrepreneurship: Services and Retail Business Creation | 3 SH |
| ENTR 6212 | Business Planning for New Ventures | 3 SH |
| ENTR 6216 | Global Social Entrepreneurship and Innovation | 3 SH |
| MKTG 6214 | New Product Development | 3 SH |

SPECIALIZATION IN INNOVATION ENTREPRENEURSHIP AND INTERNATIONAL MANAGEMENT

REQUIRED COURSE

| | | |
|---|---|---|
| ENTR 6216 | Global Social Entrepreneurship and Innovation | 3 SH |

INNOVATION ENTREPRENEURSHIP

| | | |
|---|---|---|
| ENTR 6210 | Managing Operations in Early Stage Ventures | 3 SH |
| ENTR 6211 | Entrepreneurship: Services and Retail Business Creation | 3 SH |
| ENTR 6212 | Business Planning for New Ventures | 3 SH |
| FINA 6225 | Entrepreneurial Finance for High Tech Companies | 3 SH |
| MKTG 6214 | New Product Development | 3 SH |

INTERNATIONAL MANAGEMENT

| | | |
|---|---|---|
| INTB 6212 | Cultural Aspects of International Business | 3 SH |
| INTB 6217 | Creating Sustainable Competitive Advantage through Global Innovation | 3 SH |
| FINA 6204 | International Finance Management | 3 SH |
| MKTG 6212 | International Marketing | 3 SH |
| SCHM 6213 | Global Supply Chain Management | 3 SH |

SPECIALIZATION IN INNOVATION ENTREPRENEURSHIP AND MARKETING

REQUIRED COURSE

| | | |
|---|---|---|
| MKTG 6214 | New Product Development | 3 SH |

INNOVATION ENTREPRENEURSHIP

| | | |
|---|---|---|
| ENTR 6210 | Managing Operations in Early Stage Ventures | 3 SH |
| ENTR 6211 | Entrepreneurship: Services and Retail Business Creation | 3 SH |
| ENTR 6212 | Business Planning for New Ventures | 3 SH |
| ENTR 6216 | Global Social Entrepreneurship and Innovation | 3 SH |
| FINA 6225 | Entrepreneurial Finance for High Tech Companies | 3 SH |

MARKETING

| | | |
|---|---|---|
| MKTG 6210 | Marketing Research | 3 SH |
| MKTG 6212 | International Marketing | 3 SH |
| MKTG 6216 | Market Focused Strategy | 3 SH |
| MKTG 6218 | Marketing in Service Sector | 3 SH |
| MKTG 6222 | Digital Marketing | 3 SH |
| MKTG 6223 | Brand and Advertising Management | 3 SH |
| MGMT 6225 | Sustainability and Leadership | 3 SH |

SPECIALIZATION IN INTERNATIONAL MANAGEMENT AND MARKETING

REQUIRED COURSE

| | | |
|---|---|---|
| MKTG 6212 | International Marketing | 3 SH |

INTERNATIONAL MANAGEMENT

| | | |
|---|---|---|
| ENTR 6216 | Global Social Entrepreneurship and Innovation | 3 SH |
| INTB 6212 | Cultural Aspects of International Business | 3 SH |
| INTB 6217 | Creating Sustainable Competitive Advantage through Global Innovation | 3 SH |
| FINA 6204 | International Finance Management | 3 SH |
| SCHM 6213 | Global Supply Chain Management | 3 SH |

MARKETING

| | | |
|---|---|---|
| MKTG 6210 | Marketing Research | 3 SH |
| MKTG 6214 | New Product Development | 3 SH |
| MKTG 6216 | Market Focused Strategy | 3 SH |

| | | |
|---|---|---|
| MKTG 6218 | Marketing in Service Sector | 3 SH |
| MKTG 6222 | Digital Marketing | 3 SH |
| MKTG 6223 | Brand and Advertising Management | 3 SH |

SPECIALIZATION IN INTERNATIONAL MANAGEMENT AND SUPPLY CHAIN MANAGEMENT

REQUIRED COURSE

| | | |
|---|---|---|
| SCHM 6213 | Global Supply Chain Management | 3 SH |

INTERNATIONAL MANAGEMENT

| | | |
|---|---|---|
| ENTR 6216 | Global Social Entrepreneurship and Innovation | 3 SH |
| INTB 6212 | Cultural Aspects of International Business | 3 SH |
| INTB 6217 | Creating Sustainable Competitive Advantage through Global Innovation | 3 SH |
| FINA 6204 | International Finance Management | 3 SH |
| MKTG 6212 | International Marketing | 3 SH |

SUPPLY CHAIN MANAGEMENT

| | | |
|---|---|---|
| SCHM 6210 | Supply Chain Management | 3 SH |
| SCHM 6211 | The Transportation Industries | 3 SH |
| SCHM 6220 | Growing and Protecting Business Value through the Supply Chain | 3 SH |
| SCHM 6221 | Sustainability and Supply Chain Management | 3 SH |

SPECIALIZATION IN SUPPLY CHAIN MANAGEMENT AND SUSTAINABILITY

REQUIRED COURSE

| | | |
|---|---|---|
| SCHM 6221 | Sustainability and Supply Chain Management | 3 SH |

SUPPLY CHAIN MANAGEMENT

| | | |
|---|---|---|
| SCHM 6210 | Supply Chain Management | 3 SH |
| SCHM 6211 | The Transportation Industries | 3 SH |
| SCHM 6213 | Global Supply Chain Management | 3 SH |
| SCHM 6220 | Growing and Protecting Business Value through the Supply Chain | 3 SH |

SUSTAINABILITY

| | | |
|---|---|---|
| MECN 6205 | Sustainability and the Economics of Markets | 3 SH |
| MGMT 6225 | Sustainability and Leadership | 3 SH |
| MGMT 6226 | Sustainability and the Business Environment | 3 SH |

### GPA REQUIREMENT

| Semester hours completed | Minimum GPA required |
|---|---|
| 6–11 | 2.500 |
| 12–23 | 2.990 |
| 24 or more | 3.000 |

### PROGRAM CREDIT/GPA REQUIREMENTS

50 total semester hours required
Minimum 3.000 GPA required

## DUAL DEGREES

With an MSA/MBA from Northeastern, you can earn two degrees—an MS in Accounting and an MBA—in just 15 months. This program is designed for liberal arts, nonaccounting majors. The program includes a three-month, paid internship that may lead to full-time placement in public accounting upon completion.

The MS in Finance/MBA (MSF/MBA) program is open to students admitted to the full-time MBA program, the evening MBA program, the online MBA program, or the MS in Finance program.

Northeastern's School of Nursing and D'Amore-McKim School of Business offer the MS/MBA in Nursing program, linking graduate-level management education with specific clinical and organizational issues relevant to nurse managers. The MS/MBA program seeks to provide students with the knowledge, skills, and attitudes necessary to understand, shape, and respond to the dynamic forces at play in today's healthcare environment.

The JD/MBA is a powerful combination that seeks to equip candidates to operate with equal facility in the increasingly interdependent legal and business spheres. Northeastern University offers an accelerated 45-month program in which students concurrently earn an MBA through the D'Amore-McKim School of Business and a JD through the School of Law. Northeastern's dynamic co-op program gives students hands-on experience in combining the legal and business worlds.

## MSF/MBA—Online Program

### MSF/MBA REQUIRED COURSES

***Accounting***

| | | |
|---|---|---|
| ACCT 6272 | Financial Statement Preparation and Analysis | 2.25 SH |
| ACCT 6273 | Identifying Strategic Implications in Accounting Data | 2.25 SH |

***Management***

| | | |
|---|---|---|
| HRMG 6200 | Managing People and Organizations | 3 SH |
| INTB 6200 | Managing the Global Enterprise | 3 SH |
| MGMT 6213 | Managing Ethics in the Workplace and Marketplace | 2 SH |
| MGSC 6204 | Managing Information Resources | 1.5 SH |
| MGSC 6206 | Management of Service and Manufacturing Operations | 3 SH |

***Marketing***

| | | |
|---|---|---|
| MKTG 6200 | Creating and Sustaining Customer Markets | 3 SH |
| MECN 6200 | Global Competition and Market Dominance | 3 SH |

***Finance and Analysis***

| | | |
|---|---|---|
| FINA 6200 | Value Creation through Financial Decision Making | 3 SH |
| FINA 6203 | Investment Analysis | 3 SH |
| FINA 6204 | International Finance Management | 3 SH |

| | | |
|---|---|---|
| FINA 6205 | Financial Strategy | 3 SH |
| MGSC 6200 | Information Analysis | 3 SH |
| STRT 6200 | Strategic Decision Making in a Changing Environment | 3 SH |

***Entrepreneurship***

| | | |
|---|---|---|
| ENTR 6200 | Enterprise Growth and Innovation | 3 SH |

***Seminar***

| | | |
|---|---|---|
| FINA 6206 | Finance Seminar | 3 SH |

### MSF/MBA ELECTIVES

***Finance Electives***

Complete 9 semester hours of finance electives.

***Business Electives***

Complete two courses (6 semester hours) in the following subject areas. Note that these courses may include finance courses: ACCT, ENTR, FINA, HRMG, INTB, MECN, MKTG, MGMT, SCHM, and STRT.

### GPA REQUIREMENT

| Semester hours completed | Minimum GPA required |
|---|---|
| 6–11 | 2.500 |
| 12–23 | 2.990 |
| 24 or more | 3.000 |

### PROGRAM CREDIT/GPA REQUIREMENTS

62 total semester hours required
Minimum 3.000 GPA required

## MSA/MBA—Professional Accounting Program

Complete all courses and requirements listed below unless otherwise indicated.

### TERM 1—SUMMER A

***Corporate Reporting 1***

| | | |
|---|---|---|
| ACCT 6220 | Corporate Financial Reporting and Decision Making 1 | 3 SH |

***Management***

| | | |
|---|---|---|
| HRMG 6200 | Managing People and Organizations | 3 SH |

### TERM 1—SUMMER B

***Corporate Reporting 2***

| | | |
|---|---|---|
| ACCT 6221 | Corporate Financial Reporting and Decision Making 2 | 6 SH |

***Global Competition***

| | | |
|---|---|---|
| MECN 6200 | Global Competition and Market Dominance | 3 SH |

***Information Analysis***

| | | |
|---|---|---|
| MGSC 6200 | Information Analysis | 3 SH |

### TERM GPA REQUIREMENT

A GPA of 2.500 or higher is required at the end of term 1.

### TERM 2—FALL

***Corporate Government***

| | | |
|---|---|---|
| ACCT 6217 | Corporate Governance, Ethics, and Financial Reporting | 3 SH |
| ACCT 6222 | Corporate and Governmental/Nonprofit Financial Reporting and Decision Making | 6 SH |

***Audit***

| | | |
|---|---|---|
| ACCT 6223 | Audit and Other Assurance Services | 6 SH |

***Taxation***

| | | |
|---|---|---|
| ACCT 6224 | Taxation of Individuals and Business Entities | 6 SH |

***Information Systems***

| | | |
|---|---|---|
| MGSC 6201 | Information Systems and Technology | 3 SH |

### TERM GPA REQUIREMENT

A GPA of 2.670 or higher is required at the end of term 2.

### TERM 3—SPRING

***Internship***

| | | |
|---|---|---|
| BUSN 6964 | Co-op Work Experience | 0 SH |

***Cost Management***

| | | |
|---|---|---|
| ACCT 6226 | Strategic Cost Management | 3 SH |

***Service and Manufacturing Operations***

| | | |
|---|---|---|
| MGSC 6206 | Management of Service and Manufacturing Operations | 3 SH |

### TERM GPA REQUIREMENT

A GPA of 2.830 or higher is required at the end of term 3.

### TERM 4—SUMMER A

***Accounting***

| | | |
|---|---|---|
| ACCT 6227 | Accounting for Business Combinations | 3 SH |

***Entrepreneurship***

| | | |
|---|---|---|
| ENTR 6211 | Entrepreneurship: Services and Retail Business Creation | 3 SH |

***Financial Decision Making***

| | | |
|---|---|---|
| FINA 6200 | Value Creation through Financial Decision Making | 3 SH |

***Customer Markets***

| | | |
|---|---|---|
| MKTG 6200 | Creating and Sustaining Customer Markets | 3 SH |

### TERM 4—SUMMER B

***Accounting***

| | | |
|---|---|---|
| ACCT 6228 | Contemporary Issues in Accounting Theory | 3 SH |

***Business Law and Ethics***

| | | |
|---|---|---|
| MGMT 6211 | Business Law and Professional Ethics | 3 SH |

***Global Enterprise***

| | | |
|---|---|---|
| INTB 6200 | Managing the Global Enterprise | 3 SH |

***Strategic Decision Making***

| | | |
|---|---|---|
| STRT 6200 | Strategic Decision Making in a Changing Environment | 3 SH |

## PROGRAM CREDIT/GPA REQUIREMENTS

72 total semester hours required
Minimum 3.000 GPA required

## MSF/MBA—Full-Time Program

Complete all courses and requirements listed below unless otherwise indicated.

## TERM 1—FALL

***Management***

| | | |
|---|---|---|
| BUSN 6200 | Career Management | 0 SH |
| MGSC 6205 | Management of Information Resources | 2 SH |

***Financial Reporting***

| | | |
|---|---|---|
| ACCT 6208 | Financial Reporting and Managerial Decision Making | 4 SH |

***Marketing***

| | | |
|---|---|---|
| MKTG 6208 | Marketing and Customer Value | 4 SH |

***Economics***

| | | |
|---|---|---|
| MECN 6208 | Economics for Managerial Decision Making | 2 SH |

***Human Resources***

| | | |
|---|---|---|
| HRMG 6208 | Effective Organizational and Human Behavior | 3 SH |

## TERM GPA REQUIREMENT

A GPA of 3.000 or higher is required at the end of term 1.

## TERM 2—SPRING

***Analysis***

| | | |
|---|---|---|
| MGSC 6207 | Data Analysis for Decision Making | 2 SH |
| STRT 6208 | Strategic Decisions for Growth | 3 SH |

***Management***

Requires 10 semester hours:

| | | |
|---|---|---|
| BUSN 6200 | Career Management | 0 SH |
| BUSN 6207 | Developing Critical Skills in Real Time | 2 SH |
| ENTR 6208 | Innovation and Enterprise Growth | 2 or 3 SH |
| FINA 6208 | Financial Management for Value Creation | 4 SH |
| SCHM 6208 | Managing the Supply Chain | 2 SH |

## TERM GPA REQUIREMENT

A GPA of 3.000 or higher is required at the end of term 2.

## ADDITIONAL REQUIRED CORE COURSES

***Finance Core Courses***

| | | |
|---|---|---|
| FINA 6203 | Investment Analysis | 3 SH |
| FINA 6204 | International Finance Management | 3 SH |
| FINA 6205 | Financial Strategy | 3 SH |
| FINA 6206 | Finance Seminar | 3 SH |

***International Field Study***

| | | |
|---|---|---|
| INTB 6230 | International Field Study | 3 SH |

***Management***

| | | |
|---|---|---|
| INTB 6208 | Global Management | 3 SH |

## ELECTIVES

***Finance Electives***

Complete four FINA courses (12 semester hours).

***Business Electives***

Complete three courses (12 semester hours) in the following subject areas. Note that these courses may be finance courses: ACCT, ENTR, FINA, HRMG, INTB, MECN, MKTG, MGMT, SCHM, or STRT.

***Nonfinance Business Electives***

Complete two courses (6 semester hours) in the following subject areas: ACCT, ENTR, HRMG, INTB, MECN, MKTG, MGMT, SCHM, and STRT.

## PROGRAM CREDIT/GPA REQUIREMENTS

72 total semester hours required
Minimum 3.000 GPA required

## MSF/MBA—Evening/Part-Time Program

Complete all courses and requirements listed below unless otherwise indicated.

## REQUIRED COURSES

***Accounting***

| | | |
|---|---|---|
| ACCT 6200 | Financial Reporting and Managerial Decision Making 1 | 3 SH |
| ACCT 6201 | Financial Reporting and Managerial Decision Making 2 | 1.5 SH |

***Management***

| | | |
|---|---|---|
| HRMG 6200 | Managing People and Organizations | 3 SH |
| INTB 6200 | Managing the Global Enterprise | 3 SH |
| MGSC 6204 | Managing Information Resources | 1.5 SH |
| MGSC 6206 | Management of Service and Manufacturing Operations | 3 SH |

***Marketing***

| | | |
|---|---|---|
| MKTG 6200 | Creating and Sustaining Customer Markets | 3 SH |
| MECN 6200 | Global Competition and Market Dominance | 3 SH |

***Analysis***

| | | |
|---|---|---|
| FINA 6200 | Value Creation through Financial Decision Making | 3 SH |
| MGSC 6200 | Information Analysis | 3 SH |
| STRT 6200 | Strategic Decision Making in a Changing Environment | 3 SH |

***Entrepreneurship***

| | | |
|---|---|---|
| ENTR 6200 | Enterprise Growth and Innovation | 3 SH |

### ADDITIONAL REQUIRED CORE COURSES

| | | |
|---|---|---|
| FINA 6203 | Investment Analysis | 3 SH |
| FINA 6204 | International Finance Management | 3 SH |
| FINA 6205 | Financial Strategy | 3 SH |
| FINA 6206 | Finance Seminar | 3 SH |

### ELECTIVES

***Finance Electives***

Complete 12 semester hours of FINA courses.

***Business Electives***

Complete 15 semester hours of courses in the following subject areas. Note that these courses may include finance courses: ACCT, ENTR, FINA, HRMG, INTB, MECN, MKTG, MGMT, SCHM, and STRT.

### GPA REQUIREMENT

| Semester hours completed | Minimum GPA required |
|---|---|
| 6–11 | 2.500 |
| 12–23 | 2.990 |
| 24 or more | 3.000 |

### PROGRAM CREDIT/GPA REQUIREMENTS

72 total semester hours required
Minimum 3.000 GPA required

## MS in Nursing/MBA

Complete all courses and requirements listed below unless otherwise indicated.

### BUSINESS REQUIREMENTS

| | | |
|---|---|---|
| ACCT 6272 | Financial Statement Preparation and Analysis | 2.25 SH |
| ACCT 6273 | Identifying Strategic Implications in Accounting Data | 2.25 SH |
| ENTR 6200 | Enterprise Growth and Innovation | 3 SH |
| FINA 6200 | Value Creation through Financial Decision Making | 3 SH |
| INTB 6200 | Managing the Global Enterprise | 3 SH |
| MECN 6200 | Global Competition and Market Dominance | 3 SH |
| MGSC 6200 | Information Analysis | 3 SH |
| MGSC 6206 | Management of Service and Manufacturing Operations | 3 SH |
| MKTG 6200 | Creating and Sustaining Customer Markets | 3 SH |
| STRT 6200 | Strategic Decision Making in a Changing Environment | 3 SH |

Complete one business specialization course (3 semester hours).
Complete one business specialization course (1 semester hour).

### NURSING REQUIREMENTS

| | | |
|---|---|---|
| NRSG 5118 | Healthcare System and Professional Role Development | 3 SH |
| NRSG 5121 | Epidemiology and Population Health | 3 SH |
| NRSG 6301 | Human Resources and Operations | 3 SH |
| NRSG 6302 | Health Policy and Law | 3 SH |
| NRSG 6305 | Case Management | 3 SH |
| NRSG 6306 | Health Informatics | 3 SH |
| NRSG 6307 | Operational Informatics in Healthcare Organizations | 3 SH |
| NRSG 6500 | Nursing Administration Practicum 1 | 4 SH |
| NRSG 6501 | Nursing Administration Practicum 2 | 4 SH |
| NRSG 7105 | Translating Research Evidence into Practice | 3 SH |
| NRSG 7110 | Evidence-Based Practice Research Application | 2 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

66.5 total semester hours required
Minimum 3.000 GPA required

## JD/MBA

Concurrent degree candidates follow a set schedule, as follows:

### YEAR 1

Nine months of traditional first-year law study, followed by a three-month legal co-op in the summer.

### YEAR 2 AND YEAR 3

Twelve months of courses in the business school, three months of law school courses during the fall and spring quarters, and two law/business co-ops in the winter and summer quarters.

### YEAR 4

Three months of law school courses in the fall, a final law/business co-op in the winter, and three months of law courses in the spring, with Commencement ceremonies for both schools in the spring.

## CERTIFICATE PROGRAMS

Certificate programs allow students the opportunity to earn graduate business-level credit without enrolling in a degree program. To earn a certificate, students must maintain a final GPA of 3.000 within a maximum period of three years (two years for the online certificate). An individual course may only count toward a single certificate.

Courses completed with a GPA of 3.000 or better may be transferred into a relevant Northeastern master's degree.

### Graduate Certificate in Business Administration

Students will earn their Graduate Certificate in Business Administration after completing 12 credits. They can take any available courses from the part-time MBA schedule offered each semester. Students must bear prerequisites in mind should they want to enroll in a class where prerequisites are required. With the advice of their academic advisors, students tailor their own course of study either within a specific discipline or across disciplines.

Complete all courses and requirements listed below unless otherwise indicated.

#### REQUIREMENTS

Requires 12 semester hours. Below are some suggested tracks; however, a track is not required. *Note:* The part-time MBA track and the international student track require an additional 3 semester hours.

#### PART-TIME MBA TRACK

This track is for students who are specifically interested in pursuing the part-time MBA upon completion of the certificate program. Upon successful completion of this track students are eligible to waive the GMAT/GRE requirement for admission into the part-time MBA and part-time MBA/MS Finance programs. To be eligible for the GMAT/GRE waiver, one must complete the prescribed courses listed below with a B or better in each and earn a minimum cumulative GPA of 3.300.

| | | |
|---|---|---|
| ACCT 6200 | Financial Reporting and Managerial Decision Making 1 | 3 SH |
| ACCT 6201 | Financial Reporting and Managerial Decision Making 2 | 1.5 SH |
| FINA 6200 | Value Creation through Financial Decision Making | 3 SH |
| HRMG 6200 | Managing People and Organizations | 3 SH |
| MGSC 6200 | Information Analysis | 3 SH |
| MGSC 6204 | Managing Information Resources | 1.5 SH |

#### INTERNATIONAL STUDENT TRACK

This track is an opportunity for international students to study full-time earning 15 graduate credits over two consecutive semesters. Students must take the following five core MBA courses as they become available for this particular section and must be enrolled full-time in their first semester of study.

| | | |
|---|---|---|
| ACCT 6200 | Financial Reporting and Managerial Decision Making 1 | 3 SH |
| ENTR 6200 | Enterprise Growth and Innovation | 3 SH |
| HRMG 6200 | Managing People and Organizations | 3 SH |
| INTB 6200 | Managing the Global Enterprise | 3 SH |
| MKTG 6200 | Creating and Sustaining Customer Markets | 3 SH |

#### ADDITIONAL SUGGESTED TRACKS

***Accounting and finance***

| | | |
|---|---|---|
| ACCT 6200 | Financial Reporting and Managerial Decision Making 1 | 3 SH |
| ACCT 6201 | Financial Reporting and Managerial Decision Making 2 | 1.5 SH |
| FINA 6200 | Value Creation through Financial Decision Making | 3 SH |
| FINA 6203 | Investment Analysis | 3 SH |
| FINA 6219 | Portfolio Management | 3 SH |
| MGSC 6200 | Information Analysis | 3 SH |

***CPA Exam Prerequisites***

| | | |
|---|---|---|
| FINA 6200 | Value Creation through Financial Decision Making | 3 SH |
| MECN 6200 | Global Competition and Market Dominance | 3 SH |
| MGMT 6210 | Law for Managers and Entrepreneurs | 3 SH |
| MGSC 6204 | Managing Information Resources | 1.5 SH |

***Innovation and Entrepreneurship***

| | | |
|---|---|---|
| ENTR 6200 | Enterprise Growth and Innovation | 3 SH |
| ENTR 6212 | Business Planning for New Ventures | 3 SH |
| ENTR 6214 | Social Enterprise | 3 SH |
| ENTR 6220 | Family Business Leadership and Governance | 3 SH |

***International Business***

| | | |
|---|---|---|
| INTB 6200 | Managing the Global Enterprise | 3 SH |
| INTB 6212 | Cultural Aspects of International Business | 3 SH |
| INTB 6224 | Competing to Win in Emerging Markets | 3 SH |
| INTB 6226 | Becoming a Global Leader | 3 SH |
| MECN 6200 | Global Competition and Market Dominance | 3 SH |

***Healthcare***

| | | |
|---|---|---|
| HINF 5101 | Introduction to Health Informatics and Health Information Systems | 3 SH |
| HRMG 6220 | Health Organization Management | 3 SH |
| PHTH 5232 | Evaluating Healthcare Quality | 3 SH |
| SCHM 6223 | Managing Healthcare Supply Chain | 3 SH |

***Human Resources***

| | | |
|---|---|---|
| HRMG 6200 | Managing People and Organizations | 3 SH |
| HRMG 6212 | Creating an Innovative Organization | 3 SH |
| HRMG 6213 | Leadership | 3 SH |
| HRMG 6218 | Great Companies | 3 SH |
| MGMT 6214 | Negotiations | 2 or 3 SH |

***Marketing***

| | | |
|---|---|---|
| MKTG 6200 | Creating and Sustaining Customer Markets | 3 SH |
| MKTG 6222 | Digital Marketing | 3 SH |
| MKTG 6223 | Brand and Advertising Management | 3 SH |
| MKTG 6224 | B2B and Strategic Sales | 3 SH |
| MKTG 6226 | Consumer Behavior | 3 SH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

12 total semester hours required

Minimum 3.000 GPA required

## Graduate Certificate in Business Administration—Online Program

Complete all courses and requirements listed below unless otherwise indicated.

**TRACK**

Complete one of the following six tracks:

***Management Track***

TRACK GRADE/GPA REQUIREMENT

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

A GPA of 3.300 is required.

REQUIRED COURSES

| | | |
|---|---|---|
| ACCT 6201 | Financial Reporting and Managerial Decision Making 2 | 1.5 SH |
| HRMG 6200 | Managing People and Organizations | 3 SH |
| MGSC 6200 | Information Analysis | 3 SH |
| MGSC 6204 | Managing Information Resources | 1.5 SH |
| FINA 6200 | Value Creation through Financial Decision Making | 3 SH |

***Accounting-Finance Track***

TRACK GPA REQUIREMENT

A GPA of 3.000 is required.

REQUIRED COURSES

| | | |
|---|---|---|
| ACCT 6200 | Financial Reporting and Managerial Decision Making 1 | 3 SH |
| ACCT 6201 | Financial Reporting and Managerial Decision Making 2 | 1.5 SH |
| MGSC 6200 | Information Analysis | 3 SH |
| FINA 6200 | Value Creation through Financial Decision Making | 3 SH |

ELECTIVE

Complete one of the following courses:

| | | |
|---|---|---|
| FINA 6203 | Investment Analysis | 3 SH |
| FINA 6204 | International Finance Management | 3 SH |
| FINA 6205 | Financial Strategy | 3 SH |
| FINA 6211 | Financial Risk Management | 3 SH |
| FINA 6212 | Fixed Income Securities and Risk | 3 SH |
| FINA 6213 | Investment Banking | 3 SH |
| FINA 6214 | Mergers and Acquisitions | 3 SH |
| FINA 6215 | Business Turnarounds | 3 SH |
| FINA 6216 | Valuation and Value Creation | 3 SH |
| FINA 6217 | Real Estate Finance and Investment | 3 SH |
| FINA 6218 | Personal Financial Planning | 3 SH |
| FINA 6219 | Portfolio Management | 3 SH |
| FINA 6221 | Entrepreneurial Finance | 3 SH |
| FINA 6222 | Risk Management and Insurance | 3 SH |
| FINA 6260 | Entrepreneurial Finance, Innovation Valuation, and Private Equity | 3 SH |

***Innovation and Entrepreneurship Track***

TRACK GPA REQUIREMENT

A GPA of 3.000 is required.

REQUIRED COURSES

| | | |
|---|---|---|
| ENTR 6200 | Enterprise Growth and Innovation | 3 SH |
| ENTR 6212 | Business Planning for New Ventures | 3 SH |

ELECTIVES

Complete two of the following courses:

| | | |
|---|---|---|
| ENTR 6210 | Managing Operations in Early Stage Ventures | 3 SH |
| ENTR 6214 | Social Enterprise | 3 SH |
| ENTR 6220 | Family Business Leadership and Governance | 3 SH |
| ENTR 6260 | Advanced Topics in Entrepreneurship | 3 SH |

***Marketing Track***

TRACK GPA REQUIREMENT

A GPA of 3.000 is required.

REQUIRED COURSE

| | | |
|---|---|---|
| MKTG 6200 | Creating and Sustaining Customer Markets | 3 SH |

ELECTIVES

Complete three of the following courses:

| | | |
|---|---|---|
| MKTG 6210 | Marketing Research | 3 SH |
| MKTG 6216 | Market Focused Strategy | 3 SH |
| MKTG 6218 | Marketing in Service Sector | 3 SH |
| MKTG 6222 | Digital Marketing | 3 SH |
| MKTG 6223 | Brand and Advertising Management | 3 SH |
| MKTG 6224 | B2B and Strategic Sales | 3 SH |
| MKTG 6226 | Consumer Behavior | 3 SH |

***Leadership and Change Track***

TRACK GPA REQUIREMENT

A GPA of 3.000 is required.

REQUIRED COURSE

| | | |
|---|---|---|
| HRMG 6200 | Managing People and Organizations | 3 SH |

ELECTIVES

Complete three of the following courses (9 semester hours):

| | | |
|---|---|---|
| HRMG 6212 | Creating an Innovative Organization | 3 SH |
| HRMG 6213 | Leadership | 3 SH |
| HRMG 6218 | Great Companies | 3 SH |
| MGMT 6214 | Negotiations | 2 or 3 SH |

***International Business Track***

TRACK GPA REQUIREMENT
A GPA of 3.000 is required.

REQUIRED COURSE

| | | |
|---|---|---|
| INTB 6200 | Managing the Global Enterprise | 3 SH |

ELECTIVES
Complete three of the following courses:

| | | |
|---|---|---|
| FINA 6204 | International Finance Management<br>*Prereq.* FINA 6200 | 3 SH |
| INTB 6212 | Cultural Aspects of International Business | 3 SH |
| INTB 6224 | Competing to Win in Emerging Markets | 3 SH |
| INTB 6226 | Becoming a Global Leader | 3 SH |
| MECN 6200 | Global Competition and Market Dominance | 3 SH |
| MKTG 6212 | International Marketing<br>*Prereq.* MKTG 6200 | 3 SH |

**PROGRAM CREDIT/GPA REQUIREMENTS**
12 total semester hours required
Minimum 3.000 GPA required

## Graduate Certificate in Supply Chain Management

The Graduate Certificate in Supply Chain Management allows students to take four courses in the supply chain discipline over the two semesters or up to three years. There is a required curriculum for the certificate program. Credits earned in this program can transfer into the MBA as electives or other master's programs around Northeastern (check with advisor).

Complete all courses and requirements listed below unless otherwise indicated.

**REQUIREMENTS**

***Required Courses***

| | | |
|---|---|---|
| SCHM 6210 | Supply Chain Management | 3 SH |
| SCHM 6211 | The Transportation Industries | 3 SH |
| SCHM 6213 | Global Supply Chain Management | 3 SH |

***Elective***

Complete one of the following courses:

| | | |
|---|---|---|
| SCHM 6211 | The Transportation Industries | 3 SH |
| SCHM 6212 | Executive Roundtable in Supply Chain Management | 3 SH |
| SCHM 6214 | Strategic Sourcing | 3 SH |
| SCHM 6215 | IT Applications in Supply Chain Management | 3 SH |
| SCHM 6221 | Sustainability and Supply Chain Management | 3 SH |
| SCHM 6222 | Managing Emerging Issues in Supply Chain Management | 3 SH |

**PROGRAM CREDIT/GPA REQUIREMENTS**
12 total semester hours required
Minimum 3.000 GPA required

## Graduate Certificate in Supply Chain Management—Online Program

Complete all courses and requirements listed below unless otherwise indicated.

**REQUIREMENTS**

| | | |
|---|---|---|
| SCHM 6210 | Supply Chain Management | 3 SH |
| SCHM 6212 | Executive Roundtable in Supply Chain Management | 3 SH |
| SCHM 6213 | Global Supply Chain Management | 3 SH |

The following course should be taken in the final semester:

| | | |
|---|---|---|
| SCHM 6220 | Growing and Protecting Business Value through the Supply Chain | 3 SH |

**PROGRAM CREDIT/GPA REQUIREMENTS**
12 total semester hours required
Minimum 3.000 GPA required

## Graduate Certificate in Technological Entrepreneurship

The Graduate Certificate in Technological Entrepreneurship consists of four courses. Credits earned in the certificate program may be applied toward the master's degree in technological entrepreneurship, the part-time MBA, or other MS programs at Northeastern (check with advisor).

Complete all courses and requirements listed below unless otherwise indicated.

**REQUIREMENTS**

Complete four of the following courses:

| | | |
|---|---|---|
| TECE 6222 | Emerging and Disruptive Technologies | 3 SH |
| TECE 6230 | Entrepreneurial Marketing and Selling | 3 SH |
| TECE 6250 | Lean Design and Development | 3 SH |
| TECE 6340 | The Technical Entrepreneur as Leader | 3 SH |
| ENTR 6210 | Managing Operations in Early Stage Ventures | 3 SH |
| ENTR 6212 | Business Planning for New Ventures | 3 SH |

**PROGRAM CREDIT/GPA REQUIREMENTS**
12 total semester hours required
Minimum 3.000 GPA required

# College of Computer and Information Science

www.ccs.neu.edu/graduate

**CARLA E. BRODLEY, PHD,** *Dean*

**Bryan Lackaye, EdD,** *Associate Dean for Graduate School Administration*
**Rajmohan Rajaraman, PhD,** *Associate Dean and Director of Graduate Studies*
**Karen Rosen, MEd,** *Director of Graduate Co-op Program*

202 West Village H
617.373.6840
gradschool@ccs.neu.edu

The College of Computer and Information Science (CCIS) 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 information assurance, 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, 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, information assurance, and personal health informatics are designed to prepare all students for research early in their doctoral education.

The MS curriculum in computer science 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.

In addition, we offer two interdisciplinary master's degree programs for working professionals: the MS in Health Informatics program, which seeks to prepare graduates to use information technology to improve healthcare delivery and outcomes; and the MS in Information Assurance program, which focuses on information technology and incorporates the understanding of the social sciences, law, criminology, and management needed to prevent and combat cyber attacks.

Three student laboratories house a mix of Linux and Windows workstations and separate research lab facilities. In addition, the Information Assurance Laboratory provides students with hands-on experience in information assurance exercises in an isolated network environment.

All faculty and supported graduate students have their own workstations. Our computing facilities, supported by our own systems administrators and assisted by the student crew, are connected via a high-speed network and serviced by a cadre of dedicated data servers.

Our college is a tightly knit community, and the faculty, staff, and students interact regularly through yearly town hall meetings, weekly teas, and seminars. A diverse, multicultural graduate student body and faculty members encourage rich extracurricular interaction. The student chapter of the Association for Computing Machinery organizes a number of social events to promote friendship and camaraderie within the CCIS community.

## Transferring to the CCIS

A maximum of 9 semester hours of credit obtained at another institution may be accepted toward the degree, provided the credits consist of work taken at the graduate level for graduate credit, carry grades of 3.000 or better, have been earned at an accredited institution, and 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 credits will be given for courses listed as interdisciplinary.

## Academic Requirements for PhD in Computer Science

A minimum of 16 semester hours of course work beyond the master's degree (excluding the six required core courses), or 48 semester hours of course work beyond the BS/BA degree, is required of all students.

### ADMISSION TO CANDIDACY

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 GPA of 3.500 among the six courses satisfying the above course requirements and 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 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 an MS in Computer Science may petition to the PhD committee for an exemption from these

courses. Petition forms are available in the college administrative office at 202 West Village H and at www.ccs.neu.edu/graduate/current-students/forms.

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 CCIS. 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.

## RESEARCH/SURVEY PAPER

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. Normally, the length of the paper should not exceed 15 pages. A submitted paper from a student is considered to have fulfilled the paper requirement if:

1. The paper has been submitted to 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 committee has voted on a positive recommendation.

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.

## COMPREHENSIVE EXAMINATION

The examination is taken after the student has achieved sufficient depth in a field of study in order to prepare a prospectus for the PhD dissertation. This process should take place no later than the end of the fifth year in residence. Prior to taking the comprehensive examination, the student prepares a thesis proposal for the examination, which describes the proposed research, including the relevant background materials from the literature. The thesis proposal should clearly specify the research problems to be attacked, the techniques to be used, and a schedule of milestones toward completion. Normally, the thesis proposal should not exceed 15 pages, excluding appendices and bibliography.

The thesis proposal must be approved by the comprehensive committee. It is strongly recommended that the same members should serve on both the comprehensive and thesis committees. With the help of the advisor, a student selects the comprehensive committee, consisting of four members to be approved by the PhD committee. The four members must include the advisor, two other faculty members from the college, and an external examiner (optional for comprehensive committee).

To help the PhD committee to make an informed decision, a copy of the external examiner's resumé should be submitted at the same time. 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 comprehensive committee. The student may take the comprehensive examination twice, at most.

## DOCTORAL DISSERTATION

Upon successful completion of solving the research proposed in the thesis proposal, the candidate has an opportunity to prepare the dissertation for approval by the doctoral 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*

If the thesis committee is the same as the comprehensive committee, no further approval is needed. If the thesis committee is changed in its composition, the approval process will follow that of the comprehensive committee.

### *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 doctoral committee and others in attendance concerning the results of the dissertation as well as any related matters. The examination 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.

## COMPUTER SCIENCE

Our PhD in Computer Science program seeks to prepare students to conduct state-of-the-art computer science research in preparation for careers in government, industry, and academia. Similarly, our MS in Computer Science program offers students the opportunity to broadly expand their knowledge in the field while focusing on one of our curricular specialties:

- Artificial intelligence
- Computer science theory
- Database management
- Graphics and robotics
- Human/computer interaction
- Information security
- Networks
- Programming languages
- Software engineering
- Systems

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. We have consistently placed more than 95 percent of our students in co-op positions. The college partners with several high-profile companies, including:

- Amazon
- Bloomberg
- EMC Corporation
- Fidelity Investments
- IBM Corporation
- Intuit
- Kronos
- MathWorks
- Microsoft
- Nokia
- Phase Forward
- SeaChange International
- Verizon Communications

### Admission Requirements

Applicants must submit an official application, official transcripts from all colleges/universities attended, a personal statement, official scores of the GRE General Test, and three letters of recommendation. International students must also submit official scores of the TOEFL examination. Acceptance into the CCIS is granted upon recommendation of the college graduate committee after a review of the completed application.

Candidates must have completed the undergraduate material listed below:

- Experience in some high-level procedural language, e.g., C, C++, Java, Scheme, ML
- Data structures
- Computer organization
- One year of college calculus
- Discrete mathematics

Industrial experience in these areas may be an acceptable substitute for formal course work. Students may be accepted provisionally while completing these deficiencies and may take graduate courses concurrently as their preparation allows.

### MSCS—Master of Science in Computer Science

Complete all courses and requirements listed below unless otherwise indicated.

#### GENERAL REQUIREMENTS

***Programming***

A grade of B or higher is required:

| | | |
|---|---|---|
| CS 5010 | Programming Design Paradigm | 4 SH |

***Development***

A grade of B or higher is required:

| | | |
|---|---|---|
| CS 5500 | Managing Software Development | 4 SH |
| or CS 5600 | Computer Systems | 4 SH |

***Algorithms***

A grade of B or higher is required:

| | | |
|---|---|---|
| CS 5800 | Algorithms | 4 SH |

#### CONCENTRATION AND ELECTIVES

***Concentration***

Complete two courses (8 semester hours) from one of the following concentration areas:

ARTIFICIAL INTELLIGENCE

| | | |
|---|---|---|
| CS 5100 | Foundations of Artificial Intelligence | 4 SH |
| CS 5335 | Robotic Science and Systems | 4 SH |
| CS 6110 | Knowledge-Based Systems | 4 SH |
| CS 6120 | Natural Language Processing | 4 SH |
| CS 6140 | Machine Learning | 4 SH |
| CS 7170 | Seminar in Artificial Intelligence | 2 to 4 SH |
| CS 7180 | Special Topics in Artificial Intelligence | 4 SH |

COMPUTER-HUMAN INTERFACE

| | | |
|---|---|---|
| CS 5340 | Computer/Human Interaction | 4 SH |
| CS 5350 | Applied Geometric Representation and Computation | 4 SH |
| CS 6350 | Empirical Research Methods | 4 SH |

DATABASE MANAGEMENT

| | | |
|---|---|---|
| CS 5200 | Database Management Systems | 4 SH |
| CS 6200 | Information Retrieval | 4 SH |
| CS 6220 | Data Mining Techniques | 4 SH |
| CS 6240 | Parallel Data Processing in MapReduce | 4 SH |

| | | |
|---|---|---|
| CS 7270 | Seminar in Database Systems | 2 to 4 SH |
| CS 7280 | Special Topics in Database Management | 4 SH |
| GAME DESIGN | | |
| CS 5150 | Game Artificial Intelligence | 4 SH |
| CS 5310 | Computer Graphics | 4 SH |
| CS 5340 | Computer/Human Interaction | 4 SH |
| CS 5850 | Building Game Engines | 4 SH |
| GRAPHICS | | |
| CS 5310 | Computer Graphics | 4 SH |
| CS 5320 | Digital Image Processing | 4 SH |
| CS 5330 | Pattern Recognition and Computer Vision | 4 SH |
| CS 5520 | Mobile Application Development | 4 SH |
| CS 6310 | Computational Imaging | 4 SH |
| CS 7370 | Seminar in Graphics/Image Processing | 2 to 4 SH |
| CS 7380 | Special Topics in Graphics/Image Processing | 4 SH |
| INFORMATION SECURITY | | |
| CS 5770 | Software Vulnerabilities and Security | 4 SH |
| CS 6540 | Foundations of Formal Methods and Software Analysis | 4 SH |
| CS 6740 | Network Security | 4 SH |
| CS 6750 | Cryptography and Communications Security | 4 SH |
| CS 6760 | Privacy, Security, and Usability | 4 SH |
| CS 7580 | Special Topics in Software Engineering | 4 SH |
| NETWORKS | | |
| CS 5700 | Fundamentals of Computer Networking | 4 SH |
| CS 5750 | Social Computing | 4 SH |
| CS 6710 | Wireless Network | 4 SH |
| CS 6740 | Network Security | 4 SH |
| CS 6750 | Cryptography and Communications Security | 4 SH |
| CS 6760 | Privacy, Security, and Usability | 4 SH |
| CS 7770 | Seminar in Computer Networks | 2 to 4 SH |
| CS 7775 | Seminar in Computer Security | 2 to 4 SH |
| CS 7780 | Special Topics in Networks | 4 SH |
| PROGRAMMING LANGUAGES | | |
| CS 5400 | Principles of Programming Language | 4 SH |
| CS 6410 | Compilers | 4 SH |
| CS 6412 | Semantics of Programming Language | 4 SH |
| CS 6510 | Advanced Software Development | 4 SH |
| CS 6515 | Software Development | 4 SH |
| CS 7470 | Seminar in Programming Languages | 2 to 4 SH |
| CS 7480 | Special Topics in Programming Language | 4 SH |
| CS 7570 | Seminar in Software Development | 2 to 4 SH |
| SOFTWARE ENGINEERING | | |
| CS 5610 | Web Development | 4 SH |
| CS 6510 | Advanced Software Development | 4 SH |
| CS 6520 | Methods of Software Development | 4 SH |
| CS 6530 | Analysis of Software Artifacts | 4 SH |
| CS 6535 | Engineering Reliable Software | 4 SH |
| CS 6540 | Foundations of Formal Methods and Software Analysis | 4 SH |
| CS 7575 | Seminar in Software Engineering | 2 to 4 SH |
| CS 7580 | Special Topics in Software Engineering | 4 SH |
| SYSTEMS | | |
| CS 5620 | Computer Architecture | 4 SH |
| CS 5650 | High Performance Computing | 4 SH |
| CS 6610 | Parallel Computing | 4 SH |
| CS 6740 | Network Security | 4 SH |
| CS 7670 | Seminar in Computer Systems | 2 to 4 SH |
| CS 7680 | Special Topics in Computer Systems | 4 SH |
| THEORY | | |
| CS 6610 | Parallel Computing | 4 SH |
| CS 6750 | Cryptography and Communications Security | 4 SH |
| CS 6800 | Application of Information Theory | 4 SH |
| CS 6810 | Distributed Algorithms | 4 SH |
| CS 7805 | Theory of Computation | 4 SH |
| CS 7870 | Seminar in Theoretical Computer Science | 2 to 4 SH |
| CS 7880 | Special Topics in Theories of Computer Science | 4 SH |

***Electives***

Complete three of the following courses (12 semester hours):

| | | |
|---|---|---|
| CS 5100 to CS 5850 | | |
| CS 6110 to CS 6810 | | |
| CS 8674 | Master's Project | 4 SH |
| CS 8689 | (pending approval) | |

**PROGRAM CREDIT/GPA REQUIREMENTS**

32 total semester hours required
Minimum 3.000 GPA required

## MSCS—Master of Science in Computer Science—ALIGN Program

The ALIGN program associated with MSCS is designed to prepare students who have obtained a BS/BA degree in STEM-related fields and are interested in pursuing a MSCS degree. During the fall semester of year 1, students are expected to take foundational courses in CS at the undergraduate level. Upon successful completion of the first semester, students are evaluated for admission to the MS program.

Complete all courses and requirements listed below unless otherwise indicated.

## GENERAL REQUIREMENTS

***Fundamentals***

| | | |
|---|---|---|
| CS 2500 | Fundamentals of Computer Science 1 | 4 SH |
| with CS 2501 | Lab for CS 2500 | 1 SH |

***Discrete Structures***

| | | |
|---|---|---|
| CS 1800 | Discrete Structures | 4 SH |

***Programming***

A grade of B or higher is required:

| | | |
|---|---|---|
| CS 5010 | Programming Design Paradigm | 4 SH |

***Development***

A grade of B or higher is required:

| | | |
|---|---|---|
| CS 5500 | Managing Software Development | 4 SH |
| or CS 5600 | Computer Systems | 4 SH |

***Algorithms***

A grade of B or higher is required:

| | | |
|---|---|---|
| CS 5800 | Algorithms | 4 SH |

## CONCENTRATION AND ELECTIVES

***Concentration***

Complete two courses (8 semester hours) from one of the following concentration areas:

ARTIFICIAL INTELLIGENCE

| | | |
|---|---|---|
| CS 5100 | Foundations of Artificial Intelligence | 4 SH |
| CS 5335 | Robotic Science and Systems | 4 SH |
| CS 6110 | Knowledge-Based Systems | 4 SH |
| CS 6120 | Natural Language Processing | 4 SH |
| CS 6140 | Machine Learning | 4 SH |
| CS 7170 | Seminar in Artificial Intelligence | 2 to 4 SH |
| CS 7180 | Special Topics in Artificial Intelligence | 4 SH |

COMPUTER-HUMAN INTERFACE

| | | |
|---|---|---|
| CS 5340 | Computer/Human Interaction | 4 SH |
| CS 5350 | Applied Geometric Representation and Computation | 4 SH |
| CS 6350 | Empirical Research Methods | 4 SH |

DATABASE MANAGEMENT

| | | |
|---|---|---|
| CS 5200 | Database Management Systems | 4 SH |
| CS 6200 | Information Retrieval | 4 SH |
| CS 6220 | Data Mining Techniques | 4 SH |
| CS 6240 | Parallel Data Processing in MapReduce | 4 SH |
| CS 7270 | Seminar in Database Systems | 2 to 4 SH |
| CS 7280 | Special Topics in Database Management | 4 SH |

GAME DESIGN

| | | |
|---|---|---|
| CS 5150 | Game Artificial Intelligence | 4 SH |
| CS 5310 | Computer Graphics | 4 SH |
| CS 5340 | Computer/Human Interaction | 4 SH |
| CS 5850 | Building Game Engines | 4 SH |

GRAPHICS

| | | |
|---|---|---|
| CS 5310 | Computer Graphics | 4 SH |
| CS 5320 | Digital Image Processing | 4 SH |
| CS 5330 | Pattern Recognition and Computer Vision | 4 SH |
| CS 5520 | Mobile Application Development | 4 SH |
| CS 6310 | Computational Imaging | 4 SH |
| CS 7370 | Seminar in Graphics/Image Processing | 2 to 4 SH |
| CS 7380 | Special Topics in Graphics/Image Processing | 4 SH |

INFORMATION SECURITY

| | | |
|---|---|---|
| CS 5770 | Software Vulnerabilities and Security | 4 SH |
| CS 6540 | Foundations of Formal Methods and Software Analysis | 4 SH |
| CS 6740 | Network Security | 4 SH |
| CS 6750 | Cryptography and Communications Security | 4 SH |
| CS 6760 | Privacy, Security, and Usability | 4 SH |
| CS 7580 | Special Topics in Software Engineering | 4 SH |

NETWORKS

| | | |
|---|---|---|
| CS 5700 | Fundamentals of Computer Networking | 4 SH |
| CS 5750 | Social Computing | 4 SH |
| CS 6710 | Wireless Network | 4 SH |
| CS 6740 | Network Security | 4 SH |
| CS 6750 | Cryptography and Communications Security | 4 SH |
| CS 6760 | Privacy, Security, and Usability | 4 SH |
| CS 7770 | Seminar in Computer Networks | 2 to 4 SH |
| CS 7775 | Seminar in Computer Security | 2 to 4 SH |
| CS 7780 | Special Topics in Networks | 4 SH |

PROGRAMMING LANGUAGES

| | | |
|---|---|---|
| CS 5400 | Principles of Programming Language | 4 SH |
| CS 6410 | Compilers | 4 SH |
| CS 6412 | Semantics of Programming Language | 4 SH |
| CS 6510 | Advanced Software Development | 4 SH |
| CS 6515 | Software Development | 4 SH |
| CS 7470 | Seminar in Programming Languages | 2 to 4 SH |
| CS 7480 | Special Topics in Programming Language | 4 SH |
| CS 7570 | Seminar in Software Development | 2 to 4 SH |

SOFTWARE ENGINEERING

| | | |
|---|---|---|
| CS 5610 | Web Development | 4 SH |
| CS 6510 | Advanced Software Development | 4 SH |
| CS 6520 | Methods of Software Development | 4 SH |
| CS 6530 | Analysis of Software Artifacts | 4 SH |
| CS 6535 | Engineering Reliable Software | 4 SH |
| CS 6540 | Foundations of Formal Methods and Software Analysis | 4 SH |
| CS 7575 | Seminar in Software Engineering | 2 to 4 SH |
| CS 7580 | Special Topics in Software Engineering | 4 SH |

SYSTEMS

| | | |
|---|---|---|
| CS 5620 | Computer Architecture | 4 SH |
| CS 5650 | High Performance Computing | 4 SH |
| CS 6610 | Parallel Computing | 4 SH |
| CS 6740 | Network Security | 4 SH |
| CS 7670 | Seminar in Computer Systems | 2 to 4 SH |
| CS 7680 | Special Topics in Computer Systems | 4 SH |

THEORY

| | | |
|---|---|---|
| CS 6610 | Parallel Computing | 4 SH |
| CS 6750 | Cryptography and Communications Security | 4 SH |
| CS 6800 | Application of Information Theory | 4 SH |
| CS 6810 | Distributed Algorithms | 4 SH |
| CS 7805 | Theory of Computation | 4 SH |
| CS 7870 | Seminar in Theoretical Computer Science | 2 to 4 SH |
| CS 7880 | Special Topics in Theories of Computer Science | 4 SH |

***Electives***

Complete three of the following courses (12 semester hours):

CS 5100 to CS 5850

CS 6110 to CS 6810

| | | |
|---|---|---|
| CS 8674 | Master's Project | 4 SH |
| CS 8689 | (pending approval) | |

### PROGRAM CREDIT/GPA REQUIREMENTS

40 total semester hours required

Minimum 3.000 GPA required

## PhD in Computer Science

Complete all courses and requirements listed below unless otherwise indicated.

### MILESTONES

Qualifying exam and area exam

Annual review

Dissertation proposal

Dissertation committee

Dissertation defense

### GENERAL REQUIREMENTS

***Programming***

| | | |
|---|---|---|
| CS 7400 | Intensive Principles of Programming Languages | 4 SH |

***Systems***

| | | |
|---|---|---|
| CS 7600 | Intensive Computer Systems | 4 SH |

***Algorithms***

| | | |
|---|---|---|
| CS 7800 | Advanced Algorithms | 4 SH |

***Computation***

| | | |
|---|---|---|
| CS 7805 | Theory of Computation | 4 SH |

***Specialization Courses***

Complete four of the following courses (16 semester hours).

Consult faculty advisor for other acceptable courses:

CS 5100 to CS 5850

CS 6110 to CS 6810

| | | |
|---|---|---|
| CS 7170 | Seminar in Artificial Intelligence | 2 to 4 SH |
| CS 7880 | Special Topics in Theories of Computer Science | 4 SH |
| CS 8674 | Master's Project | 4 SH |
| CS 8689 | (pending approval) | |

***Open Electives***

Complete four of the following courses (16 semester hours).

Consult faculty advisor for other acceptable courses:

CS 5100 to CS 5850

CS 6110 to CS 6810

| | | |
|---|---|---|
| CS 7170 | Seminar in Artificial Intelligence | 2 to 4 SH |
| CS 7880 | Special Topics in Theories of Computer Science | 4 SH |
| CS 8674 | Master's Project | 4 SH |
| CS 8689 | (pending approval) | |

### DISSERTATION

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| CS 9990 | Dissertation | 2 to 4 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

48 total semester hours required

Minimum 3.000 GPA required

## Graduate Certificate in Computer Science

Complete all courses and requirements listed below unless otherwise indicated.

### REQUIRED COURSE WORK

Requires five courses (16 semester hours):

| | | |
|---|---|---|
| CS 5001 | Intensive Foundations of Computer Science | 4 SH |
| CS 5002 | Discrete and Data Structures | 4 SH |
| CS 5003 | (pending approval) | |
| CS 5004 | (pending approval) | |
| CS 5005 | (pending approval) | |

### PROGRAM CREDIT/GPA REQUIREMENTS

16 total semester hours required

Minimum 3.000 GPA required

## HEALTH INFORMATICS

### MS in Health Informatics

See Bouvé College of Health Sciences interdisciplinary programs, page 209, for curriculum information.

### PhD in Personal Health Informatics

#### ADMITTANCE

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 course work 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 GPA; a minimum total GRE score of 300 or equivalent; a minimum GRE academic writing score of 3.5; and, for international applicants, a minimum TOEFL score of 105.

#### DEGREE REQUIREMENTS

***Year One***

Students take core courses in theoretical foundations of health interface design, software engineering, human-computer interaction, and statistics. Some course content links with a usability evaluation practicum requirement, where all students have an opportunity to gain experience observing an environment where personal health informatics technology could play a future role helping people or patients. Some students may observe hospital/clinical settings, others may observe people in at-risk communities, depending upon the student's research interests. The students develop proposals for improving patient care and enhancing wellness using patient-facing technology and present those ideas to other students and faculty.

***Year Two***

In addition to other core courses (research methods) and an elective to support research, students participate in a two-semester, team-taught course, HINF 5300, "Personal Health Interface Design and Development," where they work in teams to assess needs in the field using experiences from their practicums and collaboratively design, develop, deploy, and evaluate a personal health or wellness interface technology, either in a local clinical setting or among a population of at-risk individuals associated with one of Bouvé's centers. This research offers practical experience working in the field with consumers/patients, creating sophisticated technology, conducting formal needs assessment and evaluation, and writing high-quality publications. Modules throughout the course, taught by faculty affiliated with the doctoral program in personal health informatics, provide additional core material such as running clinical trials, health dialogue systems, computerized sensing systems, etc. Students also engage with industry representatives from the industrial consortium affiliated with the PhD program to solve problems within the organizations of their members.

***Years Three–Five***

Students develop a thesis proposal and work on individual research projects. We anticipate that students graduating from this program will have multiple, strong publications showing proficiency in building and deploying novel technologies for consumer- and patient-focused care.

#### CREDIT REQUIREMENT

A minimum of 48 credit hours of course work beyond a BS is required.

#### MINIMUM ACADEMIC STANDARDS AND REQUIREMENTS

***Residency Requirement***

The residency requirement will follow the University Graduate Council By-Law policy.

***Dissertation Advising***

Each student will have one primary advisor from the personal health informatics doctoral program faculty.

***Dissertation Committee***

The committee will consist of at least three members: the dissertation advisor, 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 advisor 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 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 (2 semester hours). 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 ASSESSMENT

***Learning Outcomes***

This program seeks to produce graduates who are capable of leading and performing independent, new research projects related to personal health informatics and who are well prepared to enter into a number of potential career paths, including industrial research positions, government consultants, postdoctoral or junior faculty positions in academic institutions in either technology programs or schools of health science, public health, or medicine.

***Degree Outcomes***

The dissertation committee evaluates whether the student has produced a significant contribution to personal health informatics research. The process used by the dissertation committee is based on an assessment of the goals and objectives described in the written PhD proposal. Student success can also be measured in the number and quality of publications generated by the research.

***Improving Effectiveness***

Publication venues will provide a means to assess the quality of the program, as well as the research projects. External research funding and incoming student quality will be used to measure program strength. In addition, graduates will be asked for feedback concerning their training and program preparation.

Complete all courses listed below unless otherwise indicated. Also complete any corequisite labs, recitations, clinicals, or tools courses where specified.

## MILESTONES

Three qualifying exams
Annual review
Dissertation proposal
Dissertation committee
Dissertation defense

## GENERAL REQUIREMENTS

***Foundations***

| | | |
|---|---|---|
| HINF 5200 | Theoretical Foundations in Personal Health Informatics | 4 SH |

***Program Design and Development***

| | | |
|---|---|---|
| CS 5010 | Programming Design Paradigm | 4 SH |
| CS 5340 | Computer/Human Interaction | 4 SH |
| HINF 5300 | Personal Health Interface Design and Development | 4 SH |

***Methods and Statistics***

| | | |
|---|---|---|
| CS 6350 | Empirical Research Methods | 4 SH |
| PHTH 5210 | Biostatistics in Public Health | 3 SH |

***Evaluation***

Requires 5 semester hours:

| | | |
|---|---|---|
| HINF 5XXX | (pending approval) | |
| HINF 5301 | Personal Health Technologies: Field Deployment and System Evaluation | 4 SH |

***Electives***

Requires 12 semester hours.
Consult your faculty advisor for acceptable courses.

## DISSERTATION

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| CS 9990 | Dissertation | 2 to 4 SH |

## PROGRAM CREDIT/GPA REQUIREMENTS

48 total semester hours required
Minimum 3.000 GPA required

## INFORMATION ASSURANCE

We offer both the PhD and MS degree programs in information assurance to meet a wide range of student needs. Each provides interdisciplinary knowledge and skills, focusing on information technology as well as how law, policy, and human behavior influence measures to address global threats to cyberspace.

Our MS in Information Assurance program combines an understanding of information technology with relevant knowledge from law, the social sciences, criminology, and management. The MS in Information Assurance program is designed for working professionals and others who want knowledge they can apply in their workplaces to assess and manage information security risks effectively. The program provides a natural path to the PhD in Information Assurance program for students who want to pursue research in the field and careers involving research.

The research-focused, interdisciplinary PhD in Information Assurance program combines a strong technical foundation with a policy and social sciences perspective. It seeks to prepare graduates to advance the reliability and security of cyberspace in industry, academia, and government. The interdisciplinary nature of the program distinguishes it from traditional doctoral degree programs in computer science, computer engineering, or electrical engineering and makes it unique in the Boston area.

### Admission Requirements

Admission to the Master of Science in Information Assurance program requires:

- A bachelor's degree.
- Knowledge of basic information technology concepts and mathematics. To ensure an adequate background, students are expected to have taken courses or have experience in introductory computer systems and discrete mathematics. If students do not have this preparation, their advisors will assign the necessary prerequisite courses.
- The Graduate Record Examination (GRE) is highly recommended for applicants to the MS in Information Assurance program who would like to be considered for financial assistance. A combined GRE score of 1100 and writing score of 3, or a TOEFL score of 250 CBT/100 IBT, is recommended. English tests may be required of international students when they arrive on campus.
- International students must submit official scores on the TOEFL examination and a Declaration and Certification of Finances (DCF) form (if applicable).

### MSIA—Master of Science in Information Assurance

Complete all courses and requirements listed below unless otherwise indicated.

#### GENERAL REQUIREMENTS

***Foundations***

| | | |
|---|---|---|
| IA 5010 | Foundations of Information Assurance | 4 SH |

***Technical Track***

Complete two of the following courses:

| | | |
|---|---|---|
| IA 5120 | Applied Cryptography | 4 SH |
| IA 5130 | Computer System Security | 4 SH |
| IA 5150 | Network Security Practices | 4 SH |
| IA 6120 | Software Security Practices | 4 SH |

***Contextual Track***

Complete two of the following courses:

| | | |
|---|---|---|
| IA 5200 | Security Risk Management and Assessment | 4 SH |
| IA 5210 | Information System Forensics | 4 SH |
| IA 5240 | Cyberlaw: Privacy, Ethics, and Digital Rights | 4 SH |
| IA 5250 | Decision Making for Critical Infrastructure | 4 SH |

***Capstone***

| | | |
|---|---|---|
| IA 7900 | Capstone Project/Seminar | 4 SH |

***Electives***

Complete two of the following courses (8 semester hours):

| | | |
|---|---|---|
| IA 5040 | Introduction to Cyberspace Programming | 4 SH |
| IA 5050 | Data Mining in Cyberspace | 4 SH |
| CS 5200 | Database Management Systems | 4 SH |
| CS 5500 | Managing Software Development | 4 SH |
| CS 5600 | Computer Systems | 4 SH |
| CS 5700 | Fundamentals of Computer Networking | 4 SH |
| CS 5770 | Software Vulnerabilities and Security | 4 SH |
| CS 6710 | Wireless Network | 4 SH |
| CS 6540 | Foundations of Formal Methods and Software Analysis | 4 SH |
| CS 6750 | Cryptography and Communications Security | 4 SH |
| CS 7805 | Theory of Computation | 4 SH |
| CRIM 7224 | Law and Psychology | 3 SH |
| CRIM 7312 | Special Topics in Criminology and Public Policy | 3 SH |
| PPUA 6503 | Public Personnel Administration | 3 SH |
| PPUA 6505 | Public Budgeting and Financial Management | 3 SH |
| PPUA 6507 | Institutional Leadership and the Public Manager | 3 SH |
| POLS 7341 | Security and Resilience Policy | 3 SH |

#### PROGRAM CREDIT/GPA REQUIREMENTS

32 total semester hours required
Minimum 3.000 GPA required

## MSIA—Master of Science in Information Assurance—ALIGN Program

The ALIGN program associated with MSCS is designed to prepare students who have obtained a BS/BA degree in STEM-related fields and are interested in pursuing a MSCS degree. During the fall semester of year 1, students are expected to take foundational courses in IA at the undergraduate level. Upon successful completion of the first semester, students are evaluated for admission to the MS program.

Complete all courses and requirements listed below unless otherwise indicated.

### GENERAL REQUIREMENTS

***Discrete Structures***

| | | |
|---|---|---|
| CS 1800 | Discrete Structures | 4 SH |

***Cyberspace Technology***

| | | |
|---|---|---|
| IA 5001 | Cyberspace Technology and Applications | 3 SH |

***Foundations***

| | | |
|---|---|---|
| IA 5010 | Foundations of Information Assurance | 4 SH |

***Technical Track***

Complete two of the following courses:

| | | |
|---|---|---|
| IA 5120 | Applied Cryptography | 4 SH |
| IA 5130 | Computer System Security | 4 SH |
| IA 5150 | Network Security Practices | 4 SH |
| IA 6120 | Software Security Practices | 4 SH |

***Contextual Track***

Complete two of the following courses:

| | | |
|---|---|---|
| IA 5200 | Security Risk Management and Assessment | 4 SH |
| IA 5210 | Information System Forensics | 4 SH |
| IA 5150 | Network Security Practices | 4 SH |
| IA 5250 | Decision Making for Critical Infrastructure | 4 SH |

***Capstone***

| | | |
|---|---|---|
| IA 7900 | Capstone Project/Seminar | 4 SH |

***Electives***

Complete two of the following courses (8 semester hours):

| | | |
|---|---|---|
| IA 5040 | Introduction to Cyberspace Programming | 4 SH |
| IA 5050 | Data Mining in Cyberspace | 4 SH |
| CS 5200 | Database Management Systems | 4 SH |
| CS 5500 | Managing Software Development | 4 SH |
| CS 5600 | Computer Systems | 4 SH |
| CS 5700 | Fundamentals of Computer Networking | 4 SH |
| CS 5770 | Software Vulnerabilities and Security | 4 SH |
| CS 6710 | Wireless Network | 4 SH |
| CS 6740 | Network Security | 4 SH |
| CS 6750 | Cryptography and Communications Security | 4 SH |
| CS 7805 | Theory of Computation | 4 SH |
| CRIM 7224 | Law and Psychology | 3 SH |
| CRIM 7312 | Special Topics in Criminology and Public Policy | 3 SH |
| PPUA 6503 | Public Personnel Administration | 3 SH |
| PPUA 6505 | Public Budgeting and Financial Management | 3 SH |
| PPUA 6507 | Institutional Leadership and the Public Manager | 3 SH |
| POLS 7341 | Security and Resilience Policy | 3 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

39 total semester hours required
Minimum 3.000 GPA required

## PhD in Information Assurance—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

### GENERAL REQUIREMENTS

***Fundamentals***

| | | |
|---|---|---|
| CS 5700 | Fundamentals of Computer Networking | 4 SH |
| or EECE 7336 | Digital Communications | 4 SH |

***Software***

| | | |
|---|---|---|
| CS 5770 | Software Vulnerabilities and Security | 4 SH |

***Security and Cyberlaw***

| | | |
|---|---|---|
| CS 6470 | (pending approval) | |
| or CS 6750 | Cryptography and Communications Security | 4 SH |
| IA 5200 | Security Risk Management and Assessment | 4 SH |
| IA 5240 | Cyberlaw: Privacy, Ethics, and Digital Rights | 4 SH |

***Electives and Specialization Courses***

Complete 28 semester hours from the following courses. Consult faculty advisor for other acceptable courses:

| | | |
|---|---|---|
| CS 5500 | Managing Software Development | 4 SH |
| CS 5600 | Computer Systems | 4 SH |
| CS 6140 | Machine Learning | 4 SH |
| CS 6200 | Information Retrieval | 4 SH |
| CS 6540 | Foundations of Formal Methods and Software Analysis | 4 SH |
| CS 6710 | Wireless Network | 4 SH |
| EECE 5666 | Digital Signal Processing | 4 SH |
| EECE 7204 | Applied Probability and Stochastic Processes | 4 SH |

| | | |
|---|---|---|
| EECE 7205 | Fundamentals of Computer Engineering | 4 SH |
| EECE 7337 | Information Theory | 4 SH |
| EECE 7339 | Testing and Design for Testability | 4 SH |
| EECE 7350 | Software Engineering 1 | 4 SH |
| EECE 7351 | Software Engineering 2 | 4 SH |
| EECE 7357 | Fault-Tolerant Computers | 4 SH |
| IA 5240 | Cyberlaw: Privacy, Ethics, and Digital Rights | 4 SH |
| IA 6120 | Software Security Practices | 4 SH |
| CRIM 7242 | Terrorism and International Crime | 3 SH |
| CRIM 7246 | Security Management | 3 SH |
| CRIM 7252 | White-Collar Crime | 3 SH |
| POLS 7341 | Security and Resilience Policy | 3 SH |
| SOCL 7211 | Research Methods | 3 SH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

48 total semester hours required

Minimum 3.000 GPA required

## INTERDISCIPLINARY

### MS in Game Science and Design

See the College of Arts, Media and Design, page 51, for curriculum information.

### Certificate in Data Science

See the College of Social Science and Humanities, page 332, for curriculum information.

# College of Engineering

www.coe.neu.edu/academics/graduate-school-engineering

**NADINE AUBRY, PHD,** *Dean*

**Sara Wadia-Fascetti, PhD,** *Associate Dean for Research and Graduate Studies*

130 Snell Engineering Center
617.373.2711

The Graduate School of Engineering (GSE) offers research and professional degree programs designed to prepare students for technical and leadership positions in industrial organizations, government laboratories, research laboratories, and educational institutions. We offer traditional day and part-time evening Master of Science and doctoral degree programs. Increasingly, more and more courses and degree programs are offered either partially or entirely in an online or hybrid format for distance learners.

## Graduate Degree Programs in Engineering

### DOCTOR OF PHILOSOPHY

- Bioengineering
- Chemical engineering
- Civil engineering
- Computer engineering
- Electrical engineering
- Industrial engineering
- Information assurance
- Interdisciplinary engineering
- Mechanical engineering

### MASTER OF SCIENCE

- Bioengineering
  - Biomedical devices
  - Biomechanics
  - Bioimaging and signal processing
  - Cell and tissue engineering
- Chemical engineering
  - Chemical engineering with graduate certificate in engineering leadership
- Civil engineering
  - Construction management
  - Environmental engineering
  - Geotechnical/geoenvironmental engineering
  - Structural engineering
  - Transportation engineering
  - Civil engineering with graduate certificate in engineering leadership
- Computer systems engineering
  - Engineering software design
  - Computer systems engineering with graduate certificate in engineering leadership
- Electrical and computer engineering
  - Communications, control, and signal processing
  - Computer engineering
  - Electromagnetics, plasma, and optics
  - Microsystems, materials, and devices
  - Power systems, power electronics, and motion control
  - Electrical and computer engineering with graduate certificate in engineering leadership
  - Electrical and computer engineering leadership
- Energy systems
  - Energy systems with graduate certificate in engineering leadership
- Engineering management
  - Engineering management with graduate certificate in engineering leadership
- Industrial engineering
  - Industrial engineering with graduate certificate in engineering leadership
- Information systems
  - Information systems with graduate certificate in engineering leadership
- Mechanical engineering
  - Material science and engineering
  - Mechanics and design
  - Mechatronics
  - Thermofluids engineering
  - Mechanical engineering with graduate certificate in engineering leadership
- Operations research
  - Operations research with graduate certificate in engineering leadership
- Sustainable building systems
  - Sustainable building systems with graduate certificate in engineering leadership
- Telecommunications systems management
  - Telecommunications systems management with graduate certificate in engineering leadership

### GRADUATE CERTIFICATE

- Graduate certificate in engineering leadership

## Learning Outcomes

### DOCTOR OF PHILOSOPHY

The PhD programs' student learning outcomes are:

- Ability to use basic engineering concepts flexibly in a variety of contexts
- Ability to formulate a research plan
- Ability to communicate orally a research plan
- Ability to conduct independent research

### MASTER OF SCIENCE

The MS programs' student learning outcome is:

- Ability to use basic engineering concepts flexibly in a variety of contexts

## Admission Requirements

In order to be minimally qualified to pursue admission through the GSE, a candidate must have successfully completed or be in the process of completing an undergraduate bachelor's degree from a regionally accredited U.S. college or university or its equivalent from a foreign college or university. Any offer of acceptance is contingent upon a candidate's successful completion of an undergraduate bachelor's degree from a regionally accredited U.S. college or university or its equivalent from a foreign college or university.

For most GSE programs, in order to be qualified for admissions consideration from an undergraduate academic preparation standpoint, candidates are required to have had an engineering major directly related to their graduate program of interest, but some exceptions* are made. For the MS in Engineering Management program, a degree in mathematics or physics with linear algebra and multivariable calculus, or students of any major with the equivalent background in mathematics as an engineering major, are acceptable. For the MS in Energy Systems program, quantitative business or finance majors are acceptable if candidates also have some background in computer science and calculus. For the MS in Information Systems program, any technical major (i.e., science, mathematics) is acceptable. For mechanical engineering programs, majors in applied physics are acceptable. For the MS in Operations Research program, majors in any science discipline, including computer science and mathematics, are acceptable; other majors considered are economics, business, or other liberal arts with some background in calculus and linear algebra. For the MS in Telecommunications Systems Management program, majors in mathematics, physics, or computer science are acceptable.

In terms of the admissions process, note that every element of any candidate's background is considered, that there is no single factor that determines whether or not a candidate is admitted, that there are no guarantees of admission for any candidate, and that the decision rests solely with the appropriate faculty admissions committee.

Application requirements:*

- Online application.
- Statement of purpose.
- Professional resumé.
- Transcript(s) from any and all colleges or universities attended evidencing all courses, grades, and credits, as well as any diploma(s) or provisional certificate(s) evidencing that degree(s) have been conferred.
- Two letters of recommendation.
- The GRE is required of most applicants:
  - *Department of Electrical and Computer Engineering Program Applicants:* Official GRE scores are required for all applicants to programs offered by the Department of Electrical and Computer Engineering, except applicants who have received or will receive a bachelor's degree in engineering from Northeastern University located in Boston.
  - *All Other Graduate Program Applicants:* Official GRE scores are required for all applicants who have not received or will not receive a bachelor's degree in an ABET (Accreditation Board for Engineering and Technology)–accredited engineering program from a college or university that is located within the United States. *Exception:* Applicants to the engineering management program may submit official GMAT scores instead of the GRE.
- Proof of English-language proficiency (for non-native English-language speakers). Official TOEFL or IELTS scores are required of applicants whose native language is not English. Note that applicants who hold or will hold a graduate or undergraduate degree from a college or university in a country where English is the official and predominantly spoken language before beginning any graduate engineering program at Northeastern, if admitted, are exempt from this requirement.

*Interested candidates should check the official website of their program of interest for additional exceptions and/or application requirements.

## Cooperative Education Policies

The College of Engineering Graduate Cooperative Education Program (co-op) is one option for experiential learning and is available to selected students. The goals of cooperative education are to:

- Apply knowledge and skills in new, authentic contexts.
- Develop new knowledge and skills.
- Integrate and use the deepened knowledge and skills in your academic programs.
- Reflect on and articulate how you used your knowledge and skills, how you gained new knowledge and skills, and how "theory and practice" work together.

Students who wish to participate in co-op must meet the eligibility requirements and follow the guidelines that follow. Co-op is not guaranteed for any student; students must compete and be selected for a limited number of co-op opportunities. These guidelines apply to all graduate students in the College of Engineering except for those in programs of the Department of Electrical and Computer Engineering, who have their own co-op program and procedures.

### ELIGIBILITY REQUIREMENTS

1. Students must successfully complete ENCP 6000 or EECE 6000 Career Management for Engineers (depending on their major). Students MUST meet all co-op eligibility requirements to enroll in ENCP 6000 or EECE 6000. A complete list of requirements is found on the Graduate School of Engineering website (www.coe.neu.edu/graduate-co-op/graduate-co-op-eligibility-and-requirements).
2. Full eligibility requirements for a co-op work experience are found on our website (www.coe.neu.edu/graduate-co-op/graduate-co-op-eligibility-and-requirements). Students must:
   - Be a full-time student at Northeastern University
   - Meet the minimum GPA and other requirements for their program
   - Have no disciplinary or academic probation issues and no incomplete courses (i.e., no "I" grade in their records)
   - Have at least one term left in their program after completing co-op; i.e., students must return to Northeastern to take courses for at least one term prior to graduating
   - Have a valid I-20 for international students
3. Students must receive academic and co-op advisor approval prior to accepting a placement.

### GUIDELINES

1. For the purposes of these guidelines internships, practicums, clinicals, cooperative education, residencies, or similar programs, are all treated as a co-op and are not considered separate experiences in the Graduate School of Engineering. See below for a special note for international PhD student internships only.
2. Students may not hold a graduate stipend assistantship at the university during the semesters planned for co-op.
3. 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 four months. Co-ops are aligned with academic terms (fall, spring, and full summer or summer 1 and summer 2). For purposes of determining the length of a co-op, it is based on the terms participated in—a co-op in any one term is a four-month co-op (full summer, fall, or spring); six-month co-ops are spring and summer 1 or summer 2 and fall; eight-month co-ops are two consecutive terms (spring and full summer or full summer and fall).
4. Students on four-month co-op assignments are allowed to have their co-op extended to a maximum of eight months (aligning with terms as stated above), provided they have approval from their academic and co-op advisor.
5. Co-ops are required to be full-time and, thus, students are allowed to take at most one course during the fall and spring semesters while participating in co-op activities. Students participating in co-op during the full summer are only allowed to take a single course over the entire summer (a full summer, summer 1, or summer 2, not one in each term).
6. Students are permitted to participate in one co-op experience as a graduate student.
7. Students who wish are allowed to create their own co-op placement outside the myNEU COOL, but must meet all the requirements and follow all the guidelines.
8. Final decision regarding any exceptions to the above requirements and guidelines rest with the College of Engineering's director of the Graduate Cooperative Education Program.

### INTERNATIONAL PHD STUDENT INTERNSHIPS

An internship at Northeastern is a special, and rare, case of experiential learning that applies only to international PhD students. Like co-op, it is classified as Curricular Practical Training (CPT) for F-1 visa holders or pre-Academic Training (pre-AT) for J-1 visa holders. An internship must be integral (read: essential, vital, fundamental) to a student's research or dissertation. As such the student's research or dissertation would suffer greatly without this experience. Generally, because of the close relation to the student's research or dissertation, internships are arranged by the student's faculty advisor. Further, it is incumbent upon the faculty advisor to sign and verify that this experience is integral to the student's dissertation or research as part of the visa processing allowing the student to have this experience. Paid or unpaid internships have the same requirements. *Internships are never authorized in a student's final semester.*

***Internships, Co-op, and Pre-OPT***

A position that a student finds on their own in a field related to their program of study, to provide funding during the summer, or to supplement their income does not qualify for internship CPT authorization, though the position might qualify as a co-op or Pre-OPT experience—provided the student meets all the qualifications for the relevant authorization. Like co-op, internships are not part of a jobs program, even if they do provide experience that would be beneficial to employment after graduation. The key is that any internship must have a very direct and strong relationship to the student's research or dissertation.

## Online and Video Streaming Examination Policy

### EXAM ADMINISTRATION

Students living within thirty miles of their home campus (Boston, Charlotte, or Seattle) who are enrolled in online and video-streamed sections are strongly encouraged to take exams at their home campus. In cases where a student is unable to travel to campus for exams, the student must make arrangements for an exam proctor. The Graduate School of Engineering reserves the right to reject any proctor application.

### PROCTORING

***Student Responsibilities***

Students must make arrangements for a proctor. Students are required to complete and submit a Proctor Application form to the

Graduate School of Engineering office by the end of the third week of class.

***Proctor Responsibilities***

The proctor is responsible for administering exams to the students per the instructor's directions and in accordance with the Academic Honesty and Integrity Policy in order to maintain the security and integrity of the exam process.

***Faculty Responsibilities***

To administer each exam, the instructor will make arrangements for the exchange of exam materials with the proctor.

## ACADEMIC POLICIES AND PROCEDURES

### 1.0 COURSE REGISTRATION AND WITHDRAWAL

***1.1 Overview***

Degree program curricula and faculty information for each academic department are listed below in the "Academic Programs" section. Course descriptions can be found on the registrar's website: www.northeastern.edu/registrar/cdr.html. Students must follow the curriculum of their program of study published in the *Graduate School of Engineering Student Guide and Catalog*, or *University Graduate Catalog* (2012 and beyond), for the year in which they matriculate. Any change in course work or other program requirements must be approved by the student's program advisor or departmental graduate officer. In addition, students must complete any preparatory courses stipulated at the time of admission.

Registration is mandatory. Any student attending a course who has failed to register properly before the end of the third week of classes in a given semester will not receive a grade at the end of the semester, even if he or she has completed all required course work.

Students must be registered in their last semester of study. Students finishing their requirements in the summer semester must be registered in the full summer, summer 1, or summer 2 term.

Due to last-minute scheduling changes, the Graduate School of Engineering must occasionally substitute faculty or change class meeting times after the registration period has begun. Any student who initially registered for the original course will automatically be registered for the new version should no major schedule conflicts be apparent. Otherwise, the graduate school or the department will contact all registered students for alternatives. Students should not register for an excessive number of courses or for double sections with the intention of dropping half or more of the courses during the first week of classes. Over-registering complicates course and room scheduling and closes courses prematurely to genuinely interested students.

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.

Northeastern University reserves the right to cancel, postpone, combine, or modify any course.

***1.2 Course Selection***

Minimum required number of courses: Full-time students (domestic and international) in the Graduate School of Engineering must enroll on a continuous basis and carry a minimum of 8 semester hours of credit per semester.

Any student who holds an SGA is considered full-time if enrolled in a minimum of 6 semester hours of credit. All graduate students who are registered for Dissertation, Dissertation or Thesis Continuation, PhD Candidacy Preparation, PhD Exam Preparation, or a zero-semester-hour Research course are considered full-time. The graduate school does not require part-time students to maintain any minimum enrollment. 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; see page 20 for additional information about leaves of absence.

Students should formulate a program of study in consultation with their assigned program advisor or departmental graduate officer during fall or spring orientation.

Courses other than required core courses are offered according to demand and are subject to faculty availability. Students should preselect courses whenever possible and plan to take them when offered, maintaining flexibility with alternate courses in mind. Not all courses are offered every year; however, the graduate school will do everything possible to assure continuity of programs and to permit students to make continuous progress toward their degrees.

Full-time students may register for a maximum of 16 semester hours per semester. Part-time students may register for a maximum of 8 semester hours per semester. However, a student may petition his or her program advisor or departmental graduate officer for a course overload.

Students who need assistance in course selection, course sequencing, waivers, and/or transfer credits should contact their program advisor, departmental graduate officer, or the Graduate School of Engineering.

### *1.3 Dissertation Continuation and Thesis Continuation*

Once program requirements are met for PhD candidacy, PhD candidates must register for two consecutive semesters (excluding the summer term) of Dissertation before registering for its continuation. Candidates must register for Dissertation Continuation in each subsequent semester (excluding the summer term) until the dissertation is completed and approved by the Graduate School of Engineering. However, students completing their dissertation in the summer term must register for Dissertation Continuation in the summer term. There is a one-semester-hour tuition charge for Dissertation Continuation.

Part-time PhD students must register for Dissertation Continuation in each term in which they are actively working with their faculty advisor, or need to utilize university library resources, for their dissertation. All PhD students must register for Dissertation Continuation in their last term.

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, must register for Thesis Continuation in each subsequent semester, excluding the summer term, until the thesis is completed and approved by the Graduate School of Engineering. However, students completing their thesis in the summer term must register for Thesis Continuation in the summer term. There is a one semester hour tuition charge for Thesis Continuation.Dissertation Continuation and Thesis Continuation do not carry semester hours of credit; however, students who register are considered to be in full-time status. During graduation clearance, the Graduate School of Engineering will retroactively register students who fail to register for the correct sequence of Dissertation Continuation or Thesis Continuation. Once these retroactive registrations are posted on a student's record, Student Accounts will send a tuition bill to the student.

## 2.0 ACADEMIC STANDARDS AND DEGREE REQUIREMENTS

### *2.1 Academic Requirements*

All students must satisfactorily complete an approved program of correlated work of graduate caliber and such other study as may be required by the academic department in which they are enrolled. Regardless of classification, any student whose record is not satisfactory may be withdrawn from the Graduate School of Engineering for poor performance.

To qualify for any degree from the graduate school, a student must attain a cumulative grade-point average (GPA) of 3.000 or higher with no more than 8 semester hours below the grade of B– in all courses applied toward that degree, 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. Individual programs may have additional, more stringent, requirements. **The Graduate School of Engineering allows students to repeat up to 8 semester hours of course work beyond stated minimum degree requirements in order to attain the required 3.000 GPA for graduation. In some cases, it may not be possible to repeat a course if a student wishes to do so. In certain, 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.** Within the above limitations for extra or repeated courses, a student must repeat any required core course in which he or she earns below a grade of C.

### *2.2 Prerequisite Courses/Undergraduate Courses*

Students are not awarded credit toward 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.

### *2.3 Academic Probation*

STUDENT'S ACADEMIC STANDING

Academic standing at Northeastern University is determined by a student's cumulative grade-point average (GPA). All 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. This will be noted on the student's unofficial transcript.

ACADEMIC PROBATION POLICY

Academic probation is a period of time when a student must address and remediate academic deficiencies.

A student placed on academic probation will receive written notification by the Graduate School of Engineering (hereafter referred to as the graduate school). The student's academic advisor

will also receive notification of the student's probationary status. An Academic Probation Action Plan to clear the deficiency must be developed by the student and the student's academic advisor. It is the student's responsibility to complete an action plan (with input from the advisor) that documents how the deficiency will be remediated. This action plan must be signed by the academic advisor and the student, and a copy must be submitted to the graduate school as soon as possible and no later than seven business days from the start of the next academic term. If the action plan is not received by this deadline, the graduate school will cancel the student's course registration(s). *Failure to file a complete and meaningful action plan may be cause for dismissal from the program.* The graduate school reserves the right to reject or change the action plan.

DISMISSAL FROM PROGRAM

A student (part-time or full-time) placed on 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. A student that has a cumulative GPA less than 3.000 for two consecutive terms is subject to dismissal by the university.

The graduate school may request an extension of one additional academic term; however, this request requires significant justification and demonstration that the student can achieve a cumulative GPA greater than or equal to 3.000 with a one-term extension. No additional extensions will be considered by the university. The university has final authority over dismissal decisions. If requesting an extension, the academic advisor must attach a detailed justification to the action plan and submit it to the graduate school no later than 10 business days from the end of the term.

Students being dismissed from their program will receive written notification from the Graduate School of Engineering.

END OF PROBATIONARY PERIOD

Part III of the Academic Probation Action Plan must be completed by the student's academic advisor at the end of the academic term following the term in which the student was first placed on probation. This process must be initiated by the student. A copy of the action plan, with part III completed by the advisor, must be filed with the graduate school within 10 business days from the end of the term. The graduate school will review the advisor's recommendation. The university will make the final decision regarding the student's academic status.

APPEALS PROCESS

A student may appeal a dismissal from their program of study due to failure to achieve academic standards set forth in this academic probation policy within the designated period of academic probation. To initiate an appeal, the student must send a written request to the associate dean of the graduate school detailing the reasons the student is appealing the dismissal. The written request must be signed by the student, and the appeal must be received by the Graduate School of Engineering within 30 business days from the day the student received written notification of dismissal. The graduate school will respond to the appeal within 10 business days of the date of receipt.

## 3.0 ADMINISTRATIVE PROCEDURES

### *3.1 Personal Information*

All students are responsible for maintaining valid personal contact information on the myNEU Web Portal. A student may not use a departmental mailbox as his or her mailing address.

## 4.0 PETITIONS

### *4.1 Overview*

The petition procedures described below are required in all cases so that the Graduate School of Engineering may maintain a complete and accurate file for all students. All petitions, unless otherwise noted, must be formally made on a Graduate School of Engineering petition form and approved by a student's advisor or departmental graduate officer and by the Graduate School of Engineering. Other approvals may be required as stipulated by the graduate school upon petition review.

### *4.2 Elective Outside Approved List of Courses for Program of Study*

Graduate School of Engineering–approved degree programs and courses for each are found in this *Northeastern University Graduate Catalog.* Students must follow the curriculum of their program of study published in the year in which they matriculate. If a student wishes to take a course that is not on the list of approved courses for their program, the student must request permission from their academic advisor to take the course *prior to* registering for the course. Failure to obtain permission to take the course may result in the course not counting toward the student's graduate degree. The petition must be submitted to the Graduate School of Engineering for review/approval. Final authority on requests made by petition rests with the Graduate School of Engineering.

*Note:* Students enrolled in a PhD program are not subject to this requirement. Course selection is considered a matter between the student, his or her academic advisor, and department.

### *4.3 Course Waiver*

A student may petition to waive any core, or required, course when he or she has completed equivalent or similar course work elsewhere. The student must submit a completed petition form, along with a course description and official transcript from the institution where he or she completed the course.

*Note:* Course waivers *do not* decrease the number of required semester hours in any program of study.

### *4.4 Change in Status Classification*

Students may petition to change their student status from full-time to part-time study within the same program by filing a petition form in the Graduate School of Engineering. Departmental approval is not required in this case. However, students who hold an assistantship, or whose department requires full-time students to complete a project or thesis, must have departmental approval to change status. International students are subject to the rules governing their immigration status and should consult with an advisor in the International Student and Scholar Institute before filing a status change petition.

Those who wish to change status from part-time to full-time study within the same program must have completed a minimum of 8 semester hours of course work with a minimum 3.000 GPA. Students in this case must submit a petition to change status to their advisor or departmental graduate officer for approval.

***4.5 Change in Degree Concentration***

A student who wishes to change his or her major area of concentration within the same program must submit a completed GSE Change of Degree Program form to his or her program advisor—and, if an electrical and computer engineering student, to the chair of the graduate committee—for approval. The form must then be forwarded to the Graduate School of Engineering for final review and processing. Students should refer to the Graduate School of Engineering website for additional instructions.

***4.6 Change in Degree Program***

A student who wishes to change his or her degree program must apply for admission to the desired program. This means a new online application must be submitted. The application fee is waived. In addition, the student must submit a completed GSE Change of Degree Program form to the advisor of the desired program. The form must then be forwarded to the Graduate School of Engineering for final review and processing. Students should refer to the Graduate School of Engineering website for additional instructions.

***4.7 Change in Degree Level***

A student who wishes to change from MS level to PhD level must apply for admission to the PhD program. This means a new online application must be submitted. The application fee is waived. In addition, the student must submit a completed GSE Change of Degree Level form to the director of the PhD program to which they are applying. The form must then be forwarded to the Graduate School of Engineering for final review and processing (if admitted). Students should refer to the Graduate School of Engineering website for additional instructions.

A student who wishes to change from PhD level to MS level within the same degree program must submit a GSE Change of Degree Level form to their academic advisor—and, if an electrical and computer engineering student, to the chair of the graduate committee—for approval. If approved, the Change of Degree Level form must then be submitted to the Graduate School of Engineering for final review and processing. Students should refer to the Graduate School of Engineering website for additional instructions.

# BIOENGINEERING

**www.bioe.neu.edu**

LEE MAKOWSKI, PHD
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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.

## Master of Science in Bioengineering

Students accepted to the Master of Science in Bioengineering program have the option to carry out research resulting in the preparation and defense of an MS thesis (8 semester hours of research) or an MS project (4 semester hours of research) or to complete a course-only MS degree.

Students are required to complete 33 semester hours of courses with a minimum cumulative GPA of 3.000 to graduate with an MS in bioengineering. All MS students are required to take two core courses (Medical Physiology and Principles of Bioengineering). Each student must select a concentration and complete two required courses specific to that concentration. In addition, each student needs to complete 12 (thesis option), 16 (project option), or 20 (course-only option) semester hours from an approved list of technical electives for their concentration. Enrollment in Seminar BIOE 7390 is required each term.

Students have four concentrations from which to choose:

- Concentration 1: Bioimaging and Signal Processing
- Concentration 2: Cell and Tissue Engineering
- Concentration 3: Biomechanics
- Concentration 4: Biomedical Devices

Each concentration has two required courses and a list of technical electives from which the student should select three to five courses, depending on whether he or she selects the thesis option, project option, or course-only option.

### CONCENTRATION 1: BIOIMAGING AND SIGNAL PROCESSING

This concentration is appropriate for students interested in biomedical imaging and processing of a wide array of signals from biological systems and biomedical instruments. Two courses (Linear Systems Analysis and Biomedical Signal Processing) are

required of all students choosing this option. Extensive additional options are available as approved technical electives.

### CONCENTRATION 2: CELL AND TISSUE ENGINEERING

The cell and tissue engineering concentration is appropriate for students interested in molecular, cell, and tissue engineering. Two courses (Special Topics in Chemical Engineering—which is an introduction to cell and tissue engineering—and Chemical Engineering Kinetics) 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 3: 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. The two courses required of all biomechanics concentration students are Muscoskeletal Biomechanics and Biomaterials.

### CONCENTRATION 4: BIOMEDICAL DEVICES

The biomedical devices concentration is appropriate for students interested in the design and implementation of biological devices and implants. Two core courses, Biomaterials and Introduction to Micromechanical Systems, are required for all students in this concentration.

## MSBioE—Master of Science in Bioengineering

Complete all courses and requirements listed below unless otherwise indicated.

*Note:* This major requires a concentration: biomechanics, biomedical devices, bioimaging and signal processing, or cell and tissue engineering. Consult your college administrator.

### GENERAL REQUIREMENTS

***Seminar***

| | | |
|---|---|---|
| BIOE 7390 | Seminar | 0 SH |

***Required Core***

A grade of C or higher is required in each course:

| | | |
|---|---|---|
| BIOE 5000 | (pending approval) | |
| BIOE 5100 | Medical Physiology | 4 SH |

### CONCENTRATION

Complete one of the following four concentrations:

***Biomedical Devices Concentration***

A grade of C or higher is required in each course:

| | | |
|---|---|---|
| BIOE 5280 | (pending approval) | |
| ME 6260 | Introduction to Microelectromechanical Systems (MEMS) | 4 SH |

***Biomechanics Concentration***

A grade of C or higher is required in each course:

| | | |
|---|---|---|
| BIOE 5820 | Biomaterials | 4 SH |
| ME 5665 | Musculoskeletal Biomechanics | 4 SH |

***Bioimaging and Signal Processing Concentration***

A grade of C or higher is required in each course:

| | | |
|---|---|---|
| EECE 5664 | Biomedical Signal Processing | 4 SH |
| EECE 7200 | Linear Systems Analysis | 4 SH |

***Cell and Tissue Engineering Concentration***

A grade of C or higher is required in each course:

| | | |
|---|---|---|
| BIOE 5410 | Molecular Bioengineering | 4 SH |
| CHME 7340 | Chemical Engineering Kinetics | 4 SH |

### COURSE WORK/PROJECT/THESIS OPTION

Complete one of the following twelve options:

***Biomedical Devices Course Work Option***

CONCENTRATION ELECTIVES

Complete 20 semester hours from the following courses:

| | | |
|---|---|---|
| BIOE 5810 | (pending approval) | |
| BIOE 5850 | (pending approval) | |
| BIOE 74XX | (pending approval) | |
| CHEM 5500 | Introduction to Regulatory Science | 2 SH |
| EECE 5606 | Micro- and Nanofabrication | 4 SH |
| ME 5659 | Control and Mechatronics | 4 SH |
| ME 5665 | Musculoskeletal Biomechanics | 4 SH |
| ME 5667 | Solid Mechanics of Cells and Tissues | 4 SH |
| ME 7262 | Nanomanufacturing 1 | 4 SH |
| NNMD 5470 | Nano- and Biomedical Commercialization: From Concept to Market | 3 SH |
| NNMD 7370 | Nanosystems Design for Biology and Medicine | 2 SH |

***Biomedical Devices Project Option***

PROJECT

| | | |
|---|---|---|
| BIOE 7890 | Master's Project | 4 SH |

CONCENTRATION ELECTIVES

Complete 16 semester hours from the following courses:

| | | |
|---|---|---|
| BIOE 5810 | (pending approval) | |
| BIOE 5850 | (pending approval) | |
| BIOE 74XX | (pending approval) | |
| CHEM 5500 | Introduction to Regulatory Science | 2 SH |
| EECE 5606 | Micro- and Nanofabrication | 4 SH |
| ME 5659 | Control and Mechatronics | 4 SH |
| ME 5665 | Musculoskeletal Biomechanics | 4 SH |
| ME 5667 | Solid Mechanics of Cells and Tissues | 4 SH |
| ME 7262 | Nanomanufacturing 1 | 4 SH |
| NNMD 5470 | Nano- and Biomedical Commercialization: From Concept to Market | 3 SH |
| NNMD 7370 | Nanosystems Design for Biology and Medicine | 2 SH |

***Biomedical Devices Thesis Option***

THESIS

| | | |
|---|---|---|
| BIOE 7990 | Thesis | 4 SH |

CONCENTRATION ELECTIVES

Complete 12 semester hours from the following courses:

| | | |
|---|---|---|
| BIOE 5810 | (pending approval) | |
| BIOE 5850 | (pending approval) | |
| BIOE 74XX | (pending approval) | |
| CHEM 5500 | Introduction to Regulatory Science | 2 SH |
| EECE 5606 | Micro- and Nanofabrication | 4 SH |
| ME 5659 | Control and Mechatronics | 4 SH |
| ME 5665 | Musculoskeletal Biomechanics | 4 SH |
| ME 5667 | Solid Mechanics of Cells and Tissues | 4 SH |
| ME 7262 | Nanomanufacturing 1 | 4 SH |
| NNMD 5470 | Nano- and Biomedical Commercialization: From Concept to Market | 3 SH |
| NNMD 7370 | Nanosystems Design for Biology and Medicine | 2 SH |

***Biomechanics Course Work Option***

CONCENTRATION ELECTIVES

Complete 20 semester hours from the following courses:

| | | |
|---|---|---|
| BIOE 5630 | (pending approval) | |
| BIOE 73XX | (pending approval) | |
| BIOL 5553 | Biology of Muscle: Molecules to Movements | 4 SH |
| BIOL 5601 | Multidisciplinary Approaches in Motor Control | 4 SH |
| BIOL 7384 | Topics in Integrative Biology | 2 SH |
| EECE 7200 | Linear Systems Analysis | 4 SH |
| EECE 7203 | Complex Variable Theory and Differential Equations | 4 SH |
| EECE 7367 | Robotics and Automation Systems | 4 SH |
| ME 5650 | Advanced Mechanics of Materials | 4 SH |
| ME 5655 | Dynamics and Mechanical Vibration | 4 SH |
| ME 5657 | Finite Element Method | 4 SH |
| ME 5659 | Control and Mechatronics | 4 SH |
| ME 5667 | Solid Mechanics of Cells and Tissues | 4 SH |
| ME 7210 | Elasticity and Plasticity | 4 SH |
| ME 7238 | Advanced Finite Element Method | 4 SH |
| ME 7240 | Composite Materials | 4 SH |
| ME 7245 | Fracture Mechanics and Failure Analysis | 4 SH |
| ME 7255 | Continuum Mechanics | 4 SH |

***Biomechanics Project Option***

PROJECT

| | | |
|---|---|---|
| BIOE 7890 | Master's Project | 4 SH |

CONCENTRATION ELECTIVES

Complete 16 semester hours from the following courses:

| | | |
|---|---|---|
| BIOE 5630 | (pending approval) | |
| BIOE 73XX | (pending approval) | |
| BIOL 5553 | Biology of Muscle: Molecules to Movements | 4 SH |
| BIOL 5601 | Multidisciplinary Approaches in Motor Control | 4 SH |
| BIOL 7384 | Topics in Integrative Biology | 2 SH |
| EECE 7200 | Linear Systems Analysis | 4 SH |
| EECE 7203 | Complex Variable Theory and Differential Equations | 4 SH |
| EECE 7367 | Robotics and Automation Systems | 4 SH |
| ME 5650 | Advanced Mechanics of Materials | 4 SH |
| ME 5655 | Dynamics and Mechanical Vibration | 4 SH |
| ME 5657 | Finite Element Method | 4 SH |
| ME 5659 | Control and Mechatronics | 4 SH |
| ME 5667 | Solid Mechanics of Cells and Tissues | 4 SH |
| ME 7210 | Elasticity and Plasticity | 4 SH |
| ME 7238 | Advanced Finite Element Method | 4 SH |
| ME 7240 | Composite Materials | 4 SH |
| ME 7245 | Fracture Mechanics and Failure Analysis | 4 SH |
| ME 7255 | Continuum Mechanics | 4 SH |

***Biomechanics Thesis Option***

THESIS

| | | |
|---|---|---|
| BIOE 7990 | Thesis | 4 SH |

CONCENTRATION ELECTIVES

Complete 12 semester hours from the following courses:

| | | |
|---|---|---|
| BIOE 5630 | (pending approval) | |
| BIOE 73XX | (pending approval) | |
| BIOL 5553 | Biology of Muscle: Molecules to Movements | 4 SH |
| BIOL 5601 | Multidisciplinary Approaches in Motor Control | 4 SH |
| BIOL 7384 | Topics in Integrative Biology | 2 SH |
| EECE 7200 | Linear Systems Analysis | 4 SH |
| EECE 7203 | Complex Variable Theory and Differential Equations | 4 SH |
| EECE 7367 | Robotics and Automation Systems | 4 SH |
| ME 5650 | Advanced Mechanics of Materials | 4 SH |
| ME 5655 | Dynamics and Mechanical Vibration | 4 SH |
| ME 5657 | Finite Element Method | 4 SH |
| ME 5659 | Control and Mechatronics | 4 SH |
| ME 5667 | Solid Mechanics of Cells and Tissues | 4 SH |
| ME 7210 | Elasticity and Plasticity | 4 SH |
| ME 7238 | Advanced Finite Element Method | 4 SH |
| ME 7240 | Composite Materials | 4 SH |
| ME 7245 | Fracture Mechanics and Failure Analysis | 4 SH |
| ME 7255 | Continuum Mechanics | 4 SH |

***Bioimaging and Signal Processing Course Work Option***

CONCENTRATION ELECTIVES

Complete 20 semester hours from the following courses:

| | | |
|---|---|---|
| BIOE 5320 | (pending approval) | |
| BIOE 5235 | (pending approval) | |
| BIOE 71XX | (pending approval) | |
| BIOL 5581 | Biological Imaging | 4 SH |
| EECE 5639 | Computer Vision | 4 SH |

| | | |
|---|---|---|
| EECE 5648 | Biomedical Optics | 4 SH |
| EECE 7203 | Complex Variable Theory and Differential Equations | 4 SH |
| EECE 7204 | Applied Probability and Stochastic Processes | 4 SH |
| EECE 7314 | Auditory Signal Processing | 4 SH |

***Bioimaging and Signal Processing Project Option***

PROJECT

| | | |
|---|---|---|
| BIOE 7890 | Master's Project | 4 SH |

CONCENTRATION ELECTIVES

Complete 16 semester hours from the following courses:

| | | |
|---|---|---|
| BIOE 5320 | (pending approval) | |
| BIOE 5235 | (pending approval) | |
| BIOE 71XX | (pending approval) | |
| BIOL 5581 | Biological Imaging | 4 SH |
| EECE 5639 | Computer Vision | 4 SH |
| EECE 5648 | Biomedical Optics | 4 SH |
| EECE 7203 | Complex Variable Theory and Differential Equations | 4 SH |
| EECE 7204 | Applied Probability and Stochastic Processes | 4 SH |
| EECE 7314 | Auditory Signal Processing | 4 SH |

***Bioimaging and Signal Processing Thesis Option***

THESIS

| | | |
|---|---|---|
| BIOE 7990 | Thesis | 4 SH |

CONCENTRATION ELECTIVES

Complete 12 semester hours from the following courses:

| | | |
|---|---|---|
| BIOE 5320 | (pending approval) | |
| BIOE 5235 | (pending approval) | |
| BIOE 71XX | (pending approval) | |
| BIOL 5581 | Biological Imaging | 4 SH |
| EECE 5639 | Computer Vision | 4 SH |
| EECE 5648 | Biomedical Optics | 4 SH |
| EECE 7203 | Complex Variable Theory and Differential Equations | 4 SH |
| EECE 7204 | Applied Probability and Stochastic Processes | 4 SH |
| EECE 7314 | Auditory Signal Processing | 4 SH |

***Cell and Tissue Engineering Course Work Option***

CONCENTRATION ELECTIVES

Complete 20 semester hours from the following courses:

| | | |
|---|---|---|
| BIOE 5420 | (pending approval) | |
| BIOE 5430 | (pending approval) | |
| BIOE 5630 | (pending approval) | |
| BIOE 5820 | Biomaterials | 4 SH |
| BIOE 72XX | (pending approval) | |
| BIOL 5543 | Stem Cells and Regeneration | 4 SH |
| BIOL 6301 | Molecular Cell Biology | 4 SH |
| CHEM 5500 | Introduction to Regulatory Science | 2 SH |
| ME 5667 | Solid Mechanics of Cells and Tissues | 4 SH |
| NNMD 5470 | Nano- and Biomedical Commercialization: From Concept to Market | 3 SH |
| NNMD 7370 | Nanosystems Design for Biology and Medicine | 2 SH |

***Cell and Tissue Engineering Project Option***

PROJECT

| | | |
|---|---|---|
| BIOE 7890 | Master's Project | 4 SH |

CONCENTRATION ELECTIVES

Complete 16 semester hours from the following courses:

| | | |
|---|---|---|
| BIOE 5420 | (pending approval) | |
| BIOE 5430 | (pending approval) | |
| BIOE 5630 | (pending approval) | |
| BIOE 5820 | Biomaterials | 4 SH |
| BIOE 72XX | (pending approval) | |
| BIOL 5543 | Stem Cells and Regeneration | 4 SH |
| BIOL 6301 | Molecular Cell Biology | 4 SH |
| CHEM 5500 | Introduction to Regulatory Science | 2 SH |
| ME 5667 | Solid Mechanics of Cells and Tissues | 4 SH |
| NNMD 5470 | Nano- and Biomedical Commercialization: From Concept to Market | 3 SH |
| NNMD 7370 | Nanosystems Design for Biology and Medicine | 2 SH |

***Cell and Tissue Engineering Thesis Option***

THESIS

| | | |
|---|---|---|
| BIOE 7990 | Thesis | 4 SH |

CONCENTRATION ELECTIVES

Complete 12 semester hours from the following courses:

| | | |
|---|---|---|
| BIOE 5420 | (pending approval) | |
| BIOE 5430 | (pending approval) | |
| BIOE 5630 | (pending approval) | |
| BIOE 5820 | Biomaterials | 4 SH |
| BIOE 72XX | (pending approval) | |
| BIOL 5543 | Stem Cells and Regeneration | 4 SH |
| BIOL 6301 | Molecular Cell Biology | 4 SH |
| CHEM 5500 | Introduction to Regulatory Science | 2 SH |
| ME 5667 | Solid Mechanics of Cells and Tissues | 4 SH |
| NNMD 5470 | Nano- and Biomedical Commercialization: From Concept to Market | 3 SH |
| NNMD 7370 | Nanosystems Design for Biology and Medicine | 2 SH |

## PROGRAM CREDIT/GPA REQUIREMENTS

33 total semester hours required

Minimum 3.000 GPA required

## Doctor of Philosophy

Our interdisciplinary Doctor of Philosophy program in bioengineering draws on faculty across the university and reflects the significant strengths of bioengineering research in multiple areas. Students accepted to the bioengineering program will undertake a rigorous core curriculum in basic bioengineering science followed by an immersion track curriculum. There are currently eight tracks from which to choose:

- Track 1: Biomedical Imaging and Signal Processing
- Track 2: Biomechanics and Mechanobiology
- Track 3: BioMEMs/BioNANO
- Track 4: Biochemical and Bioenvironmental Engineering
- Track 5: Motor Control
- Track 6: Biocomputing
- Track 7: Cell and Tissue Engineering
- Track 8: General Bioengineering Studies

Biology can inspire engineering. Increasingly, discoveries in the life sciences reveal processes, complexity, and control without analogy in the limited 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 with efficiency unparalleled by anything in today's laboratories. At the same time, traditional engineering disciplines struggle to find new and complex challenges. The last 50 years of basic life science research have gradually peeled the layers of complexity from 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 many affiliated faculty.

### DEGREE REQUIREMENTS

Completion of the PhD degree requires students to successfully complete the following requirements:

- **Curriculum:** The curriculum comprises a strong fundamental, broad core of courses that is then coupled with one of a series of available tracks for depth in a particular field of study. The detailed course requirements are outlined below.
- **Qualifying exam (written):** To qualify to continue in the PhD program, students must pass the bioengineering comprehensive qualifying examination, which comprises the synthesis of knowledge derived from the core curriculum and current literature in the form of an NIH-style proposal. Oral defense of the proposal is required to pass the exam.
- **Dissertation committee:** The dissertation committee is composed of a minimum of three members, two of whom must be selected from the list of bioengineering-affiliated faculty. In addition, one of the two affiliated faculty must have a primary appointment in the College of Engineering. **Area exam:** PhD students must submit a "prospectus" to their thesis committee in the form of a 15-page NIH research plan and successfully defend the research plan in the form of an open presentation to their thesis committee.
- **Dissertation:** PhD candidates must satisfactorily complete and defend a dissertation describing original research in bioengineering.

The PhD degree requires a minimum of 16 semester hours of course work beyond a relevant and accepted master's degree and PhD dissertation. The required course distribution is shown in the table below.

| Requirements | Credits |
|---|---|
| Required core courses | 24 SH |
| Required and elective track courses | 24 SH |
| Advanced seminar | 0 SH |
| Dissertation | 0 SH |
| **Minimum semester hours required** | **48 SH** |

The core emphasizes the breadth of topics that our graduates must appreciate as internationally competitive bioengineers. It utilizes existing courses within the College of Engineering as well as introducing new/external courses that are necessary and will be developed.

### TRACK 1: BIOMEDICAL IMAGING AND SIGNAL PROCESSING

***Track Managers: Dana Brooks and Deniz Erdogmus***

The biomedical imaging and signal processing track reflects Northeastern University's outstanding research profile in various aspects of biological and biomedical imaging and image processing and signal processing. This is evidenced by the Gordon Center for Subsurface Sensing and Imaging Systems, the Center for Communications and Digital Signal Processing Research, and the strong externally funded active research groups and faculty whose interest lie at the intersection of imaging, signal processing technologies, and biological and medical applications.

The courses listed below concentrate largely on general mathematical methods for signal and image processing and image formation and on image acquisition modalities and applications. Research in this area takes place at the intersection of these technical streams, and students completing the track will have a sufficiently strong background in the component areas to be able to carry out high-quality research efforts. Bioengineering PhD candidates may complete this track by taking at least two of the restricted electives and sufficient unrestricted electives to meet

course requirements as specified by their degree program in addition to their core bioengineering curriculum.

## TRACK 2: BIOMECHANICS AND MECHANOBIOLOGY

***Track Managers: Sinan Muftu and Jeffrey Ruberti***

Biomechanics and mechanobiology are linked by the biological response to applied forces and strains. To understand the overall effect of load on biological systems, it is important to consider not only the deformation and shear rates that result from force application but also the short- and long-term biological responses. The biomechanics and mechanobiology track reflects this understanding and leverages the strong faculty research at Northeastern, which is attempting to tie biomechanics to biological responses at multiple scales.

The biomechanics track is designed to capitalize on the substantial expertise in the mechanical and industrial engineering department, which has a strong fundamental research program in biomechanics. Faculty in the department perform investigations that comprise theoretical, computational, and experimental investigations. Students who select this track must take all of the restricted electives in addition to the bioengineering core curriculum and sufficient unrestricted electives to meet course requirements as specified by their degree program.

## TRACK 3: BIOMEMS/BIONANO

***Track Managers: Nicol McGruer and Shashi Murthy***

The BioMEMs/BioNANO track reflects Northeastern University's strength as indicated by the NSF Center for High Rate Nanomanufacturing, the NSF/NCI Nanomedicine IGERT training grant, and the strong pharmaceutical sciences department. In addition, Northeastern also has a research presence in MEMs that, when combined with the bioengineering curriculum, presents significant interdisciplinary opportunities for students in the program. Students may choose to complete this track by taking three of the restricted electives in addition to their core bioengineering curriculum and sufficient unrestricted electives to meet course requirements of their degree program.

## TRACK 4: BIOCHEMICAL AND BIOENVIRONMENTAL

***Track Managers: Rebecca Carrier and April Gu***

The track reflects strengths in biochemical engineering and bioenvironmental engineering by active research programs focused in pharmaceutical bioprocessing, biomaterials, tissue engineering, drug delivery, environmental microbiology, biotreatment/bioremediation, and environmental modeling. Students wishing to pursue this track should take two of the restricted electives listed below in addition to the bioengineering core curriculum and sufficient unrestricted electives to meet the course requirements of their degree program.

## TRACK 5: MOTOR CONTROL

***Track Managers: Rifat Sipahi and Dagmar Sternad***

The motor control track is designed to capitalize on the collective expertise of cross-disciplinary collaborations between existing Northeastern faculty whose research lies at the intersection of sensorimotor control systems, neuroscience, and dynamical systems. Insights into learning and coordination of functional motor behavior provides the basis for a better understanding of neurological diseases of motor function such as stroke, Parkinson's disease, and cerebral palsy. Insights will be the foundation for designing better therapy and rehabilitation.

Students who select this track must take four out of five restricted electives in addition to the bioengineering core curriculum and unrestricted elective courses to meet requirements of the track program.

## TRACK 6: BIOCOMPUTING

***Track Managers: Stefano Basagni and Miriam Leeser***

The biocomputing track draws on strengths in computer engineering and computation applied to bioengineering applications. Bioengineering MS or PhD candidates may complete this track by taking both of the restricted electives and sufficient unrestricted electives to meet course requirements as specified by their degree program.

## TRACK 7: CELL AND TISSUE ENGINEERING

***Track Managers: Anand Asthagiri and Erin Cram***

Cell and tissue engineering is a major strength at Northeastern University with several research labs focused on understanding and engineering living cells and tissues. These labs are elucidating the quantitative principles that govern cell fate decisions and are developing design strategies to promote the assembly and patterning of multicellular systems into viable, functional tissues. Cells are remarkable physicochemical systems that sense, respond, and actively reshape their rich microenvironment. Parsing the dialogue between the microenvironment and cells and elucidating design strategies to engineer the dynamic cellular milieu has far-reaching implications for biomedicine, including applications such as tissue engineering and the development of novel therapeutic strategies.

This pioneering, multidisciplinary research is enabled by strengths at Northeastern in key foundational areas, such as biomolecular engineering, computational modeling, developmental biology, imaging, materials science, micro- and nanofluidics, mechanobiology, molecular cell biology, and systems biology.

Cell and tissue engineering is widely recognized as a core subfield of bioengineering. A formal track in this area offers our students a program of study that capitalizes on a major strength at Northeastern.

## TRACK 8: GENERAL BIOENGINEERING STUDIES

***Track Manager: Jeffrey Ruberti***

### PhD in Bioengineering—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

## GENERAL REQUIREMENTS

***Seminar***

| | | |
|---|---|---|
| BIOE 7390 | Seminar | 0 SH |

***Required Courses***

| | | |
|---|---|---|
| BIOE 5100 | Medical Physiology | 4 SH |
| BIOE 7374 | Special Topics in Bioengineering | 4 SH |

***Additional Courses***

Complete three of the following courses:

| | | |
|---|---|---|
| BIOE 7001 | Biomaterials | 4 SH |
| CHME 5630 | Biochemical Engineering | 4 SH |
| CHME 5699 | Special Topics in Chemical Engineering | 4 SH |
| EECE 5664 | Biomedical Signal Processing | 4 SH |
| ME 5667 | Solid Mechanics of Cells and Tissues | 4 SH |

## TRACKS

Complete one of the following tracks:

***Biomedical Imaging and Signal Processing Track***

REQUIRED COURSES

| | | |
|---|---|---|
| EECE 7200 | Linear Systems Analysis | 4 SH |
| EECE 7203 | Complex Variable Theory and Differential Equations | 4 SH |
| EECE 7204 | Applied Probability and Stochastic Processes | 4 SH |

TRACK ELECTIVES

Complete 16 semester hours from the following courses:

| | | |
|---|---|---|
| BIOL 5587 | Comparative Neurobiology | 4 SH |
| BIOL 5603 | Computational Neuroscience | 4 SH |
| BIOL 6200 | Bioinformatics Programming | 4 SH |
| BIOL 6308 | Bioinformatics Computational Methods 1 | 4 SH |
| BIOL 6309 | Bioinformatics Computational Methods 2 | 4 SH |
| CHEM 5612 | Principles of Mass Spectrometry | 3 SH |
| CHEM 5613 | Optical Methods of Analysis | 3 SH |
| CHEM 5637 | Foundations of Spectroscopy | 3 SH |
| EECE 5648 | Biomedical Optics | 4 SH |
| EECE 7202 | Electromagnetic Theory 1 | 4 SH |
| EECE 7271 | Computational Methods in Electromagnetics | 4 SH |
| EECE 7280 | Fourier and Binary Optics | 4 SH |
| EECE 7281 | Fourier Optics | 4 SH |
| EECE 7284 | Optical Properties of Matter | 4 SH |
| EECE 7293 | Modern Imaging | 4 SH |
| EECE 7310 | Modern Signal Processing | 4 SH |
| EECE 7311 | Two Dimensional Signal and Image Processing | 4 SH |
| EECE 7312 | Statistical and Adaptive Signal Processing | 4 SH |
| EECE 7313 | Pattern Recognition | 4 SH |
| EECE 7314 | Auditory Signal Processing | 4 SH |
| EECE 7323 | Numerical Optimization Methods | 4 SH |
| EECE 7337 | Information Theory | 4 SH |
| PHSC 6226 | Imaging in Medicine and Drug Discovery | 2 SH |
| PHYS 7741 | Biological Physics 2 | 4 SH |
| PSYC 5120 | Proseminar in Sensation | 3 SH |
| PSYC 5130 | Proseminar in Perception | 3 SH |
| PSYC 7220 | Seminar in Sensation | 3 SH |
| PSYC 7230 | Seminar in Perception | 3 SH |
| PSYC 7300 | Advanced Quantitative Analysis | 3 SH |
| PT 5138 | Neuroscience | 4 SH |
| with PT 5139 | Lab for PT 5138 | 1 SH |
| SLPA 5111 | Anatomy and Physiology of the Auditory System | 3 SH |
| SLPA 6209 | Psychoacoustics | 2 SH |
| SLPA 6301 | Speech Science | 3 SH |

***Biomechanics and Mechanobiology Track***

REQUIRED COURSES

| | | |
|---|---|---|
| CHME 5699 | Special Topics in Chemical Engineering | 4 SH |
| ME 5665 | Musculoskeletal Biomechanics | 4 SH |
| ME 7210 | Elasticity and Plasticity | 4 SH |

MATHEMATICAL METHODS

Complete one of the following courses:

| | | |
|---|---|---|
| CHME 7320 | Chemical Engineering Mathematics | 4 SH |
| EECE 7200 | Linear Systems Analysis | 4 SH |
| EECE 7203 | Complex Variable Theory and Differential Equations | 4 SH |
| ME 7205 | Advanced Mathematical Methods for Mechanical Engineers | 4 SH |

TRACK ELECTIVES

Complete 12 semester hours from the following courses:

| | | |
|---|---|---|
| EECE 7367 | Robotics and Automation Systems | 4 SH |
| ME 5650 | Advanced Mechanics of Materials | 4 SH |
| ME 5655 | Dynamics and Mechanical Vibration | 4 SH |
| ME 5657 | Finite Element Method | 4 SH |
| ME 5659 | Control and Mechatronics | 4 SH |
| ME 5667 | Solid Mechanics of Cells and Tissues | 4 SH |
| ME 7238 | Advanced Finite Element Method | 4 SH |
| ME 7240 | Composite Materials | 4 SH |
| ME 7245 | Fracture Mechanics and Failure Analysis | 4 SH |

| | | |
|---|---|---|
| ME 7255 | Continuum Mechanics | 4 SH |
| ME 7275 | Essentials of Fluid Dynamics | 4 SH |
| ME 7280 | Statistical Thermodynamics | 4 SH |
| ME 7325 | Two Phase Flow | 4 SH |
| PT 5133 | Kinesiology | 3 SH |
| with PT 5134 | Lab for PT 5133 | 1 SH |
| PT 5170 | Motor Control | 3 SH |
| with PT 5171 | Lab for PT 5170 | 1 SH |
| PT 6215 | Assistive Technology | 3 SH |
| with PT 6216 | Lab for PT 6215 | 1 SH |

***BioMEMs/BioNANO Track***

REQUIRED COURSES

| | | |
|---|---|---|
| EECE 5606 | Micro- and Nanofabrication | 4 SH |
| ME 6260 | Introduction to Microelectromechanical Systems (MEMS) | 4 SH |
| PHYS 5260 | Introduction to Nanoscience and Nanotechnology | 4 SH |

MATHEMATICAL METHODS

Complete one of the following courses:

| | | |
|---|---|---|
| CHME 7320 | Chemical Engineering Mathematics | 4 SH |
| EECE 7200 | Linear Systems Analysis | 4 SH |
| EECE 7203 | Complex Variable Theory and Differential Equations | 4 SH |
| ME 7205 | Advanced Mathematical Methods for Mechanical Engineers | 4 SH |

TRACK ELECTIVES

Complete 12 semester hours from the following courses:

| | | |
|---|---|---|
| CHEM 5613 | Optical Methods of Analysis | 3 SH |
| CHEM 5638 | Molecular Modeling | 3 SH |
| CHEM 7247 | Advances in Nanomaterials | 3 SH |
| CHME 5699 | Special Topics in Chemical Engineering | 4 SH |
| EECE 5606 | Micro- and Nanofabrication | 4 SH |
| ME 7262 | Nanomanufacturing 1 | 4 SH |
| PHSC 5100 | Concepts in Pharmaceutical Science | 2 SH |
| PHSC 6210 | Drug Design, Evaluation, and Development | 2 SH |
| PHSC 6226 | Imaging in Medicine and Drug Discovery | 2 SH |
| PHYS 7731 | Biological Physics 1 | 4 SH |
| PMST 6250 | Advanced Physical Pharmacy | 2 SH |
| PMST 6252 | Pharmacokinetics and Drug Metabolism | 3 SH |
| PMST 6254 | Advanced Drug Delivery System | 3 SH |
| PMST 6256 | Advanced Pharmacokinetics | 2 SH |

***Biochemical and Bioenvironmental Track***

SELECTED COURSES

Complete two of the following courses:

| | | |
|---|---|---|
| BIOL 6300 | Biochemistry | 4 SH |
| CHME 5630 | Biochemical Engineering | 4 SH |
| CHME 7340 | Chemical Engineering Kinetics | 4 SH |
| CHME 7350 | Transport Phenomena | 4 SH |
| CIVE 7251 | Environmental Biological Processes | 4 SH |

MATHEMATICAL METHODS

Complete one of the following courses:

| | | |
|---|---|---|
| CHME 7320 | Chemical Engineering Mathematics | 4 SH |
| EECE 7200 | Linear Systems Analysis | 4 SH |
| EECE 7203 | Complex Variable Theory and Differential Equations | 4 SH |
| ME 7205 | Advanced Mathematical Methods for Mechanical Engineers | 4 SH |

TRACK ELECTIVES

Complete 16 semester hours from the following courses:

| | | |
|---|---|---|
| BIOL 5579 | Biochemistry/Molecular Biology Experimental Approaches | 4 SH |
| BIOL 5581 | Biological Imaging | 4 SH |
| BIOL 6200 | Bioinformatics Programming | 4 SH |
| BIOL 6301 | Molecular Cell Biology | 4 SH |
| BIOL 6308 | Bioinformatics Computational Methods 1 | 4 SH |
| BIOL 6309 | Bioinformatics Computational Methods 2 | 4 SH |
| CHEM 5612 | Principles of Mass Spectrometry | 3 SH |
| CHEM 5613 | Optical Methods of Analysis | 3 SH |
| CHEM 5620 | Protein Chemistry | 3 SH |
| CHEM 5621 | Principles of Chemical Biology for Chemists | 3 SH |
| CHEM 5660 | Analytical Biochemistry | 3 SH |
| CHEM 5686 | Fundamentals of Molecular Structure and Electronics | 3 SH |
| CHEM 7317 | Analytical Biotechnology | 3 SH |
| PHSC 5100 | Concepts in Pharmaceutical Science | 2 SH |
| PHSC 6210 | Drug Design, Evaluation, and Development | 2 SH |
| PHSC 6218 | Biomedical Chemical Analysis | 2 SH |
| PHSC 6226 | Imaging in Medicine and Drug Discovery | 2 SH |
| PHSC 6290 | Biophysical Methods in Drug Discovery | 2 SH |
| PHYS 7731 | Biological Physics 1 | 4 SH |
| PMST 6250 | Advanced Physical Pharmacy | 2 SH |
| PMST 6252 | Pharmacokinetics and Drug Metabolism | 3 SH |
| PMST 6254 | Advanced Drug Delivery System | 3 SH |
| PMST 6256 | Advanced Pharmacokinetics | 2 SH |

***Motor Control Track***

REQUIRED COURSES

| | | |
|---|---|---|
| BIOL 5601 | Multidisciplinary Approaches in Motor Control | 4 SH |
| ME 5659 | Control and Mechatronics | 4 SH |
| ME 5665 | Musculoskeletal Biomechanics | 4 SH |

MATHEMATICAL METHODS

Complete one of the following courses:

| | | |
|---|---|---|
| CHME 7320 | Chemical Engineering Mathematics | 4 SH |
| EECE 7200 | Linear Systems Analysis | 4 SH |
| EECE 7203 | Complex Variable Theory and Differential Equations | 4 SH |
| ME 7205 | Advanced Mathematical Methods for Mechanical Engineers | 4 SH |

TRACK ELECTIVES

Complete 12 semester hours from the following courses:

| | | |
|---|---|---|
| BIOL 5587 | Comparative Neurobiology | 4 SH |
| CS 5335 | Robotic Science and Systems | 4 SH |
| with CS 5336 | Lab for CS 5335 | 0 SH |
| EECE 7200 | Linear Systems Analysis | 4 SH |
| EECE 7204 | Applied Probability and Stochastic Processes | 4 SH |
| EECE 7213 | System Identification and Adaptive Control | 4 SH |
| EECE 7214 | Optimal and Robust Control | 4 SH |
| EECE 7310 | Modern Signal Processing | 4 SH |
| IE 7280 | Statistical Methods in Engineering | 4 SH |
| IE 7315 | Human Factors Engineering | 4 SH |
| ME 5655 | Dynamics and Mechanical Vibration | 4 SH |
| ME 6200 | Mathematical Methods for Mechanical Engineers 1 | 4 SH |
| ME 6201 | Mathematical Methods for Mechanical Engineers 2 | 4 SH |
| ME 7350 | Graduate Seminar in Robotics | 1 SH |
| PHYS 7301 | Classical Mechanics/Math Methods | 4 SH |
| PHYS 7321 | Computational Physics | 4 SH |
| PHYS 7735 | Nonlinear Dynamics | 4 SH |
| PHYS 7741 | Biological Physics 2 | 4 SH |
| PSYC 5180 | Quantitative Methods 1 | 3 SH |
| PSYC 5181 | Quantitative Methods 2 | 3 SH |
| PT 5138 | Neuroscience | 4 SH |
| with PT 5139 | Lab for PT 5138 | 1 SH |
| PT 5150 | Motor Control, Development, and Learning | 4 SH |
| with PT 5151 | Lab for PT 5150 | 1 SH |

***Biocomputing Track***

REQUIRED COURSES

| | | |
|---|---|---|
| EECE 7205 | Fundamentals of Computer Engineering | 4 SH |
| EECE 7360 | Combinatorial Optimization | 4 SH |

MATHEMATICAL METHODS

Complete one of the following courses:

| | | |
|---|---|---|
| CHME 7320 | Chemical Engineering Mathematics | 4 SH |
| EECE 7200 | Linear Systems Analysis | 4 SH |
| EECE 7203 | Complex Variable Theory and Differential Equations | 4 SH |
| ME 7205 | Advanced Mathematical Methods for Mechanical Engineers | 4 SH |

TRACK ELECTIVES

Complete 16 semester hours from the following courses:

| | | |
|---|---|---|
| BIOL 5581 | Biological Imaging | 4 SH |
| BIOL 5587 | Comparative Neurobiology | 4 SH |
| BIOL 6200 | Bioinformatics Programming | 4 SH |
| BIOL 6308 | Bioinformatics Computational Methods 1 | 4 SH |
| BIOL 6309 | Bioinformatics Computational Methods 2 | 4 SH |
| CS 5100 | Foundations of Artificial Intelligence | 4 SH |
| CS 5200 | Database Management Systems | 4 SH |
| CS 5310 | Computer Graphics | 4 SH |
| CS 5320 | Digital Image Processing | 4 SH |
| CS 5330 | Pattern Recognition and Computer Vision | 4 SH |
| CS 5400 | Principles of Programming Language | 4 SH |
| CS 5600 | Computer Systems | 4 SH |
| CS 5800 | Algorithms | 4 SH |
| CS 6110 | Knowledge-Based Systems | 4 SH |
| CS 6140 | Machine Learning | 4 SH |
| CS 6200 | Information Retrieval | 4 SH |
| CS 6410 | Compilers | 4 SH |
| CS 6610 | Parallel Computing | 4 SH |
| CS 6810 | Distributed Algorithms | 4 SH |
| EECE 7200 | Linear Systems Analysis | 4 SH |
| EECE 7203 | Complex Variable Theory and Differential Equations | 4 SH |
| EECE 7204 | Applied Probability and Stochastic Processes | 4 SH |
| EECE 7313 | Pattern Recognition | 4 SH |
| EECE 7339 | Testing and Design for Testability | 4 SH |
| EECE 7350 to EECE 7354 | | |
| EECE 7357 to EECE 7359 | | |
| EECE 7361 | Digital Hardware Synthesis | 4 SH |
| EECE 7364 | Mobile and Wireless Networking | 4 SH |
| EECE 7365 | Distributed Systems | 4 SH |
| EECE 7367 | Robotics and Automation Systems | 4 SH |
| EECE 7368 | High-Level Design of Hardware-Software Systems | 4 SH |
| EECE 7389 | Robot Vision and Sensors | 4 SH |
| OR 6205 | Deterministics Operations Research | 4 SH |
| OR 7230 | Probabilistic Operation Research | 4 SH |

***Cell and Tissue Engineering Track***

REQUIRED COURSES

| | | |
|---|---|---|
| BIOL 6401 | Research Methods and Critical Analysis in Molecular Cell Biology | 4 SH |
| CHME 5699 | Special Topics in Chemical Engineering | 4 SH |
| CHME 7340 | Chemical Engineering Kinetics | 4 SH |

MATHEMATICAL METHODS

Complete one of the following courses:

| | | |
|---|---|---|
| CHME 7320 | Chemical Engineering Mathematics | 4 SH |
| EECE 7200 | Linear Systems Analysis | 4 SH |

| | | |
|---|---|---|
| EECE 7203 | Complex Variable Theory and Differential Equations | 4 SH |
| ME 7205 | Advanced Mathematical Methods for Mechanical Engineers | 4 SH |

TRACK ELECTIVES

Complete 12 semester hours from the following courses:

| | | |
|---|---|---|
| BIOL 5307 | Biological Electron Microscopy | 4 SH |
| BIOL 5577 | Developmental Biology | 4 SH |
| BIOL 5579 | Biochemistry/Molecular Biology Experimental Approaches | 4 SH |
| BIOL 5581 | Biological Imaging | 4 SH |
| CHME 7350 | Transport Phenomena | 4 SH |
| ECE5648 | | |
| ME 5667 | Solid Mechanics of Cells and Tissues | 4 SH |
| PHYS 7741 | Biological Physics 2 | 4 SH |

***General Bioengineering Studies Track***

MATHEMATICAL METHODS

Complete one of the following courses:

| | | |
|---|---|---|
| CHME 7320 | Chemical Engineering Mathematics | 4 SH |
| EECE 7200 | Linear Systems Analysis | 4 SH |
| EECE 7203 | Complex Variable Theory and Differential Equations | 4 SH |

TRACK ELECTIVES

Complete 24 semester hours from the following courses:

| | | |
|---|---|---|
| BIOL 5307 | Biological Electron Microscopy | 4 SH |
| BIOL 5553 | Biology of Muscle: Molecules to Movements | 4 SH |
| BIOL 5577 | Developmental Biology | 4 SH |
| BIOL 5579 | Biochemistry/Molecular Biology Experimental Approaches | 4 SH |
| BIOL 5581 | Biological Imaging | 4 SH |
| BIOL 5587 | Comparative Neurobiology | 4 SH |
| BIOL 5601 | Multidisciplinary Approaches in Motor Control | 4 SH |
| BIOL 5603 | Computational Neuroscience | 4 SH |
| BIOL 6200 | Bioinformatics Programming | 4 SH |
| BIOL 6300 | Biochemistry | 4 SH |
| BIOL 6301 | Molecular Cell Biology | 4 SH |
| BIOL 6308 | Bioinformatics Computational Methods 1 | 4 SH |
| BIOL 6309 | Bioinformatics Computational Methods 2 | 4 SH |
| BIOL 6401 | Research Methods and Critical Analysis in Molecular Cell Biology | 4 SH |
| CAEP 6202 | Research, Evaluation, and Data Analysis | 3 SH |
| CHEM 5612 | Principles of Mass Spectrometry | 3 SH |
| CHEM 5613 | Optical Methods of Analysis | 3 SH |
| CHEM 5620 | Protein Chemistry | 3 SH |
| CHEM 5621 | Principles of Chemical Biology for Chemists | 3 SH |
| CHEM 5637 | Foundations of Spectroscopy | 3 SH |
| CHEM 5638 | Molecular Modeling | 3 SH |
| CHEM 5660 | Analytical Biochemistry | 3 SH |
| CHEM 5686 | Fundamentals of Molecular Structure and Electronics | 3 SH |
| CHEM 7247 | Advances in Nanomaterials | 3 SH |
| CHEM 7317 | Analytical Biotechnology | 3 SH |
| CHME 5630 | Biochemical Engineering | 4 SH |
| CHME 5699 | Special Topics in Chemical Engineering | 4 SH |
| CHME 7260 | Special Topics in Chemical Engineering | 4 SH |
| CHME 7330 | Chemical Engineering Thermodynamics | 4 SH |
| CHME 7340 | Chemical Engineering Kinetics | 4 SH |
| CHME 7350 | Transport Phenomena | 4 SH |
| CIVE 7251 | Environmental Biological Processes | 4 SH |
| CS 5100 | Foundations of Artificial Intelligence | 4 SH |
| CS 5200 | Database Management Systems | 4 SH |
| CS 5310 | Computer Graphics | 4 SH |
| CS 5320 | Digital Image Processing | 4 SH |
| CS 5330 | Pattern Recognition and Computer Vision | 4 SH |
| CS 5335 | Robotic Science and Systems | 4 SH |
| CS 5336 | Lab for CS 5335 | 0 SH |
| CS 5600 | Computer Systems | 4 SH |
| CS 5800 | Algorithms | 4 SH |
| CS 6110 | Knowledge-Based Systems | 4 SH |
| CS 6140 | Machine Learning | 4 SH |
| CS 6200 | Information Retrieval | 4 SH |
| CS 6410 | Compilers | 4 SH |
| CS 6610 | Parallel Computing | 4 SH |
| CS 6810 | Distributed Algorithms | 4 SH |
| EECE 5606 | Micro- and Nanofabrication | 4 SH |
| EECE 5648 | Biomedical Optics | 4 SH |
| EECE 7200 | Linear Systems Analysis | 4 SH |
| EECE 7202 | Electromagnetic Theory 1 | 4 SH |
| EECE 7203 | Complex Variable Theory and Differential Equations | 4 SH |
| EECE 7204 | Applied Probability and Stochastic Processes | 4 SH |
| EECE 7205 | Fundamentals of Computer Engineering | 4 SH |
| EECE 7211 | Nonlinear Control | 4 SH |
| EECE 7213 | System Identification and Adaptive Control | 4 SH |
| EECE 7214 | Optimal and Robust Control | 4 SH |
| EECE 7236 | Special Topics in Control | 4 SH |
| EECE 7271 | Computational Methods in Electromagnetics | 4 SH |
| EECE 7280 | Fourier and Binary Optics | 4 SH |
| EECE 7281 | Fourier Optics | 4 SH |
| EECE 7284 | Optical Properties of Matter | 4 SH |
| EECE 7293 | Modern Imaging | 4 SH |
| EECE 7310 | Modern Signal Processing | 4 SH |

| | | |
|---|---|---|
| EECE 7311 | Two Dimensional Signal and Image Processing | 4 SH |
| EECE 7312 | Statistical and Adaptive Signal Processing | 4 SH |
| EECE 7313 | Pattern Recognition | 4 SH |
| EECE 7314 | Auditory Signal Processing | 4 SH |
| EECE 7323 | Numerical Optimization Methods | 4 SH |
| EECE 7335 | Detection and Estimation Theory | 4 SH |
| EECE 7337 | Information Theory | 4 SH |
| EECE 7339 | Testing and Design for Testability | 4 SH |
| EECE 7350 to EECE 7354 | | |
| EECE 7357 to EECE 7361 | | |
| EECE 7364 | Mobile and Wireless Networking | 4 SH |
| EECE 7365 | Distributed Systems | 4 SH |
| EECE 7367 | Robotics and Automation Systems | 4 SH |
| EECE 7368 | High-Level Design of Hardware-Software Systems | 4 SH |
| EECE 7389 | Robot Vision and Sensors | 4 SH |
| EXSC 6263 | Research Design and Methodology | 3 SH |
| IE 7280 | Statistical Methods in Engineering | 4 SH |
| IE 7315 | Human Factors Engineering | 4 SH |
| ME 5650 | Advanced Mechanics of Materials | 4 SH |
| ME 5655 | Dynamics and Mechanical Vibration | 4 SH |
| ME 5657 | Finite Element Method | 4 SH |
| ME 5659 | Control and Mechatronics | 4 SH |
| ME 5665 | Musculoskeletal Biomechanics | 4 SH |
| ME 5667 | Solid Mechanics of Cells and Tissues | 4 SH |
| ME 6200 | Mathematical Methods for Mechanical Engineers 1 | 4 SH |
| ME 6201 | Mathematical Methods for Mechanical Engineers 2 | 4 SH |
| ME 6260 | Introduction to Microelectromechanical Systems (MEMS) | 4 SH |
| ME 7210 | Elasticity and Plasticity | 4 SH |
| ME 7238 | Advanced Finite Element Method | 4 SH |
| ME 7240 | Composite Materials | 4 SH |
| ME 7245 | Fracture Mechanics and Failure Analysis | 4 SH |
| ME 7255 | Continuum Mechanics | 4 SH |
| ME 7262 | Nanomanufacturing 1 | 4 SH |
| ME 7275 | Essentials of Fluid Dynamics | 4 SH |
| ME 7280 | Statistical Thermodynamics | 4 SH |
| ME 7325 | Two Phase Flow | 4 SH |
| OR 6205 | Deterministics Operations Research | 4 SH |
| OR 7230 | Probabilistic Operation Research | 4 SH |
| PHSC 5100 | Concepts in Pharmaceutical Science | 2 SH |
| PHSC 6210 | Drug Design, Evaluation, and Development | 2 SH |
| PHSC 6218 | Biomedical Chemical Analysis | 2 SH |
| PHSC 6226 | Imaging in Medicine and Drug Discovery | 2 SH |
| PHSC 6290 | Biophysical Methods in Drug Discovery | 2 SH |
| PHYS 5260 | Introduction to Nanoscience and Nanotechnology | 4 SH |
| PHYS 7301 | Classical Mechanics/Math Methods | 4 SH |
| PHYS 7321 | Computational Physics | 4 SH |
| PHYS 7731 | Biological Physics 1 | 4 SH |
| PHYS 7735 | Nonlinear Dynamics | 4 SH |
| PHYS 7741 | Biological Physics 2 | 4 SH |
| PMST 6250 | Advanced Physical Pharmacy | 2 SH |
| PMST 6252 | Pharmacokinetics and Drug Metabolism | 3 SH |
| PMST 6254 | Advanced Drug Delivery System | 3 SH |
| PMST 6256 | Advanced Pharmacokinetics | 2 SH |
| PSYC 5120 | Proseminar in Sensation | 3 SH |
| PSYC 5130 | Proseminar in Perception | 3 SH |
| PSYC 5180 | Quantitative Methods 1 | 3 SH |
| PSYC 5181 | Quantitative Methods 2 | 3 SH |
| PSYC 7220 | Seminar in Sensation | 3 SH |
| PSYC 7230 | Seminar in Perception | 3 SH |
| PSYC 7300 | Advanced Quantitative Analysis | 3 SH |
| PT 5133 | Kinesiology | 3 SH |
| PT 5134 | Lab for PT 5133 | 1 SH |
| PT 5138 | Neuroscience | 4 SH |
| PT 5139 | Lab for PT 5138 | 1 SH |
| PT 5150 | Motor Control, Development, and Learning | 4 SH |
| PT 5151 | Lab for PT 5150 | 1 SH |
| PT 5170 | Motor Control | 3 SH |
| PT 5171 | Lab for PT 5170 | 1 SH |
| PT 6215 | Assistive Technology | 3 SH |
| SLPA 5111 | Anatomy and Physiology of the Auditory System | 3 SH |
| SLPA 6209 | Psychoacoustics | 2 SH |
| SLPA 6301 | Speech Science | 3 SH |

## DISSERTATION COURSES

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| BIOE 9990 | Dissertation | 0 SH |

## PROGRAM CREDIT/GPA REQUIREMENTS

48 total semester hours required

Minimum 3.000 GPA required

## CHEMICAL ENGINEERING

**www.che.neu.edu**

THOMAS J. WEBSTER, PHD
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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 or a nonthesis degree. Most courses are offered in the late afternoon or early evening to make them accessible to part-time students pursuing full-time industrial careers. A full-time MS student may apply for participation in the cooperative education plan. Master's students pursuing the thesis option must first gain the consent of their advisor prior to participating in the cooperative education plan. The MS thesis 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 are able to select thesis topics from a diverse range of faculty research interests. New graduate students can learn about ongoing research topics 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.

### Master's Degree in Chemical Engineering

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 course work. 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 course work 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 director of the department's graduate program and follow the procedure detailed in section 4.7 of this catalog (page 98). If admission is granted, then the student must satisfy all the requirements of the doctoral degree program, including the requirements for doctoral candidacy. For further information, see the section "PhD in Chemical Engineering," below.

#### COURSE REQUIREMENTS

A minimum of 32 semester hours (SH) of academic work is required of all full-time students (continuous and cooperative education full-time students) 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 matriculating 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. Full-time Master of Science degree students who complete the required 8 semester hours of thesis work (CHME 7990) are required to register for CHME 7996 Thesis Continuation (0 SH) each semester until their thesis is completed. Note that although no credits are associated with CHME 7996 Thesis Continuation, a student registered for this course is considered full-time.

**If pursuing a nonthesis option,** students must complete a minimum of 32 semester hours of course work and no enrollment in the seminar course is required. Required core courses and example elective courses for all graduate students are provided below.

#### 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 head. The graduate school requirements and electronic submittal instructions can be found on the Web at www.coe.neu.edu/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 course work 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 have left the chemical engineering department prior to completion of all degree requirements. In such instances, longtime 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.

| Degree Requirements | Thesis Option | Nonthesis 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** |

*Students may complete a maximum of 8 semester hours (thesis option) or 12 semester hours (nonthesis option) of course work for credit outside the Department of Chemical Engineering under guidance of their advisor and approval of the chemical engineering graduate program director.

**Exclusive of any preparatory undergraduate courses.

## MSCHE—Master of Science in Chemical Engineering

Complete all courses and requirements listed below unless otherwise indicated.

### GENERAL REQUIREMENTS

| | | |
|---|---|---|
| CHME 7320 | Chemical Engineering Mathematics | 4 SH |
| CHME 7330 | Chemical Engineering Thermodynamics | 4 SH |
| CHME 7340 | Chemical Engineering Kinetics | 4 SH |
| CHME 7350 | Transport Phenomena | 4 SH |

### OPTIONS

Complete one of the following options:

***Course Work Option***

Complete 16 semester hours from the following courses:

| | | |
|---|---|---|
| CHME 5204 | Heterogeneous Catalysis | 4 SH |
| CHME 5630 | Biochemical Engineering | 4 SH |
| CHME 7201 | Fluid Mechanics | 4 SH |
| CHME 7202 | Chemical Process Heat Transfer | 4 SH |
| CHME 7205 | Numerical Techniques in Chemical Engineering | 4 SH |
| CHME 7210 | Advanced Chemical Engineering Calculations | 4 SH |
| CHME 7220 | Electronic Materials, Thin Films, and Nanostructures | 4 SH |
| CHME 7221 | Thin Film Technology | 4 SH |
| CHME 7222 | Principals of Membrane Processes | 4 SH |
| CHME 7231 | Chemical Process Dynamics and Control | 4 SH |
| CHME 7240 | Polymer Science | 4 SH |
| CHME 7260 | Special Topics in Chemical Engineering | 4 SH |
| CHME 7261 | Special Topics in Chemical Engineering | 2 SH |
| CHME 7978 | Independent Study | 1 to 4 SH |
| ENGR 5670 | Sustainable Energy: Materials, Conversion, Storage, and Usage | 4 SH |
| ENGR 6150 | Nanotechnology in Engineering | 4 SH |

***Thesis Option***

THESIS

Requires 8 semester hours (CHME 7990 is repeatable):

| | | |
|---|---|---|
| CHME 7390 | Seminar | 0 SH |
| CHME 7990 | Thesis | 1 to 4 SH |

ELECTIVES

Complete 8 semester hours from the following courses:

| | | |
|---|---|---|
| CHME 5204 | Heterogeneous Catalysis | 4 SH |
| CHME 5630 | Biochemical Engineering | 4 SH |
| CHME 7201 | Fluid Mechanics | 4 SH |
| CHME 7202 | Chemical Process Heat Transfer | 4 SH |
| CHME 7205 | Numerical Techniques in Chemical Engineering | 4 SH |
| CHME 7210 | Advanced Chemical Engineering Calculations | 4 SH |
| CHME 7220 | Electronic Materials, Thin Films, and Nanostructures | 4 SH |
| CHME 7221 | Thin Film Technology | 4 SH |
| CHME 7222 | Principals of Membrane Processes | 4 SH |
| CHME 7231 | Chemical Process Dynamics and Control | 4 SH |
| CHME 7240 | Polymer Science | 4 SH |
| CHME 7260 | Special Topics in Chemical Engineering | 4 SH |
| CHME 7261 | Special Topics in Chemical Engineering | 2 SH |
| CHME 7978 | Independent Study | 1 to 4 SH |
| ENGR 5670 | Sustainable Energy: Materials, Conversion, Storage, and Usage | 4 SH |
| ENGR 6150 | Nanotechnology in Engineering | 4 SH |

***Engineering Leadership Option***

Students completing this option receive the graduate certificate in engineering leadership in addition to the master's degree.

LEADERSHIP

| | | |
|---|---|---|
| ENLR 5121 | Engineering Leadership 1 | 2 SH |
| ENLR 5122 | Engineering Leadership 2 | 2 SH |

FOUNDATIONS

| | | |
|---|---|---|
| ENLR 5131 | Scientific Foundations of Engineering 1 | 2 SH |
| ENLR 5132 | Scientific Foundations of Engineering 2 | 2 SH |

| | | |
|---|---|---|
| PROJECT | | |
| ENLR 7440 | Engineering Leadership Challenge Project 1 | 4 SH |
| ENLR 7442 | Engineering Leadership Challenge Project 2 | 4 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

32 total semester hours required
Minimum 3.000 GPA required

## Doctor of Philosophy

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 course work and a dissertation under the direction of a dissertation advisor. All doctoral candidates must also pass a final oral examination. Additional details for departmental procedures on advisor selection, committee selection, candidacy proposal defense, and dissertation defense are provided in the *Chemical Engineering Graduate Student Guidebook,* available online at www.che.neu.edu.

### QUALIFYING FOR DOCTORAL CANDIDACY

To qualify for doctoral candidacy, the student must demonstrate mastery of the four core areas of chemical engineering (thermodynamics, kinetics, transport, and mathematics) through course performance. To become a doctoral candidate, students must have no grades below a B and must maintain a GPA of 3.500 or above, typically at the end of the first year, as an average considering all four core courses.

In addition, each student must also 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 oral candidacy proposal defense in order to advance to doctoral candidacy. The oral presentation will be open to students, faculty, and the student's committee. The student earns the classification of *doctoral candidate* upon successful completion of these requirements.

### COURSE REQUIREMENTS

A minimum of 24 semester hours (SH) of academic course work, **not including any independent study credits,** beyond the bachelor's degree is required. The 24 SH must include at least 16 SH of academic course work (exclusive of thesis or dissertation) taken at Northeastern University. All four of the core courses (see table below) must be included in the student's academic graduate course work.

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, CHME 8960 Doctoral Candidacy Preparation, 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 advisor as the "instructor."

After reaching PhD candidacy, students are required to register for CHME 9990 Dissertation for two consecutive semesters. This is then followed by registration for CHME 9996 Dissertation Continuation in each semester thereafter until the dissertation has been completed and defended. ***Note:*** **No course credits are awarded for CHME 9990 Dissertation or CHME 9996 Dissertation Continuation; 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 for each semester they are matriculating toward their degree.

Students will be advised on their courses for the first semester by the chemical engineering graduate coordinator during orientation. After the first semester, students will work with their advisor to determine appropriate courses and course schedule to meet their educational needs and aspirations. Upon consultation with the dissertation advisor, a student may take up to 44 SH of course credit without additional financial penalty. Students and advisors should keep in mind that the requirements for doctoral candidacy include all four core courses and the proposal defense and 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 Doctor of Philosophy degree. However, each candidate must be proficient in technical writing and oral presentation in the English language. The graduate committee may require additional course work 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 course work (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, he or she 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 advisor at least one month prior to the dissertation defense. The committee must have a minimum of three members, in addition to the primary advisor. The primary dissertation advisor must be a faculty member in the Department of Chemical Engineering. Additionally, one of these committee members must be external to the Department of Chemical Engineering. Committee membership is not limited to faculty at Northeastern University, nor to engineering faculty. The student is

encouraged to consider experts in the dissertation topic and to work with the dissertation advisor to create a meaningful and helpful committee. The dissertation committee will approve the dissertation in its final form. Required dissertation format is the same as for the MS thesis, and the graduate school requirements and electronic submittal instructions can be found on the Web at www.coe.neu.edu/coe/graduate. 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 left 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.

## PhD in Chemical Engineering

Complete all courses and requirements listed below unless otherwise indicated.

### MILESTONES

Annual review
Dissertation proposal
Dissertation committee
Dissertation defense

### GENERAL REQUIREMENTS

A minimum of 24 semester hours of academic course work is required. Independent study credits do not apply to the 24 required semester hours.

***Approved Course Work***

Requires four courses (16 semester hours) with a GPA of 3.500 or higher. Consult your faculty advisor for acceptable courses.

***Electives***

Requires two courses (8 semester hours). Consult your faculty advisor for acceptable courses.

### DISSERTATION

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| CHME 9990 | Dissertation | 0 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

24 total semester hours required
Minimum 3.000 GPA required

# CIVIL AND ENVIRONMENTAL ENGINEERING

**www.civ.neu.edu**

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The Department of Civil and Environmental Engineering (CEE) offers graduate programs leading to the degrees of Master of Science in Civil Engineering, Master of Science (without specification), and Doctor of Philosophy in Civil Engineering. At the master's level, five areas of concentration are offered:

- Construction management
- Environmental engineering
- Geotechnical/geoenvironmental engineering
- Structural engineering
- Transportation engineering

Students may pursue the Master of Science degree program on either a full- or part-time basis. Students must pursue the PhD program on a basis consistent with the residence requirements for the degree as described in the curriculum requirements. The curriculum includes areas of concentration in construction management, environmental engineering, geotechnical/geoenvironmental engineering, structural engineering, and transportation engineering. 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 GPA of 3.000.

Detailed course and degree requirements are listed in the following sections for different concentration areas. There are three types of courses to fulfill the required semester hours, including required core courses, restricted electives, and other electives. Students may substitute required core courses not counted as part of their required core courses as a restricted elective. Students may substitute restricted electives not counted as part of their restricted electives as other electives. In addition to the other electives listed for each concentration, any graduate CIVE course can be counted as an other elective. Other courses, outside the CIVE department and not listed as an other elective, may also be considered as other electives, but these courses require a petition approved by the concentration advisor via the Graduate School of Engineering petition system.

## Master's Degree in Civil Engineering with Graduate Certificate in Engineering Leadership

As an option, the department offers a Master of Science degree in civil engineering with a graduate certificate in engineering leadership from the Gordon Leadership Program. Students pursuing this degree must complete 16 semester hours of course work in the Gordon Leadership Program and 16–18 semester hours of course work in a civil engineering discipline (construction management, environmental engineering, geotechnical/geoenvironmental engineering, structural engineering, or transportation engineering). For some civil engineering disciplines, a petition is required to include course work from the Gordon Leadership Program in lieu of civil engineering restricted electives.

## Master's Degree in Civil Engineering with Concentration in Construction Management

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 CEE department, 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 | Course Work 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** |

## MSCivE—Master of Science in Civil Engineering with Concentration in Construction Management

Complete all courses and requirements listed below unless otherwise indicated.

### GENERAL REQUIREMENTS

| | | |
|---|---|---|
| CIVE 7220 | Construction Management | 4 SH |
| CIVE 5221 | Construction Project Control and Organization | 2 SH |
| CIVE 7230 | Legal Aspects of Civil Engineering | 4 SH |
| EMGT 6305 | Financial Management for Engineers | 4 SH |
| IE 6200 | Engineering Probability and Statistics | 4 SH |

### OPTIONS

Complete one of the following options:

***Course Work Option***

Complete four of the following courses (14 semester hours):

| | | |
|---|---|---|
| OR 6205 | Deterministics Operations Research | 4 SH |
| ACCT 6200 | Financial Reporting and Managerial Decision Making 1 | 3 SH |

| | | |
|---|---|---|
| ACCT 6201 | Financial Reporting and Managerial Decision Making 2 | 1.5 SH |
| CIVE 5231 | Alternative Project Delivery Systems in Construction | 2 SH |
| CIVE 7240 | Construction Equipment and Modeling | 4 SH |
| CIVE 7301 | Advanced Soil Mechanics | 4 SH |
| CIVE 7302 | Advanced Foundation Engineering | 4 SH |
| EMGT 5300 | Engineering/Organizational Psychology | 4 SH |
| IE 7215 | Simulation Analysis | 4 SH |
| IE 7290 | Reliability Analysis and Risk Assessment | 4 SH |
| IE 7615 | Neural Networks in Engineering | 4 SH |
| INFO 6210 | Data Management and Database Design | 4 SH |
| INFO 6215 | Business Analysis and Information Engineering | 4 SH |
| INFO 6245 | Planning and Managing Information Systems Development | 4 SH |

***Report Option***

COURSE WORK

Complete three of the following courses (10 semester hours):

| | | |
|---|---|---|
| OR 6205 | Deterministics Operations Research | 4 SH |
| ACCT 6200 | Financial Reporting and Managerial Decision Making 1 | 3 SH |
| ACCT 6201 | Financial Reporting and Managerial Decision Making 2 | 1.5 SH |
| CIVE 5231 | Alternative Project Delivery Systems in Construction | 2 SH |
| CIVE 7240 | Construction Equipment and Modeling | 4 SH |
| CIVE 7301 | Advanced Soil Mechanics | 4 SH |
| CIVE 7302 | Advanced Foundation Engineering | 4 SH |
| EMGT 5300 | Engineering/Organizational Psychology | 4 SH |
| IE 7215 | Simulation Analysis | 4 SH |
| IE 7290 | Reliability Analysis and Risk Assessment | 4 SH |
| IE 7615 | Neural Networks in Engineering | 4 SH |
| INFO 6210 | Data Management and Database Design | 4 SH |
| INFO 6215 | Business Analysis and Information Engineering | 4 SH |
| INFO 6245 | Planning and Managing Information Systems Development | 4 SH |

REPORT

Requires 4 semester hours:

| | | |
|---|---|---|
| CIVE 8674 | Master's Report | 2 or 4 SH |

***Thesis Option***

COURSE WORK

Complete two of the following courses (6 semester hours):

| | | |
|---|---|---|
| OR 6205 | Deterministics Operations Research | 4 SH |
| ACCT 6200 | Financial Reporting and Managerial Decision Making 1 | 3 SH |
| ACCT 6201 | Financial Reporting and Managerial Decision Making 2 | 1.5 SH |
| CIVE 5231 | Alternative Project Delivery Systems in Construction | 2 SH |
| CIVE 7240 | Construction Equipment and Modeling | 4 SH |
| CIVE 7301 | Advanced Soil Mechanics | 4 SH |
| CIVE 7302 | Advanced Foundation Engineering | 4 SH |
| EMGT 5300 | Engineering/Organizational Psychology | 4 SH |
| IE 7215 | Simulation Analysis | 4 SH |
| IE 7290 | Reliability Analysis and Risk Assessment | 4 SH |
| IE 7615 | Neural Networks in Engineering | 4 SH |
| INFO 6210 | Data Management and Database Design | 4 SH |
| INFO 6215 | Business Analysis and Information Engineering | 4 SH |
| INFO 6245 | Planning and Managing Information Systems Development | 4 SH |

THESIS

Requires 8 semester hours:

| | | |
|---|---|---|
| CIVE 7990 | Thesis | 1 to 8 SH |

***Engineering Leadership Option***

Students completing this option receive the graduate certificate in engineering leadership in addition to the master's degree.

LEADERSHIP

| | | |
|---|---|---|
| ENLR 5121 | Engineering Leadership 1 | 2 SH |
| ENLR 5122 | Engineering Leadership 2 | 2 SH |

FOUNDATIONS

| | | |
|---|---|---|
| ENLR 5131 | Scientific Foundations of Engineering 1 | 2 SH |
| ENLR 5132 | Scientific Foundations of Engineering 2 | 2 SH |

PROJECT

| | | |
|---|---|---|
| ENLR 7440 | Engineering Leadership Challenge Project 1 | 4 SH |
| ENLR 7442 | Engineering Leadership Challenge Project 2 | 4 SH |

## PROGRAM CREDIT/GPA REQUIREMENTS

32 total semester hours required

Minimum 3.000 GPA required

## Master's Degree in Civil Engineering with Concentration in Environmental Engineering

This program is intended for students who are interested in environmental engineering or a closely related field. It includes study in water and wastewater treatment and disposal, hazardous waste management, air pollution management, groundwater remediation and protection, surface water quanity and quality, and water resources management. It includes required core courses from the CEE department, complemented by electives in civil and environmental engineering, as well as electives from other departments such as electrical and computer engineering, chemical engineering , mechanical and industrial engineering, earth and environmental sciences, and mathematics.

| Degree Requirements | With Report | With Thesis | Course Work 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** |

## MSCivE—Master of Science in Civil Engineering with Concentration in Environmental Engineering

Complete all courses and requirements listed below unless otherwise indicated.

### GENERAL REQUIREMENTS

Complete two of the following courses:

| | | |
|---|---|---|
| CIVE 7250 | Environmental Chemistry | 4 SH |
| CIVE 7251 | Environmental Biological Processes | 4 SH |
| CIVE 7260 | Hydrology | 4 SH |

### OPTIONS

Complete one of the following options:

***Course Work Option***

RESTRICTIVE ELECTIVES

Complete three of the following courses:

| | | |
|---|---|---|
| CIVE 5270 | Environmental Protection and Management | 4 SH |
| CIVE 5271 | Solid and Hazardous Waste Management | 4 SH |
| CIVE 5321 | Geoenvironmental Engineering | 4 SH |
| CIVE 5536 | Hydrologic Engineering | 4 SH |
| CIVE 7252 | Water and Wastewater Treatment Processes | 4 SH |
| CIVE 7261 | Surface Water Quality Modeling | 4 SH |
| CIVE 7263 | Groundwater Hydraulics and Quality Modeling | 4 SH |
| CIVE 7322 | Engineering Geology | 4 SH |
| CIVE 7272 | Air Quality Management | 4 SH |

ADDITIONAL ELECTIVES

Complete three of the following courses:

| | | |
|---|---|---|
| EECE 5626 | Image Processing and Pattern Recognition | 4 SH |
| EECE 7204 | Applied Probability and Stochastic Processes | 4 SH |
| ENVR 5190 | Soil Science | 4 SH |
| ENVR 5210 | Environmental Planning | 4 SH |
| ENVR 5250 | Geology and Land-Use Planning | 4 SH |
| ENVR 5260 | Geographical Information Systems | 4 SH |
| EEMB 5516 | Oceanography | 4 SH |
| IE 6200 | Engineering Probability and Statistics | 4 SH |
| IE 7280 | Statistical Methods in Engineering | 4 SH |
| IE 7290 | Reliability Analysis and Risk Assessment | 4 SH |
| MATH 7341 | Probability 2 | 4 SH |
| MATH 7343 | Applied Statistics | 4 SH |
| MATH 7344 | Regression, ANOVA, and Design | 4 SH |
| ME 6200 | Mathematical Methods for Mechanical Engineers 1 | 4 SH |

***Report Option***

RESTRICTIVE ELECTIVES

Complete three of the following courses:

| | | |
|---|---|---|
| CIVE 5270 | Environmental Protection and Management | 4 SH |
| CIVE 5271 | Solid and Hazardous Waste Management | 4 SH |
| CIVE 5321 | Geoenvironmental Engineering | 4 SH |
| CIVE 5536 | Hydrologic Engineering | 4 SH |
| CIVE 7252 | Water and Wastewater Treatment Processes | 4 SH |
| CIVE 7261 | Surface Water Quality Modeling | 4 SH |
| CIVE 7263 | Groundwater Hydraulics and Quality Modeling | 4 SH |
| CIVE 7322 | Engineering Geology | 4 SH |
| CIVE 7272 | Air Quality Management | 4 SH |

ADDITIONAL ELECTIVES

Complete two of the following courses:

| | | |
|---|---|---|
| EECE 5626 | Image Processing and Pattern Recognition | 4 SH |
| EECE 7204 | Applied Probability and Stochastic Processes | 4 SH |
| ENVR 5190 | Soil Science | 4 SH |
| ENVR 5210 | Environmental Planning | 4 SH |
| ENVR 5250 | Geology and Land-Use Planning | 4 SH |
| ENVR 5260 | Geographical Information Systems | 4 SH |
| EEMB 5516 | Oceanography | 4 SH |
| IE 6200 | Engineering Probability and Statistics | 4 SH |
| IE 7280 | Statistical Methods in Engineering | 4 SH |
| IE 7290 | Reliability Analysis and Risk Assessment | 4 SH |

| | | |
|---|---|---|
| MATH 7341 | Probability 2 | 4 SH |
| MATH 7343 | Applied Statistics | 4 SH |
| MATH 7344 | Regression, ANOVA, and Design | 4 SH |
| ME 6200 | Mathematical Methods for Mechanical Engineers 1 | 4 SH |

REPORT

Requires 4 semester hours:

| | | |
|---|---|---|
| CIVE 8674 | Master's Report | 2 or 4 SH |

***Thesis Option***

RESTRICTIVE ELECTIVES

Complete three of the following courses:

| | | |
|---|---|---|
| CIVE 5270 | Environmental Protection and Management | 4 SH |
| CIVE 5271 | Solid and Hazardous Waste Management | 4 SH |
| CIVE 5321 | Geoenvironmental Engineering | 4 SH |
| CIVE 5536 | Hydrologic Engineering | 4 SH |
| CIVE 7252 | Water and Wastewater Treatment Processes | 4 SH |
| CIVE 7261 | Surface Water Quality Modeling | 4 SH |
| CIVE 7263 | Groundwater Hydraulics and Quality Modeling | 4 SH |
| CIVE 7322 | Engineering Geology | 4 SH |
| CIVE 7272 | Air Quality Management | 4 SH |

ADDITIONAL ELECTIVES

Complete one of the following courses:

| | | |
|---|---|---|
| EECE 5626 | Image Processing and Pattern Recognition | 4 SH |
| EECE 7204 | Applied Probability and Stochastic Processes | 4 SH |
| ENVR 5190 | Soil Science | 4 SH |
| ENVR 5210 | Environmental Planning | 4 SH |
| ENVR 5250 | Geology and Land-Use Planning | 4 SH |
| ENVR 5260 | Geographical Information Systems | 4 SH |
| EEMB 5516 | Oceanography | 4 SH |
| IE 6200 | Engineering Probability and Statistics | 4 SH |
| IE 7280 | Statistical Methods in Engineering | 4 SH |
| IE 7290 | Reliability Analysis and Risk Assessment | 4 SH |
| MATH 7341 | Probability 2 | 4 SH |
| MATH 7343 | Applied Statistics | 4 SH |
| MATH 7344 | Regression, ANOVA, and Design | 4 SH |
| ME 6200 | Mathematical Methods for Mechanical Engineers 1 | 4 SH |

THESIS

Requires 8 semester hours:

| | | |
|---|---|---|
| CIVE 7990 | Thesis | 1 to 8 SH |

***Engineering Leadership Option***

Students completing this option receive the graduate certificate in engineering leadership in addition to the master's degree.

ADDITIONAL CORE COURSE

Complete one of the following courses:

| | | |
|---|---|---|
| CIVE 7250 | Environmental Chemistry | 4 SH |
| CIVE 7251 | Environmental Biological Processes | 4 SH |
| CIVE 7260 | Hydrology | 4 SH |

LEADERSHIP

| | | |
|---|---|---|
| ENLR 5121 | Engineering Leadership 1 | 2 SH |
| ENLR 5122 | Engineering Leadership 2 | 2 SH |

FOUNDATIONS

| | | |
|---|---|---|
| ENLR 5131 | Scientific Foundations of Engineering 1 | 2 SH |
| ENLR 5132 | Scientific Foundations of Engineering 2 | 2 SH |

PROJECT

| | | |
|---|---|---|
| ENLR 7440 | Engineering Leadership Challenge Project 1 | 4 SH |
| ENLR 7442 | Engineering Leadership Challenge Project 2 | 4 SH |

ELECTIVE

Complete one of the following courses:

| | | |
|---|---|---|
| CIVE 5270 | Environmental Protection and Management | 4 SH |
| CIVE 5271 | Solid and Hazardous Waste Management | 4 SH |
| CIVE 5321 | Geoenvironmental Engineering | 4 SH |
| CIVE 5536 | Hydrologic Engineering | 4 SH |
| CIVE 7252 | Water and Wastewater Treatment Processes | 4 SH |
| CIVE 7261 | Surface Water Quality Modeling | 4 SH |
| CIVE 7263 | Groundwater Hydraulics and Quality Modeling | 4 SH |
| CIVE 7322 | Engineering Geology | 4 SH |
| CIVE 7272 | Air Quality Management | 4 SH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

32 total semester hours required

Minimum 3.000 GPA required

## Master's Degree in Civil Engineering with Concentration in Geotechnical/Geoenvironmental Engineering

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 CEE department, 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 | Course Work 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** |

## MSCivE—Master of Science in Civil Engineering with Concentration in Geotechnical/Geoenvironmental Engineering

Complete all courses and requirements listed below unless otherwise indicated.

### GENERAL REQUIREMENTS

| | | |
|---|---|---|
| CIVE 7301 | Advanced Soil Mechanics | 4 SH |
| CIVE 7302 | Advanced Foundation Engineering | 4 SH |

### OPTIONS

Complete one of the following options:

***Course Work Option***

Complete six of the following courses (24 semester hours):

| | | |
|---|---|---|
| CIVE 5270 | Environmental Protection and Management | 4 SH |
| CIVE 5271 | Solid and Hazardous Waste Management | 4 SH |
| CIVE 5321 | Geoenvironmental Engineering | 4 SH |
| CIVE 5536 | Hydrologic Engineering | 4 SH |
| CIVE 7230 | Legal Aspects of Civil Engineering | 4 SH |
| CIVE 7240 | Construction Equipment and Modeling | 4 SH |
| CIVE 7250 | Environmental Chemistry | 4 SH |
| CIVE 7251 | Environmental Biological Processes | 4 SH |
| CIVE 7260 | Hydrology | 4 SH |
| CIVE 7263 | Groundwater Hydraulics and Quality Modeling | 4 SH |
| CIVE 7303 | Geotechnical Instrumentation | 2 SH |
| CIVE 7311 | Soil and Foundation Dynamics | 4 SH |
| CIVE 7312 | Earthquake Engineering | 4 SH |
| CIVE 7322 | Engineering Geology | 4 SH |
| CIVE 7330 | Advanced Structural Analysis | 4 SH |
| CIVE 7331 | Structural Dynamics | 4 SH |
| IE 6200 | Engineering Probability and Statistics | 4 SH |
| IE 7290 | Reliability Analysis and Risk Assessment | 4 SH |
| ME 5657 | Finite Element Method | 4 SH |
| ME 7205 | Advanced Mathematical Methods for Mechanical Engineers | 4 SH |

***Report Option***

REPORT

Requires 4 semester hours:

| | | |
|---|---|---|
| CIVE 8674 | Master's Report | 2 or 4 SH |

GEOENVIRONMENTAL/OTHER ELECTIVES

Complete five of the following courses (20 semester hours):

| | | |
|---|---|---|
| CIVE 5270 | Environmental Protection and Management | 4 SH |
| CIVE 5271 | Solid and Hazardous Waste Management | 4 SH |
| CIVE 5321 | Geoenvironmental Engineering | 4 SH |
| CIVE 5536 | Hydrologic Engineering | 4 SH |
| CIVE 7230 | Legal Aspects of Civil Engineering | 4 SH |
| CIVE 7240 | Construction Equipment and Modeling | 4 SH |
| CIVE 7250 | Environmental Chemistry | 4 SH |
| CIVE 7251 | Environmental Biological Processes | 4 SH |
| CIVE 7260 | Hydrology | 4 SH |
| CIVE 7263 | Groundwater Hydraulics and Quality Modeling | 4 SH |
| CIVE 7303 | Geotechnical Instrumentation | 2 SH |
| CIVE 7311 | Soil and Foundation Dynamics | 4 SH |
| CIVE 7312 | Earthquake Engineering | 4 SH |
| CIVE 7322 | Engineering Geology | 4 SH |
| CIVE 7330 | Advanced Structural Analysis | 4 SH |
| CIVE 7331 | Structural Dynamics | 4 SH |
| IE 6200 | Engineering Probability and Statistics | 4 SH |
| IE 7290 | Reliability Analysis and Risk Assessment | 4 SH |
| ME 5657 | Finite Element Method | 4 SH |
| ME 7205 | Advanced Mathematical Methods for Mechanical Engineers | 4 SH |

***Thesis Option***

THESIS

Requires 8 semester hours:

| | | |
|---|---|---|
| CIVE 7990 | Thesis | 1 to 8 SH |

GEOENVIRONMENTAL/OTHER ELECTIVES

Complete four of the following courses (16 semester hours):

| | | |
|---|---|---|
| CIVE 5270 | Environmental Protection and Management | 4 SH |
| CIVE 5271 | Solid and Hazardous Waste Management | 4 SH |
| CIVE 5321 | Geoenvironmental Engineering | 4 SH |
| CIVE 5536 | Hydrologic Engineering | 4 SH |
| CIVE 7230 | Legal Aspects of Civil Engineering | 4 SH |
| CIVE 7240 | Construction Equipment and Modeling | 4 SH |
| CIVE 7250 | Environmental Chemistry | 4 SH |
| CIVE 7251 | Environmental Biological Processes | 4 SH |
| CIVE 7260 | Hydrology | 4 SH |
| CIVE 7263 | Groundwater Hydraulics and Quality Modeling | 4 SH |
| CIVE 7303 | Geotechnical Instrumentation | 2 SH |
| CIVE 7311 | Soil and Foundation Dynamics | 4 SH |
| CIVE 7312 | Earthquake Engineering | 4 SH |
| CIVE 7322 | Engineering Geology | 4 SH |
| CIVE 7330 | Advanced Structural Analysis | 4 SH |
| CIVE 7331 | Structural Dynamics | 4 SH |

| | | |
|---|---|---|
| IE 6200 | Engineering Probability and Statistics | 4 SH |
| IE 7290 | Reliability Analysis and Risk Assessment | 4 SH |
| ME 5657 | Finite Element Method | 4 SH |
| ME 7205 | Advanced Mathematical Methods for Mechanical Engineers | 4 SH |

***Engineering Leadership Option***

Students completing this option receive the graduate certificate in engineering leadership in addition to the master's degree.

LEADERSHIP

| | | |
|---|---|---|
| ENLR 5121 | Engineering Leadership 1 | 2 SH |
| ENLR 5122 | Engineering Leadership 2 | 2 SH |

FOUNDATIONS

| | | |
|---|---|---|
| ENLR 5131 | Scientific Foundations of Engineering 1 | 2 SH |
| ENLR 5132 | Scientific Foundations of Engineering 2 | 2 SH |

PROJECT

| | | |
|---|---|---|
| ENLR 7440 | Engineering Leadership Challenge Project 1 | 4 SH |
| ENLR 7442 | Engineering Leadership Challenge Project 2 | 4 SH |

ELECTIVES

Complete two of the following courses (8 semester hours):

| | | |
|---|---|---|
| CIVE 5270 | Environmental Protection and Management | 4 SH |
| CIVE 5271 | Solid and Hazardous Waste Management | 4 SH |
| CIVE 5321 | Geoenvironmental Engineering | 4 SH |
| CIVE 5536 | Hydrologic Engineering | 4 SH |
| CIVE 7230 | Legal Aspects of Civil Engineering | 4 SH |
| CIVE 7240 | Construction Equipment and Modeling | 4 SH |
| CIVE 7250 | Environmental Chemistry | 4 SH |
| CIVE 7251 | Environmental Biological Processes | 4 SH |
| CIVE 7260 | Hydrology | 4 SH |
| CIVE 7263 | Groundwater Hydraulics and Quality Modeling | 4 SH |
| CIVE 7303 | Geotechnical Instrumentation | 2 SH |
| CIVE 7311 | Soil and Foundation Dynamics | 4 SH |
| CIVE 7312 | Earthquake Engineering | 4 SH |
| CIVE 7322 | Engineering Geology | 4 SH |
| CIVE 7330 | Advanced Structural Analysis | 4 SH |
| CIVE 7331 | Structural Dynamics | 4 SH |
| IE 6200 | Engineering Probability and Statistics | 4 SH |
| IE 7290 | Reliability Analysis and Risk Assessment | 4 SH |
| ME 5657 | Finite Element Method | 4 SH |
| ME 7205 | Advanced Mathematical Methods for Mechanical Engineers | 4 SH |

## PROGRAM CREDIT/GPA REQUIREMENTS

32 total semester hours required

Minimum 3.000 GPA required

## Master's Degree in Civil Engineering with Concentration in Structural Engineering

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 CEE department, 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 | Course Work 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** |

## MSCivE—Master of Science in Civil Engineering with Concentration in Structural Engineering

Complete all courses and requirements listed below unless otherwise indicated.

### GENERAL REQUIREMENTS

| | | |
|---|---|---|
| CIVE 7330 | Advanced Structural Analysis | 4 SH |
| CIVE 7331 | Structural Dynamics | 4 SH |

### OPTIONS

Complete one of the following options:

***Course Work Option***

RESTRICTED ELECTIVES

Complete three of the following courses:

| | | |
|---|---|---|
| CIVE 5522 | Structural Analysis 2 | 4 SH |
| CIVE 7340 | Seismic Analysis and Design | 4 SH |
| CIVE 7341 | Structural Reliability | 4 SH |
| CIVE 7342 | System Identification | 4 SH |
| CIVE 7350 | Behavior of Concrete Structures | 4 SH |
| CIVE 7351 | Behavior of Steel Structures | 4 SH |
| CIVE 7354 | Wind Engineering | 4 SH |
| CIVE 7355 | Advanced Bridge Design | 4 SH |

ADDITIONAL ELECTIVES

Complete three of the following courses:

| | | |
|---|---|---|
| MATH 7241 | Probability 1 | 4 SH |
| MATH 7342 | Mathematical Statistics | 4 SH |
| MATH 7343 | Applied Statistics | 4 SH |
| MATL 7365 | Properties and Processing of Electronic Materials | 4 SH |
| ME 5240 | Computer Aided Design and Manufacturing | 4 SH |
| ME 5650 | Advanced Mechanics of Materials | 4 SH |
| ME 5655 | Dynamics and Mechanical Vibration | 4 SH |
| ME 5657 | Finite Element Method | 4 SH |

| | | |
|---|---|---|
| ME 5659 | Control and Mechatronics | 4 SH |
| ME 6200 | Mathematical Methods for Mechanical Engineers 1 | 4 SH |
| ME 6201 | Mathematical Methods for Mechanical Engineers 2 | 4 SH |
| ME 7205 | Advanced Mathematical Methods for Mechanical Engineers | 4 SH |
| ME 7210 | Elasticity and Plasticity | 4 SH |
| ME 7232 | Theory of Plates and Shells | 4 SH |
| ME 7238 | Advanced Finite Element Method | 4 SH |
| ME 7245 | Fracture Mechanics and Failure Analysis | 4 SH |
| ME 7255 | Continuum Mechanics | 4 SH |

***Report Option***

MASTER'S REPORT

Requires 4 semester hours:

| | | |
|---|---|---|
| CIVE 8674 | Master's Report | 2 or 4 SH |

RESTRICTED ELECTIVES

Complete three of the following courses:

| | | |
|---|---|---|
| CIVE 5522 | Structural Analysis 2 | 4 SH |
| CIVE 7340 | Seismic Analysis and Design | 4 SH |
| CIVE 7341 | Structural Reliability | 4 SH |
| CIVE 7342 | System Identification | 4 SH |
| CIVE 7350 | Behavior of Concrete Structures | 4 SH |
| CIVE 7351 | Behavior of Steel Structures | 4 SH |
| CIVE 7354 | Wind Engineering | 4 SH |
| CIVE 7355 | Advanced Bridge Design | 4 SH |

ADDITIONAL ELECTIVES

Complete two of the following courses:

| | | |
|---|---|---|
| MATH 7241 | Probability 1 | 4 SH |
| MATH 7342 | Mathematical Statistics | 4 SH |
| MATH 7343 | Applied Statistics | 4 SH |
| MATL 7365 | Properties and Processing of Electronic Materials | 4 SH |
| ME 5240 | Computer Aided Design and Manufacturing | 4 SH |
| ME 5650 | Advanced Mechanics of Materials | 4 SH |
| ME 5655 | Dynamics and Mechanical Vibration | 4 SH |
| ME 5657 | Finite Element Method | 4 SH |
| ME 5659 | Control and Mechatronics | 4 SH |
| ME 6200 | Mathematical Methods for Mechanical Engineers 1 | 4 SH |
| ME 6201 | Mathematical Methods for Mechanical Engineers 2 | 4 SH |
| ME 7205 | Advanced Mathematical Methods for Mechanical Engineers | 4 SH |
| ME 7210 | Elasticity and Plasticity | 4 SH |
| ME 7232 | Theory of Plates and Shells | 4 SH |
| ME 7238 | Advanced Finite Element Method | 4 SH |
| ME 7245 | Fracture Mechanics and Failure Analysis | 4 SH |
| ME 7255 | Continuum Mechanics | 4 SH |

***Thesis Option***

THESIS

Requires 8 semester hours:

| | | |
|---|---|---|
| CIVE 7990 | Thesis | 1 to 8 SH |

RESTRICTED ELECTIVES

Complete three of the following courses:

| | | |
|---|---|---|
| CIVE 5522 | Structural Analysis 2 | 4 SH |
| CIVE 7340 | Seismic Analysis and Design | 4 SH |
| CIVE 7341 | Structural Reliability | 4 SH |
| CIVE 7342 | System Identification | 4 SH |
| CIVE 7350 | Behavior of Concrete Structures | 4 SH |
| CIVE 7351 | Behavior of Steel Structures | 4 SH |
| CIVE 7354 | Wind Engineering | 4 SH |
| CIVE 7355 | Advanced Bridge Design | 4 SH |

ADDITIONAL ELECTIVE

Complete one of the following courses:

| | | |
|---|---|---|
| MATH 7241 | Probability 1 | 4 SH |
| MATH 7342 | Mathematical Statistics | 4 SH |
| MATH 7343 | Applied Statistics | 4 SH |
| MATL 7365 | Properties and Processing of Electronic Materials | 4 SH |
| ME 5240 | Computer Aided Design and Manufacturing | 4 SH |
| ME 5650 | Advanced Mechanics of Materials | 4 SH |
| ME 5655 | Dynamics and Mechanical Vibration | 4 SH |
| ME 5657 | Finite Element Method | 4 SH |
| ME 5659 | Control and Mechatronics | 4 SH |
| ME 6200 | Mathematical Methods for Mechanical Engineers 1 | 4 SH |
| ME 6201 | Mathematical Methods for Mechanical Engineers 2 | 4 SH |
| ME 7205 | Advanced Mathematical Methods for Mechanical Engineers | 4 SH |
| ME 7210 | Elasticity and Plasticity | 4 SH |
| ME 7232 | Theory of Plates and Shells | 4 SH |
| ME 7238 | Advanced Finite Element Method | 4 SH |
| ME 7245 | Fracture Mechanics and Failure Analysis | 4 SH |
| ME 7255 | Continuum Mechanics | 4 SH |

***Engineering Leadership Option***

Students completing this option receive the graduate certificate in engineering leadership in addition to the master's degree.

LEADERSHIP

| | | |
|---|---|---|
| ENLR 5121 | Engineering Leadership 1 | 2 SH |
| ENLR 5122 | Engineering Leadership 2 | 2 SH |

FOUNDATIONS

| | | |
|---|---|---|
| ENLR 5131 | Scientific Foundations of Engineering 1 | 2 SH |
| ENLR 5132 | Scientific Foundations of Engineering 2 | 2 SH |

PROJECT

| | | |
|---|---|---|
| ENLR 7440 | Engineering Leadership Challenge Project 1 | 4 SH |
| ENLR 7442 | Engineering Leadership Challenge Project 2 | 4 SH |

RESTRICTED ELECTIVES

Complete two of the following courses:

| | | |
|---|---|---|
| CIVE 5522 | Structural Analysis 2 | 4 SH |
| CIVE 7340 | Seismic Analysis and Design | 4 SH |
| CIVE 7341 | Structural Reliability | 4 SH |
| CIVE 7342 | System Identification | 4 SH |
| CIVE 7350 | Behavior of Concrete Structures | 4 SH |
| CIVE 7351 | Behavior of Steel Structures | 4 SH |
| CIVE 7354 | Wind Engineering | 4 SH |
| CIVE 7355 | Advanced Bridge Design | 4 SH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

32 total semester hours required

Minimum 3.000 GPA required

## Master's Degree in Civil Engineering with Concentration in Transportation

This program is designed for students with career goals in transportation engineering and transportation planning. The degree requirements include core courses from the CEE department, 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 | Course Work Only |
|---|---|---|---|
| Required core courses | 12 SH | 12 SH | 12 SH |
| Restricted clectives | 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** |

## MSCivE—Master of Science in Civil Engineering with Concentration in Transportation Engineering

Complete all courses and requirements listed below unless otherwise indicated.

**GENERAL REQUIREMENTS**

| | | |
|---|---|---|
| CIVE 5373 | Transportation Planning and Engineering | 4 SH |
| CIVE 5376 | Traffic Engineering | 4 SH |
| IE 6200 | Engineering Probability and Statistics | 4 SH |

**OPTIONS**

Complete one of the following options:

***Course Work Option***

RESTRICTED ELECTIVES

Complete 12 semester hours from the following courses:

| | | |
|---|---|---|
| CIVE 7380 | Traffic Simulation, Performance Models, and Signal Control | 4 SH |
| CIVE 7381 | Transportation Demand Models | 4 SH |
| CIVE 7385 | Public Transportation | 4 SH |
| CIVE 7387 | Design Aspects of Roadway Safety | 4 SH |
| IE 7215 | Simulation Analysis | 4 SH |
| IE 7280 | Statistical Methods in Engineering | 4 SH |

OTHER ELECTIVES

Complete two CIVE courses (8 semester hours).

***Report Option***

RESTRICTED ELECTIVES

Complete 8 semester hours from the following courses:

| | | |
|---|---|---|
| CIVE 7380 | Traffic Simulation, Performance Models, and Signal Control | 4 SH |
| CIVE 7381 | Transportation Demand Models | 4 SH |
| CIVE 7385 | Public Transportation | 4 SH |
| CIVE 7387 | Design Aspects of Roadway Safety | 4 SH |
| IE 7215 | Simulation Analysis | 4 SH |
| IE 7280 | Statistical Methods in Engineering | 4 SH |

OTHER ELECTIVES

Complete two CIVE courses (8 semester hours).

REPORT

Requires 4 semester hours:

| | | |
|---|---|---|
| CIVE 8674 | Master's Report | 2 or 4 SH |

***Thesis Option***

RESTRICTED ELECTIVES

Complete 8 semester hours from the following courses:

| | | |
|---|---|---|
| CIVE 7380 | Traffic Simulation, Performance Models, and Signal Control | 4 SH |
| CIVE 7381 | Transportation Demand Models | 4 SH |
| CIVE 7385 | Public Transportation | 4 SH |
| CIVE 7387 | Design Aspects of Roadway Safety | 4 SH |
| IE 7215 | Simulation Analysis | 4 SH |
| IE 7280 | Statistical Methods in Engineering | 4 SH |

OTHER ELECTIVE

Complete one CIVE course (4 semester hours).

THESIS

Requires 8 semester hours:

| | | |
|---|---|---|
| CIVE 7990 | Thesis | 1 to 8 SH |

***Engineering Leadership Option***

Students completing this option receive the graduate certificate in engineering leadership in addition to the master's degree.

LEADERSHIP

| | | |
|---|---|---|
| ENLR 5121 | Engineering Leadership 1 | 2 SH |
| ENLR 5122 | Engineering Leadership 2 | 2 SH |

| | | |
|---|---|---|
| FOUNDATIONS | | |
| ENLR 5131 | Scientific Foundations of Engineering 1 | 2 SH |
| ENLR 5132 | Scientific Foundations of Engineering 2 | 2 SH |
| PROJECT | | |
| ENLR 7440 | Engineering Leadership Challenge Project 1 | 4 SH |
| ENLR 7442 | Engineering Leadership Challenge Project 2 | 4 SH |
| RESTRICTED ELECTIVE | | |
| Complete one of the following courses: | | |
| CIVE 7380 | Traffic Simulation, Performance Models, and Signal Control | 4 SH |
| CIVE 7381 | Transportation Demand Models | 4 SH |
| CIVE 7385 | Public Transportation | 4 SH |
| CIVE 7387 | Design Aspects of Roadway Safety | 4 SH |
| IE 7215 | Simulation Analysis | 4 SH |
| IE 7280 | Statistical Methods in Engineering | 4 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

32 total semester hours required
Minimum 3.000 GPA required

## Doctor of Philosophy

Award of the Doctor of Philosophy degree is based on exceptional performance in course work as well as evidence of ability to formulate and execute original research. The PhD program has two components: (1) An academic program of graduate-level courses that provides depth in a specific area of civil engineering (the major field) as well as other course work that provides additional exposure at an advanced level to one or more disciplines; and (2) the dissertation, an extended independent research effort on a relevant technical problem resulting in an original contribution to the field.

Each student's mastery of subject matter is measured by a qualifying examination covering a subset of subjects 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 an expanded group of faculty and research staff upon completion of the work.

The doctoral program is deliberately designed to be flexible with respect to subject area. Since the PhD is primarily a research degree, the program must be adaptable to changes in research needs.

### QUALIFYING EXAMINATION AND DEGREE CANDIDACY

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 subject matter at the master's degree level selected from the major field and includes basic engineering and science disciplines, as well as civil 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 time with the permission of the qualifying examination committee.

Students must take the qualifying exam during the first 18 months of their PhD program. PhD students who start their graduate program at Northeastern with a BS degree shall take the qualifying exam within the first 30 months after entering the program. Upon successful completion of the exam, the student is classified as a doctoral candidate.

### 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 civil and environmental engineering faculty member as the dissertation advisor. A dissertation committee formed by the student and his or her dissertation advisor will monitor progress and approve the final document. The dissertation committee shall have no fewer than four members, at least two of whom must be full-time faculty from the CEE department. Each doctoral candidate must defend his or her dissertation within seven years from the start of the PhD program.

### COURSE REQUIREMENTS

Each student, along with a faculty advisor, must jointly develop a proposal defining the content of the academic program, subject to review by the qualifying examination committee. Intellectual rigor, connectivity of subject matter, and compatibility with departmental interests are critical issues. The qualifying exam committee's approval of the proposal represents a mutual agreement between the student and the committee. 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 engineering practice.

The academic program must include at least 52 semester hours of graduate-level course work beyond the bachelor's degree. Students with a master's degree in civil engineering must complete a minimum of 20 semester hours of course work 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. A minimum of 40 semester hours must be related to the major field but may include courses from other departments when appropriate.

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, CIVE 8960 Exam Preparation, can be taken if needed to fulfill full-time course registration. The course is an individual instruction course, billed at 1 semester hour, and graded S or U. There is no course content, and students must register in a section with their research or academic advisor as the "instructor."

Upon successful completion of the qualifying exam and the majority of required course work, each doctoral candidate must register in two consecutive semesters for CIVE 9990 Dissertation.

Upon completion of this sequence, the candidate must register for CIVE 9996 Dissertation Continuation in every semester until the dissertation is complete. Students may not register for Continuation until they fulfill the two-semester dissertation sequence.

### 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 course work in the case of any deficiency in these areas.

### COMPREHENSIVE EXAMINATION

The comprehensive exam is a defense of the doctoral research work and an examination on subject matter related to the dissertation area.

## PhD in Civil Engineering—Advanced Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

### MILESTONES

Qualifying exam and comprehensive exam
Annual review
Dissertation proposal
Dissertation committee
Dissertation defense

### GENERAL REQUIREMENTS

Complete 20 semester hours of approved course work. A maximum of 4 semester hours from the following course:

| | | |
|---|---|---|
| CIVE 7978 | Independent Study | 1 to 4 SH |

is allowed to count toward approved course work. Consult your faculty advisor for acceptable courses.

### DISSERTATION COURSES

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| CIVE 9990 | Dissertation | 0 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

20 total semester hours required
Minimum 3.000 GPA required

## PhD in Civil Engineering—Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

### MILESTONES

Qualifying exam and comprehensive exam
Annual review
Dissertation proposal
Dissertation committee
Dissertation defense

### GENERAL REQUIREMENTS

Complete 52 semester hours of approved course work. A maximum of 4 semester hours from the following course:

| | | |
|---|---|---|
| CIVE 7978 | Independent Study | 1 to 4 SH |

is allowed to count toward approved course work. Consult your faculty advisor for acceptable courses.

### DISSERTATION COURSES

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| CIVE 9990 | Dissertation | 0 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

52 total semester hours required
Minimum 3.000 GPA required

## COMPUTER SYSTEMS ENGINEERING

**www.coe.neu.edu/degrees/master-science-computer-systems-engineering**

KAL BUGRARA, PHD
*Program Director*

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617.373.2501 (fax)
Kal Bugrara, PhD, *Program Director*, kmb@coe.neu.edu

Our newly renovated computer systems engineering (CSYE) program takes a sociotechnical, engineering approach to software. This engineering foundation enables CSYE 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.

CSYE now has the capacity to take advantage of new market dynamics triggered by the rising demand for practical solutions, for real people in their everyday lives, at the level of policy as well as process. We have moved well beyond a programming emphasis not only through our new engineering-architecture emphasis but also insofar as a sociotechnical dimension has been built integrally into the CSYE program. Software systems that are sociotechnical in nature can help accelerate, for example, new drug development, affordable as well as much more effective healthcare, a revamped global financial system, and improved infrastructures. CSYE recognizes that the market challenges present in today's society are multidimensional in nature and involve knowledge of technology and its regulations as well as acute consciousness of social issues. CSYE has consequently been refocused in ways that seeks to produce sophisticated software engineers who are capable of taking on the challenges of how to implement large-scale and industry-specific information and communication infrastructures that can deliver the best information to the right people, at the right time, and all for the best ethical reasons.

### MSCSE—Master of Science in Computer Systems Engineering with Concentration in Software Design Engineering

Complete all courses and requirements listed below unless otherwise indicated.

#### GENERAL REQUIREMENTS

| | | |
|---|---|---|
| CSYE 6200 | Concepts of Object-Oriented Design | 4 SH |
| CSYE 6220 | Enterprise Software Design | 4 SH |
| CSYE 7230 | Software Engineering | 4 SH |

#### OPTIONS

Complete one of the following options:

***Course Work Option***

Complete five of the following courses (20 semester hours):

| | | |
|---|---|---|
| CSYE 6XXX | (pending approval) | 4 SH |
| CSYE 6210 | Component Software Development | 4 SH |
| CSYE 6225 | Network Structures and Cloud Computing | 4 SH |
| CSYE 7215 | Foundations of Parallel, Concurrent, and Multithreaded Programming | 4 SH |
| CSYE 7280 | Advanced User Experience Design and Testing | 4 SH |
| CSYE 7374 | Special Topics in Computer Systems Engineering | 4 SH |
| CSYE 7978 | Independent Study | 1 to 4 SH |
| INFO 5000 | C Programming and Development | 4 SH |
| INFO 5100 | Application Engineering and Development | 4 SH |
| INFO 6150 | Web Design and User Experience Engineering | 4 SH |
| INFO 6205 | Program Structure and Algorithms | 4 SH |
| INFO 6210 | Data Management and Database Design | 4 SH |
| INFO 6215 | Business Analysis and Information Engineering | 4 SH |
| INFO 6240 | C++ Object-Oriented Design | 4 SH |
| INFO 6245 | Planning and Managing Information Systems Development | 4 SH |
| INFO 6250 | Web Development Tools and Methods | 4 SH |
| INFO 6260 | Business Process Engineering and Management | 4 SH |
| INFO 6350 | Smartphones-Based Web Development | 4 SH |
| INFO 6660 | People, Problems, and Patents: Ethical Principles and Basics of Intellectual Property | 4 SH |
| INFO 7205 | Advanced Application Engineering and Development | 4 SH |
| INFO 7225 | Accounting and Budgetary Systems for Engineers | 4 SH |
| INFO 7245 | Agile Software Development | 4 SH |
| INFO 7250 | Engineering of Big-Data Systems | 4 SH |
| INFO 7260 | Business Process Engineering | 4 SH |
| INFO 7265 | Enterprise Systems Architecture and Engineering | 4 SH |
| INFO 7270 | PERL Programming | 4 SH |
| INFO 7275 | Advanced Database Management Systems | 4 SH |
| INFO 7280 | Model-Driven Architecture | 4 SH |
| INFO 7285 | Organizational Change and IT | 4 SH |
| INFO 7290 | Data Warehousing and Integration | 4 SH |
| INFO 7300 | Engineering Secure Software Systems | 4 SH |
| INFO 7305 | System Architecture and Technology Management | 4 SH |

| | | |
|---|---|---|
| INFO 7310 | Introduction to Distributed Security | 4 SH |
| INFO 7315 | Web Services/Service-Oriented Architecture | 4 SH |
| INFO 7320 | Global Technology Outsourcing | 3 SH |
| INFO 7325 | Introduction to Information Technology Auditing | 4 SH |
| INFO 7330 | Information Systems for Healthcare-Services Delivery | 4 SH |
| INFO 7365 | Enterprise Architecture Planning and Management | 4 SH |
| INFO 7374 | Special Topics in Information Systems | 1 to 4 SH |
| INFO 7390 | Advances in Data Sciences and Architecture | 4 SH |
| INFO 7420 | Drug Development Processes and Information Systems Compliance | 4 SH |

***Thesis Option***

ELECTIVES

Complete three of the following courses (12 semester hours):

| | | |
|---|---|---|
| CSYE 6XXX | (pending approval) | 4 SH |
| CSYE 6210 | Component Software Development | 4 SH |
| CSYE 6225 | Network Structures and Cloud Computing | 4 SH |
| CSYE 7215 | Foundations of Parallel, Concurrent, and Multithreaded Programming | 4 SH |
| CSYE 7280 | Advanced User Experience Design and Testing | 4 SH |
| CSYE 7374 | Special Topics in Computer Systems Engineering | 4 SH |
| CSYE 7978 | Independent Study | 1 to 4 SH |
| INFO 5000 | C Programming and Development | 4 SH |
| INFO 5100 | Application Engineering and Development | 4 SH |
| INFO 6150 | Web Design and User Experience Engineering | 4 SH |
| INFO 6205 | Program Structure and Algorithms | 4 SH |
| INFO 6210 | Data Management and Database Design | 4 SH |
| INFO 6215 | Business Analysis and Information Engineering | 4 SH |
| INFO 6240 | C++ Object-Oriented Design | 4 SH |
| INFO 6245 | Planning and Managing Information Systems Development | 4 SH |
| INFO 6250 | Web Development Tools and Methods | 4 SH |
| INFO 6260 | Business Process Engineering and Management | 4 SH |
| INFO 6350 | Smartphones-Based Web Development | 4 SH |
| INFO 6660 | People, Problems, and Patents: Ethical Principles and Basics of Intellectual Property | 4 SH |
| INFO 7205 | Advanced Application Engineering and Development | 4 SH |
| INFO 7225 | Accounting and Budgetary Systems for Engineers | 4 SH |
| INFO 7245 | Agile Software Development | 4 SH |
| INFO 7250 | Engineering of Big-Data Systems | 4 SH |
| INFO 7260 | Business Process Engineering | 4 SH |
| INFO 7265 | Enterprise Systems Architecture and Engineering | 4 SH |
| INFO 7270 | PERL Programming | 4 SH |
| INFO 7275 | Advanced Database Management Systems | 4 SH |
| INFO 7280 | Model-Driven Architecture | 4 SH |
| INFO 7285 | Organizational Change and IT | 4 SH |
| INFO 7290 | Data Warehousing and Integration | 4 SH |
| INFO 7300 | Engineering Secure Software Systems | 4 SH |
| INFO 7305 | System Architecture and Technology Management | 4 SH |
| INFO 7310 | Introduction to Distributed Security | 4 SH |
| INFO 7315 | Web Services/Service-Oriented Architecture | 4 SH |
| INFO 7320 | Global Technology Outsourcing | 3 SH |
| INFO 7325 | Introduction to Information Technology Auditing | 4 SH |
| INFO 7365 | Enterprise Architecture Planning and Management | 4 SH |
| INFO 7374 | Special Topics in Information Systems | 1 to 4 SH |
| INFO 7390 | Advances in Data Sciences and Architecture | 4 SH |
| INFO 7420 | Drug Development Processes and Information Systems Compliance | 4 SH |

THESIS

Requires 8 semester hours:

| | | |
|---|---|---|
| CSYE 7990 | Thesis | 1 to 8 SH |

***Engineering Leadership Option***

Students completing this option receive the graduate certificate in engineering leadership in addition to the master's degree.

LEADERSHIP

| | | |
|---|---|---|
| ENLR 5121 | Engineering Leadership 1 | 2 SH |
| ENLR 5122 | Engineering Leadership 2 | 2 SH |

FOUNDATIONS

| | | |
|---|---|---|
| ENLR 5131 | Scientific Foundations of Engineering 1 | 2 SH |
| ENLR 5132 | Scientific Foundations of Engineering 2 | 2 SH |

PROJECT

| | | |
|---|---|---|
| ENLR 7440 | Engineering Leadership Challenge Project 1 | 4 SH |
| ENLR 7442 | Engineering Leadership Challenge Project 2 | 4 SH |

ELECTIVE

Complete one of the following courses (4 semester hours):

| | | |
|---|---|---|
| CSYE 6XXX | (pending approval) | 4 SH |
| CSYE 6210 | Component Software Development | 4 SH |

| | | |
|---|---|---|
| CSYE 6225 | Network Structures and Cloud Computing | 4 SH |
| CSYE 7215 | Foundations of Parallel, Concurrent, and Multithreaded Programming | 4 SH |
| CSYE 7280 | Advanced User Experience Design and Testing | 4 SH |
| CSYE 7374 | Special Topics in Computer Systems Engineering | 4 SH |
| CSYE 7978 | Independent Study | 1 to 4 SH |
| INFO 5000 | C Programming and Development | 4 SH |
| INFO 5100 | Application Engineering and Development | 4 SH |
| INFO 6150 | Web Design and User Experience Engineering | 4 SH |
| INFO 6205 | Program Structure and Algorithms | 4 SH |
| INFO 6210 | Data Management and Database Design | 4 SH |
| INFO 6215 | Business Analysis and Information Engineering | 4 SH |
| INFO 6240 | C++ Object-Oriented Design | 4 SH |
| INFO 6245 | Planning and Managing Information Systems Development | 4 SH |
| INFO 6250 | Web Development Tools and Methods | 4 SH |
| INFO 6260 | Business Process Engineering and Management | 4 SH |
| INFO 6350 | Smartphones-Based Web Development | 4 SH |
| INFO 6660 | People, Problems, and Patents: Ethical Principles and Basics of Intellectual Property | 4 SH |
| INFO 7205 | Advanced Application Engineering and Development | 4 SH |
| INFO 7225 | Accounting and Budgetary Systems for Engineers | 4 SH |
| INFO 7245 | Agile Software Development | 4 SH |
| INFO 7250 | Engineering of Big-Data Systems | 4 SH |
| INFO 7260 | Business Process Engineering | 4 SH |
| INFO 7265 | Enterprise Systems Architecture and Engineering | 4 SH |
| INFO 7270 | PERL Programming | 4 SH |
| INFO 7275 | Advanced Database Management Systems | 4 SH |
| INFO 7280 | Model-Driven Architecture | 4 SH |
| INFO 7285 | Organizational Change and IT | 4 SH |
| INFO 7290 | Data Warehousing and Integration | 4 SH |
| INFO 7300 | Engineering Secure Software Systems | 4 SH |
| INFO 7305 | System Architecture and Technology Management | 4 SH |
| INFO 7310 | Introduction to Distributed Security | 4 SH |
| INFO 7315 | Web Services/Service-Oriented Architecture | 4 SH |
| INFO 7320 | Global Technology Outsourcing | 3 SH |
| INFO 7325 | Introduction to Information Technology Auditing | 4 SH |
| INFO 7365 | Enterprise Architecture Planning and Management | 4 SH |
| INFO 7374 | Special Topics in Information Systems | 1 to 4 SH |
| INFO 7390 | Advances in Data Sciences and Architecture | 4 SH |
| INFO 7420 | Drug Development Processes and Information Systems Compliance | 4 SH |

## PROGRAM CREDIT/GPA REQUIREMENTS

32 total semester hours required
Minimum 3.000 GPA required

# ELECTRICAL AND COMPUTER ENGINEERING

**www.ece.neu.edu**

SHEILA S. HEMAMI, PHD
*Professor and Chair*

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Faith Crisley, *Graduate Coordinator*, f.crisley@neu.edu

The Department of Electrical and Computer Engineering (ECE) offers the following graduate degree programs:

- Master of Science in Electrical and Computer Engineering (MSECE)
- Master of Science in Electrical and Computer Engineering Leadership (MSECEL)
- Doctor of Philosophy in Computer Engineering (PhD)
- Doctor of Philosophy in Electrical Engineering (PhD)

All degrees can be pursued on either a full or part-time basis consistent with residence requirements for the degrees. The curriculum includes areas of concentration in communications, control, and signal processing; computer engineering; electromagnetics, plasma, and optics; microsystems, materials, and devices; and power systems, power electronics, and motion control.

MSECE students pursue their degree by selecting one of the two tracks—MSECE with thesis and course track (MS/T) or MSECE course-only track (MS/C). 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 GPA of 3.000. Full-time students are responsible for meeting with their faculty academic or research advisor early in their program of study to determine an appropriate sequence of course work. Part-time students should follow the curriculum requirements and confer with their faculty academic advisor as needed.

## Master of Science Degree Requirements

Students must complete a minimum of 32 semester hours of approved course work with a minimum GPA of 3.000. MS/T track students must complete an 8-semester-hour thesis as part of their program of study.

Students who select the MS/T track must form a thesis committee comprised of at least three members. The thesis committee must include the thesis advisor and at least two members must be tenured or tenure-track ECE faculty. The student shall present the thesis to this committee and to the ECE department at-large in the form of a seminar before final approval of the thesis.

The ECE department requires the master's degree students who hold research assistantships to register full-time.

### COURSE REQUIREMENTS FOR MS/C STUDENTS

The program requires 32 semester hours of graduate-level courses. At least five of these courses must be from the list of "depth" courses in the student's concentration and at least two must be outside this list; these courses are known as "breadth" courses. None of these courses can be from the list of "excluded courses." For all concentrations except computer engineering, at least 24 semester hours of the 32 required semester hours must be graduate-level ECE courses. For students in the computer engineering concentration, at least 20 semester hours of the 32 required semester hours must be graduate-level ECE courses.

### COURSE REQUIREMENTS FOR MS/T STUDENTS

The program requires 24 semester hours of graduate-level courses. At least three of these courses must be from the list of "depth" courses in the student's concentration and at least two must be outside this list; these courses are known as "breadth" courses. None of these courses can be from the list of "excluded courses." At least 16 semester hours of the required 24 semester hours must be graduate-level ECE courses. In addition, the program requires 8 semester hours of EECE 7990 (MS Thesis).

## Doctor of Philosophy Degree Requirements

The ECE department offers doctoral degree programs both in electrical and in computer engineering.

### 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 areas 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 in the PhD program is considered a predoctoral student. Upon successful completion of the qualifying exam, the student is designated a PhD candidate. All predoctoral students who hold a master's degree or its equivalent and who matriculate in a fall semester must take this exam in the spring semester of their first academic year of study. A student who fails the qualifying exam will be permitted to retake the exam only one more time.

### 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 six months of passing the PhD qualifying exam, the PhD candidate must form a dissertation committee. A dissertation committee must have at least three members. At least two of the committee members must be tenured or tenure-track ECE faculty and the committee must include the student's advisor. The chair of the committee must be a 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 majority of required course work, the PhD candidate must register in two consecutive semesters for Dissertation. Upon completion of this sequence, the student must register for Dissertation Continuation 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 PRE-DOCTORAL 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 EECE 9986 Research (0 credit, full-time equivalent) *if needed* to fulfill the registration requirement.

### PHD PROPOSAL REVIEW

Within three years of the establishment of degree candidacy, 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.

## Electrical and Computer Engineering PhD Course Requirements

The student and his or her dissertation committee determine the program of study. A typical program comprises 24 semester hours of course work beyond the Master of Science degree. However, as a minimum, the PhD program must include at least 16 semester hours of graduate course work beyond the Master of Science degree. At least 8 semester hours of the PhD course requirements must be graduate-level ECE courses. All students must achieve a minimum cumulative GPA of 3.000.

## MSECE—Master of Science in Electrical and Computer Engineering with Concentration in Communications, Control, and Signal Processing

Complete all courses and requirements listed below unless otherwise indicated.

### OPTIONS

Complete one of the following options:

***Course Work Option***

DEPTH COURSES

Complete five courses (20 semester hours) from the list of depth courses below.

BREADTH COURSES

Complete two courses (8 semester hours) from the list of breadth courses below. *Note:* Depth courses cannot be taken for breadth.

ADDITIONAL ELECTIVE

Complete one additional course (4 semester hours) from either the list of depth courses below or the list of breadth courses below.

***Thesis Option***

DEPTH COURSES

Complete three courses (12 semester hours) from the list of depth courses below.

BREADTH COURSES

Complete two courses (8 semester hours) from the list of breadth courses below. *Note:* Depth courses cannot be taken for breadth.

ADDITIONAL ELECTIVE

Complete one additional course (4 semester hours) from either the list of depth courses below or the list of breadth courses below.

THESIS

Requires 8 semester hours:

| | | |
|---|---|---|
| EECE 7990 | Thesis | 4 to 8 SH |

### COURSE LISTS

***Depth Courses***

| | | |
|---|---|---|
| EECE 5576 | Wireless Communication Systems | 4 SH |
| EECE 5580 | Classical Control Systems | 4 SH |
| EECE 5610 | Digital Control Systems | 4 SH |
| EECE 5626 | Image Processing and Pattern Recognition | 4 SH |
| EECE 5639 | Computer Vision | 4 SH |

| | | |
|---|---|---|
| EECE 5644 | Introduction to Machine Learning and Pattern Recognition | 4 SH |
| EECE 5645 | (pending approval) | |
| EECE 5664 | Biomedical Signal Processing | 4 SH |
| EECE 5666 | Digital Signal Processing | 4 SH |
| EECE 7200 | Linear Systems Analysis | 4 SH |
| EECE 7203 | Complex Variable Theory and Differential Equations | 4 SH |
| EECE 7204 | Applied Probability and Stochastic Processes | 4 SH |
| EECE 7211 | Nonlinear Control | 4 SH |
| EECE 7213 | System Identification and Adaptive Control | 4 SH |
| EECE 7214 | Optimal and Robust Control | 4 SH |
| EECE 7236 | Special Topics in Control | 4 SH |
| EECE 7242 | Integrated Circuits for Communications and Mixed-Signal Processing | 4 SH |
| EECE 7245 | Microwave Circuit Design for Wireless Communication | 4 SH |
| EECE 7293 | Modern Imaging | 4 SH |
| EECE 7310 | Modern Signal Processing | 4 SH |
| EECE 7311 | Two Dimensional Signal and Image Processing | 4 SH |
| EECE 7312 | Statistical and Adaptive Signal Processing | 4 SH |
| EECE 7313 | Pattern Recognition | 4 SH |
| EECE 7315 | Digital Image Processing | 4 SH |
| EECE 7323 | Numerical Optimization Methods | 4 SH |
| EECE 7327 | Special Topics in Signal Processing 1 | 4 SH |
| EECE 7332 | Error Correcting Codes | 4 SH |
| EECE 7334 | Wireless Communications | 4 SH |
| EECE 7335 | Detection and Estimation Theory | 4 SH |
| EECE 7336 | Digital Communications | 4 SH |
| EECE 7337 | Information Theory | 4 SH |
| EECE 7347 | Special Topics in Communications 1 | 4 SH |
| EECE 7364 | Mobile and Wireless Networking | 4 SH |
| EECE 7397 | Advanced Machine Learning | 4 SH |

***Breadth Courses***

| | | |
|---|---|---|
| EECE 5606 | Micro- and Nanofabrication | 4 SH |
| EECE 5627 | Arithmetic and Circuit Design for Inexact Computing with Nanoscaled CMOS | 4 SH |
| EECE 5640 | High-Performance Computing | 4 SH |
| EECE 5642 | Data Visualization | 4 SH |
| EECE 5647 | Nanophotonics | 4 SH |
| EECE 5648 | Biomedical Optics | 4 SH |
| EECE 5649 | Design of Analog Integrated Circuits with Complementary Metal-Oxide-Semiconductor Technology | 4 SH |
| EECE 5684 | Power Electronics | 4 SH |
| EECE 5686 | Electrical Machines | 4 SH |
| EECE 5688 | Analysis of Unbalanced Power Grids | 4 SH |
| EECE 5694 | Electromagnetic Photonic Devices | 4 SH |
| EECE 5695 | Radio-Frequency and Optical Antennas | 4 SH |
| EECE 5696 | Energy Harvesting Systems | 4 SH |
| EECE 5697 | Acoustics and Sensing | 4 SH |
| EECE 7105 | Optics for Engineers | 4 SH |
| EECE 7201 | Solid State Devices | 4 SH |
| EECE 7202 | Electromagnetic Theory 1 | 4 SH |
| EECE 7205 | Fundamentals of Computer Engineering | 4 SH |
| EECE 7212 | Multivariable Control Systems | 4 SH |
| EECE 7220 | Power System Analysis 2 | 4 SH |
| EECE 7221 | Power System Operation and Control | 4 SH |
| EECE 7224 | Power Systems State Estimation | 4 SH |
| EECE 7226 | Modeling and Simulation of Power System Transients | 4 SH |
| EECE 7238 | Special Topics in Electric Drives | 4 SH |
| EECE 7239 | Special Topics in Power Systems | 4 SH |
| EECE 7240 | Analog Integrated Circuit Design | 4 SH |
| EECE 7241 | Advanced Solid State Devices | 4 SH |
| EECE 7243 | Integrated Circuit Fabrication | 4 SH |
| EECE 7244 | Introduction to Microelectromechanical Systems (MEMS) | 4 SH |
| EECE 7246 | Design and Analysis of Digital Integrated Circuits | 4 SH |
| EECE 7247 | Radio Frequency Integrated Circuit Design | 4 SH |
| EECE 7270 | Electromagnetic Theory 2 | 4 SH |
| EECE 7271 | Computational Methods in Electromagnetics | 4 SH |
| EECE 7275 | Antennas and Radiation | 4 SH |
| EECE 7276 | Microwave Properties of Materials | 4 SH |
| EECE 7284 | Optical Properties of Matter | 4 SH |
| EECE 7285 | Opto-electronics and Fiber Optics | 4 SH |
| EECE 7287 | Optical Detection | 4 SH |
| EECE 7295 | Applied Magnetism | 4 SH |
| EECE 7296 | Electronic Materials | 4 SH |
| EECE 7297 | Advanced Magnetic Materials—Magnetic Devices | 4 SH |
| EECE 7298 | Magnetic Materials—Fundamentals and Measurements | 4 SH |
| EECE 7309 | Special Topics in Electromagnetics, Plasma, and Optics | 4 SH |
| EECE 7352 | Computer Architecture | 4 SH |
| EECE 7353 | VLSI Design | 4 SH |
| EECE 7357 | Fault-Tolerant Computers | 4 SH |
| EECE 7360 | Combinatorial Optimization | 4 SH |
| EECE 7368 | High-Level Design of Hardware-Software Systems | 4 SH |
| EECE 7370 | Advanced Computer Vision | 4 SH |
| EECE 7374 | Fundamentals of Computer Networks | 4 SH |
| EECE 7375 | (pending approval) | |
| EECE 7376 | Operating Systems: Interface and Implementation | 4 SH |

| | | |
|---|---|---|
| EECE 7390 | Computer Hardware Security | 4 SH |
| EECE 7394 | Networks and Systems Security | 4 SH |
| EECE 7399 | Preparing High-Stakes Written and Oral Materials | 4 SH |
| ENGR 5670 | Sustainable Energy: Materials, Conversion, Storage, and Usage | 4 SH |
| MATH 7232 | Combinatorial Analysis | 4 SH |
| MATH 7233 | Graph Theory | 4 SH |
| CS 5100 | Foundations of Artificial Intelligence | 4 SH |
| CS 5200 | Database Management Systems | 4 SH |
| CS 5310 | Computer Graphics | 4 SH |
| CS 5340 | Computer/Human Interaction | 4 SH |
| CS 5400 | Principles of Programming Language | 4 SH |
| CS 5500 | Managing Software Development | 4 SH |
| CS 5600 | Computer Systems | 4 SH |
| CS 5770 | Software Vulnerabilities and Security | 4 SH |
| CS 6110 | Knowledge-Based Systems | 4 SH |
| CS 6200 | Information Retrieval | 4 SH |
| CS 6310 | Computational Imaging | 4 SH |
| CS 6410 | Compilers | 4 SH |
| CS 6510 | Advanced Software Development | 4 SH |
| CS 6520 | Methods of Software Development | 4 SH |
| CS 6530 | Analysis of Software Artifacts | 4 SH |
| CS 6540 | Foundations of Formal Methods and Software Analysis | 4 SH |
| CS 6610 | Parallel Computing | 4 SH |
| CS 6740 | Network Security | 4 SH |
| CS 6750 | Cryptography and Communications Security | 4 SH |
| CS 6760 | Privacy, Security, and Usability | 4 SH |
| CS 6810 | Distributed Algorithms | 4 SH |
| CS 7800 | Advanced Algorithms | 4 SH |

## PROGRAM CREDIT/GPA REQUIREMENTS

32 total semester hours required
Minimum 3.000 GPA required

# MSECE—Master of Science in Electrical and Computer Engineering with Concentration in Computer Engineering

Complete all courses and requirements listed below unless otherwise indicated.

## OPTIONS

Complete one of the following options:

***Course Work Option***

DEPTH COURSES
Complete five courses (20 semester hours) from the list of depth courses below.

BREADTH COURSES
Complete two courses (8 semester hours) from the list of breadth courses below. *Note:* Depth courses cannot be taken for breadth.

ADDITIONAL ELECTIVE
Complete one additional course (4 semester hours) from either the list of depth courses below or the list of breadth courses below.

***Thesis Option***

DEPTH COURSES
Complete three courses (12 semester hours) from the list of depth courses below.

BREADTH COURSES
Complete two courses (8 semester hours) from the list of breadth courses below. *Note:* Depth courses cannot be taken for breadth.

ADDITIONAL ELECTIVE
Complete one additional course (4 semester hours) from either the list of depth courses below or the list of breadth courses below.

THESIS
Requires 8 semester hours:

| | | |
|---|---|---|
| EECE 7990 | Thesis | 4 to 8 SH |

## COURSE LISTS

***Depth Courses***

| | | |
|---|---|---|
| EECE 5626 | Image Processing and Pattern Recognition | 4 SH |
| EECE 5627 | Arithmetic and Circuit Design for Inexact Computing with Nanoscaled CMOS | 4 SH |
| EECE 5639 | Computer Vision | 4 SH |
| EECE 5640 | High-Performance Computing | 4 SH |
| EECE 5642 | Data Visualization | 4 SH |
| EECE 5644 | Introduction to Machine Learning and Pattern Recognition | 4 SH |
| EECE 5645 | (pending approval) | |
| EECE 7205 | Fundamentals of Computer Engineering | 4 SH |
| EECE 7240 | Analog Integrated Circuit Design | 4 SH |
| EECE 7313 | Pattern Recognition | 4 SH |
| EECE 7332 | Error Correcting Codes | 4 SH |
| EECE 7334 | Wireless Communications | 4 SH |
| EECE 7352 | Computer Architecture | 4 SH |
| EECE 7353 | VLSI Design | 4 SH |
| EECE 7357 | Fault-Tolerant Computers | 4 SH |
| EECE 7360 | Combinatorial Optimization | 4 SH |
| EECE 7364 | Mobile and Wireless Networking | 4 SH |
| EECE 7368 | High-Level Design of Hardware-Software Systems | 4 SH |
| EECE 7370 | Advanced Computer Vision | 4 SH |
| EECE 7374 | Fundamentals of Computer Networks | 4 SH |
| EECE 7375 | (pending approval) | |
| EECE 7376 | Operating Systems: Interface and Implementation | 4 SH |
| EECE 7390 | Computer Hardware Security | 4 SH |
| EECE 7394 | Networks and Systems Security | 4 SH |
| EECE 7397 | Advanced Machine Learning | 4 SH |
| MATH 7232 | Combinatorial Analysis | 4 SH |
| MATH 7233 | Graph Theory | 4 SH |

| | | |
|---|---|---|
| CS 5100 | Foundations of Artificial Intelligence | 4 SH |
| CS 5200 | Database Management Systems | 4 SH |
| CS 5310 | Computer Graphics | 4 SH |
| CS 5340 | Computer/Human Interaction | 4 SH |
| CS 5400 | Principles of Programming Language | 4 SH |
| CS 5500 | Managing Software Development | 4 SH |
| CS 5600 | Computer Systems | 4 SH |
| CS 5770 | Software Vulnerabilities and Security | 4 SH |
| CS 6110 | Knowledge-Based Systems | 4 SH |
| CS 6200 | Information Retrieval | 4 SH |
| CS 6310 | Computational Imaging | 4 SH |
| CS 6410 | Compilers | 4 SH |
| CS 6510 | Advanced Software Development | 4 SH |
| CS 6520 | Methods of Software Development | 4 SH |
| CS 6530 | Analysis of Software Artifacts | 4 SH |
| CS 6540 | Foundations of Formal Methods and Software Analysis | 4 SH |
| CS 6610 | Parallel Computing | 4 SH |
| CS 6740 | Network Security | 4 SH |
| CS 6750 | Cryptography and Communications Security | 4 SH |
| CS 6760 | Privacy, Security, and Usability | 4 SH |
| CS 6810 | Distributed Algorithms | 4 SH |
| CS 7800 | Advanced Algorithms | 4 SH |

***Breadth Courses***

| | | |
|---|---|---|
| EECE 5576 | Wireless Communication Systems | 4 SH |
| EECE 5580 | Classical Control Systems | 4 SH |
| EECE 5606 | Micro- and Nanofabrication | 4 SH |
| EECE 5610 | Digital Control Systems | 4 SH |
| EECE 5647 | Nanophotonics | 4 SH |
| EECE 5648 | Biomedical Optics | 4 SH |
| EECE 5649 | Design of Analog Integrated Circuits with Complementary Metal-Oxide-Semiconductor Technology | 4 SH |
| EECE 5664 | Biomedical Signal Processing | 4 SH |
| EECE 5666 | Digital Signal Processing | 4 SH |
| EECE 5680 | Electric Drives | 4 SH |
| EECE 5682 | Power Systems Analysis 1 | 4 SH |
| EECE 5684 | Power Electronics | 4 SH |
| EECE 5686 | Electrical Machines | 4 SH |
| EECE 5688 | Analysis of Unbalanced Power Grids | 4 SH |
| EECE 5694 | Electromagnetic Photonic Devices | 4 SH |
| EECE 5695 | Radio-Frequency and Optical Antennas | 4 SH |
| EECE 5696 | Energy Harvesting Systems | 4 SH |
| EECE 5697 | Acoustics and Sensing | 4 SH |
| EECE 7105 | Optics for Engineers | 4 SH |
| EECE 7200 | Linear Systems Analysis | 4 SH |
| EECE 7201 | Solid State Devices | 4 SH |
| EECE 7202 | Electromagnetic Theory 1 | 4 SH |
| EECE 7203 | Complex Variable Theory and Differential Equations | 4 SH |
| EECE 7204 | Applied Probability and Stochastic Processes | 4 SH |
| EECE 7211 | Nonlinear Control | 4 SH |
| EECE 7212 | Multivariable Control Systems | 4 SH |
| EECE 7213 | System Identification and Adaptive Control | 4 SH |
| EECE 7214 | Optimal and Robust Control | 4 SH |
| EECE 7220 | Power System Analysis 2 | 4 SH |
| EECE 7221 | Power System Operation and Control | 4 SH |
| EECE 7224 | Power Systems State Estimation | 4 SH |
| EECE 7226 | Modeling and Simulation of Power System Transients | 4 SH |
| EECE 7236 | Special Topics in Control | 4 SH |
| EECE 7237 | Special Topics in Power Electronics | 4 SH |
| EECE 7238 | Special Topics in Electric Drives | 4 SH |
| EECE 7239 | Special Topics in Power Systems | 4 SH |
| EECE 7240 | Analog Integrated Circuit Design | 4 SH |
| EECE 7241 | Advanced Solid State Devices | 4 SH |
| EECE 7242 | Integrated Circuits for Communications and Mixed-Signal Processing | 4 SH |
| EECE 7243 | Integrated Circuit Fabrication | 4 SH |
| EECE 7244 | Introduction to Microelectromechanical Systems (MEMS) | 4 SH |
| EECE 7245 | Microwave Circuit Design for Wireless Communication | 4 SH |
| EECE 7246 | Design and Analysis of Digital Integrated Circuits | 4 SH |
| EECE 7247 | Radio Frequency Integrated Circuit Design | 4 SH |
| EECE 7270 | Electromagnetic Theory 2 | 4 SH |
| EECE 7271 | Computational Methods in Electromagnetics | 4 SH |
| EECE 7275 | Antennas and Radiation | 4 SH |
| EECE 7276 | Microwave Properties of Materials | 4 SH |
| EECE 7284 | Optical Properties of Matter | 4 SH |
| EECE 7285 | Opto-electronics and Fiber Optics | 4 SH |
| EECE 7287 | Optical Detection | 4 SH |
| EECE 7293 | Modern Imaging | 4 SH |
| EECE 7295 | Applied Magnetism | 4 SH |
| EECE 7296 | Electronic Materials | 4 SH |
| EECE 7297 | Advanced Magnetic Materials—Magnetic Devices | 4 SH |
| EECE 7298 | Magnetic Materials—Fundamentals and Measurements | 4 SH |
| EECE 7309 | Special Topics in Electromagnetics, Plasma, and Optics | 4 SH |
| EECE 7310 | Modern Signal Processing | 4 SH |
| EECE 7311 | Two Dimensional Signal and Image Processing | 4 SH |
| EECE 7312 | Statistical and Adaptive Signal Processing | 4 SH |
| EECE 7315 | Digital Image Processing | 4 SH |
| EECE 7323 | Numerical Optimization Methods | 4 SH |
| EECE 7327 | Special Topics in Signal Processing 1 | 4 SH |

| | | |
|---|---|---|
| EECE 7335 | Detection and Estimation Theory | 4 SH |
| EECE 7336 | Digital Communications | 4 SH |
| EECE 7337 | Information Theory | 4 SH |
| EECE 7347 | Special Topics in Communications 1 | 4 SH |
| EECE 7399 | Preparing High-Stakes Written and Oral Materials | 4 SH |
| ENGR 5670 | Sustainable Energy: Materials, Conversion, Storage, and Usage | 4 SH |

## PROGRAM CREDIT/GPA REQUIREMENTS

32 total semester hours required
Minimum 3.000 GPA required

# MSECE—Master of Science in Electrical and Computer Engineering with Concentration in Electromagnetics, Plasma, and Optics

Complete all courses and requirements listed below unless otherwise indicated.

## OPTIONS

Complete one of the following options:

***Course Work Option***

DEPTH COURSES

Complete five courses (20 semester hours) from the list of depth courses below.

BREADTH COURSES

Complete two courses (8 semester hours) from the list of breadth courses below. *Note:* Depth courses cannot be taken for breadth.

ADDITIONAL ELECTIVE

Complete one additional course (4 semester hours) from either the list of depth courses below or the list of breadth courses below.

***Thesis Option***

DEPTH COURSES

Complete three courses (12 semester hours) from the list of depth courses below.

BREADTH COURSES

Complete two courses (8 semester hours) from the list of breadth courses below. *Note:* Depth courses cannot be taken for breadth.

ADDITIONAL ELECTIVE

Complete one additional course (4 semester hours) from either the list of depth courses below or the list of breadth courses below.

THESIS

Requires 8 semester hours:

| | | |
|---|---|---|
| EECE 7990 | Thesis | 4 to 8 SH |

## COURSE LISTS

***Depth Courses***

| | | |
|---|---|---|
| EECE 5648 | Biomedical Optics | 4 SH |
| EECE 5694 | Electromagnetic Photonic Devices | 4 SH |
| EECE 5695 | Radio-Frequency and Optical Antennas | 4 SH |
| EECE 5697 | Acoustics and Sensing | 4 SH |
| EECE 7105 | Optics for Engineers | 4 SH |
| EECE 7200 | Linear Systems Analysis | 4 SH |
| EECE 7202 | Electromagnetic Theory 1 | 4 SH |
| EECE 7203 | Complex Variable Theory and Differential Equations | 4 SH |
| EECE 7245 | Microwave Circuit Design for Wireless Communication | 4 SH |
| EECE 7270 | Electromagnetic Theory 2 | 4 SH |
| EECE 7271 | Computational Methods in Electromagnetics | 4 SH |
| EECE 7275 | Antennas and Radiation | 4 SH |
| EECE 7276 | Microwave Properties of Materials | 4 SH |
| EECE 7284 | Optical Properties of Matter | 4 SH |
| EECE 7285 | Opto-electronics and Fiber Optics | 4 SH |
| EECE 7287 | Optical Detection | 4 SH |
| EECE 7293 | Modern Imaging | 4 SH |
| EECE 7295 | Applied Magnetism | 4 SH |
| EECE 7296 | Electronic Materials | 4 SH |
| EECE 7297 | Advanced Magnetic Materials—Magnetic Devices | 4 SH |
| EECE 7309 | Special Topics in Electromagnetics, Plasma, and Optics | 4 SH |

***Breadth Courses***

| | | |
|---|---|---|
| EECE 5576 | Wireless Communication Systems | 4 SH |
| EECE 5580 | Classical Control Systems | 4 SH |
| EECE 5606 | Micro- and Nanofabrication | 4 SH |
| EECE 5610 | Digital Control Systems | 4 SH |
| EECE 5626 | Image Processing and Pattern Recognition | 4 SH |
| EECE 5627 | Arithmetic and Circuit Design for Inexact Computing with Nanoscaled CMOS | 4 SH |
| EECE 5639 | Computer Vision | 4 SH |
| EECE 5640 | High-Performance Computing | 4 SH |
| EECE 5642 | Data Visualization | 4 SH |
| EECE 5644 | Introduction to Machine Learning and Pattern Recognition | 4 SH |
| EECE 5645 | (pending approval) | |
| EECE 5647 | Nanophotonics | 4 SH |
| EECE 5649 | Design of Analog Integrated Circuits with Complementary Metal-Oxide-Semiconductor Technology | 4 SH |
| EECE 5664 | Biomedical Signal Processing | 4 SH |
| EECE 5666 | Digital Signal Processing | 4 SH |
| EECE 5680 | Electric Drives | 4 SH |
| EECE 5682 | Power Systems Analysis 1 | 4 SH |
| EECE 5684 | Power Electronics | 4 SH |
| EECE 5686 | Electrical Machines | 4 SH |
| EECE 5688 | Analysis of Unbalanced Power Grids | 4 SH |
| EECE 5696 | Energy Harvesting Systems | 4 SH |
| EECE 7200 | Linear Systems Analysis | 4 SH |
| EECE 7201 | Solid State Devices | 4 SH |
| EECE 7204 | Applied Probability and Stochastic Processes | 4 SH |

| | | |
|---|---|---|
| EECE 7205 | Fundamentals of Computer Engineering | 4 SH |
| EECE 7211 | Nonlinear Control | 4 SH |
| EECE 7212 | Multivariable Control Systems | 4 SH |
| EECE 7213 | System Identification and Adaptive Control | 4 SH |
| EECE 7214 | Optimal and Robust Control | 4 SH |
| EECE 7220 | Power System Analysis 2 | 4 SH |
| EECE 7221 | Power System Operation and Control | 4 SH |
| EECE 7224 | Power Systems State Estimation | 4 SH |
| EECE 7226 | Modeling and Simulation of Power System Transients | 4 SH |
| EECE 7236 | Special Topics in Control | 4 SH |
| EECE 7237 | Special Topics in Power Electronics | 4 SH |
| EECE 7238 | Special Topics in Electric Drives | 4 SH |
| EECE 7239 | Special Topics in Power Systems | 4 SH |
| EECE 7240 | Analog Integrated Circuit Design | 4 SH |
| EECE 7241 | Advanced Solid State Devices | 4 SH |
| EECE 7242 | Integrated Circuits for Communications and Mixed-Signal Processing | 4 SH |
| EECE 7243 | Integrated Circuit Fabrication | 4 SH |
| EECE 7244 | Introduction to Microelectromechanical Systems (MEMS) | 4 SH |
| EECE 7310 | Modern Signal Processing | 4 SH |
| EECE 7311 | Two Dimensional Signal and Image Processing | 4 SH |
| EECE 7312 | Statistical and Adaptive Signal Processing | 4 SH |
| EECE 7313 | Pattern Recognition | 4 SH |
| EECE 7315 | Digital Image Processing | 4 SH |
| EECE 7323 | Numerical Optimization Methods | 4 SH |
| EECE 7327 | Special Topics in Signal Processing 1 | 4 SH |
| EECE 7332 | Error Correcting Codes | 4 SH |
| EECE 7334 | Wireless Communications | 4 SH |
| EECE 7335 | Detection and Estimation Theory | 4 SH |
| EECE 7336 | Digital Communications | 4 SH |
| EECE 7337 | Information Theory | 4 SH |
| EECE 7347 | Special Topics in Communications 1 | 4 SH |
| EECE 7352 | Computer Architecture | 4 SH |
| EECE 7353 | VLSI Design | 4 SH |
| EECE 7357 | Fault-Tolerant Computers | 4 SH |
| EECE 7360 | Combinatorial Optimization | 4 SH |
| EECE 7364 | Mobile and Wireless Networking | 4 SH |
| EECE 7368 | High-Level Design of Hardware-Software Systems | 4 SH |
| EECE 7370 | Advanced Computer Vision | 4 SH |
| EECE 7374 | Fundamentals of Computer Networks | 4 SH |
| EECE 7375 | (pending approval) | |
| EECE 7376 | Operating Systems: Interface and Implementation | 4 SH |
| EECE 7390 | Computer Hardware Security | 4 SH |
| EECE 7394 | Networks and Systems Security | 4 SH |
| EECE 7397 | Advanced Machine Learning | 4 SH |
| EECE 7399 | Preparing High-Stakes Written and Oral Materials | 4 SH |
| ENGR 5670 | Sustainable Energy: Materials, Conversion, Storage, and Usage | 4 SH |
| MATH 7232 | Combinatorial Analysis | 4 SH |
| MATH 7233 | Graph Theory | 4 SH |
| CS 5100 | Foundations of Artificial Intelligence | 4 SH |
| CS 5200 | Database Management Systems | 4 SH |
| CS 5310 | Computer Graphics | 4 SH |
| CS 5340 | Computer/Human Interaction | 4 SH |
| CS 5400 | Principles of Programming Language | 4 SH |
| CS 5500 | Managing Software Development | 4 SH |
| CS 5600 | Computer Systems | 4 SH |
| CS 5770 | Software Vulnerabilities and Security | 4 SH |
| CS 6110 | Knowledge-Based Systems | 4 SH |
| CS 6200 | Information Retrieval | 4 SH |
| CS 6310 | Computational Imaging | 4 SH |
| CS 6410 | Compilers | 4 SH |
| CS 6510 | Advanced Software Development | 4 SH |
| CS 6520 | Methods of Software Development | 4 SH |
| CS 6530 | Analysis of Software Artifacts | 4 SH |
| CS 6540 | Foundations of Formal Methods and Software Analysis | 4 SH |
| CS 6610 | Parallel Computing | 4 SH |
| CS 6740 | Network Security | 4 SH |
| CS 6750 | Cryptography and Communications Security | 4 SH |
| CS 6760 | Privacy, Security, and Usability | 4 SH |
| CS 6810 | Distributed Algorithms | 4 SH |
| CS 7800 | Advanced Algorithms | 4 SH |

## PROGRAM CREDIT/GPA REQUIREMENTS

32 total semester hours required
Minimum 3.000 GPA required

## MSECE—Master of Science in Electrical and Computer Engineering with Concentration in Microsystems, Materials, and Devices

Complete all courses and requirements listed below unless otherwise indicated.

## OPTIONS

Complete one of the following options:

***Course Work Option***

DEPTH COURSES

Complete five courses (20 semester hours) from the list of depth courses below.

BREADTH COURSES

Complete two courses (8 semester hours) from the list of breadth courses below. *Note:* Depth courses cannot be taken for breadth.

ADDITIONAL ELECTIVE

Complete one additional course (4 semester hours) from either the list of depth courses below or the list of breadth courses below.

***Thesis Option***

DEPTH COURSES

Complete three courses (12 semester hours) from the list of depth courses below.

BREADTH COURSES

Complete two courses (8 semester hours) from the list of breadth courses below. *Note:* Depth courses cannot be taken for breadth.

ADDITIONAL ELECTIVE

Complete one additional course (4 semester hours) from either the list of depth courses below or the list of breadth courses below.

THESIS

Requires 8 semester hours:

| | | |
|---|---|---|
| EECE 7990 | Thesis | 4 to 8 SH |

## COURSE LISTS

***Depth Courses***

| | | |
|---|---|---|
| EECE 5606 | Micro- and Nanofabrication | 4 SH |
| EECE 5647 | Nanophotonics | 4 SH |
| EECE 5648 | Biomedical Optics | 4 SH |
| EECE 5649 | Design of Analog Integrated Circuits with Complementary Metal-Oxide-Semiconductor Technology | 4 SH |
| EECE 5680 | Electric Drives | 4 SH |
| EECE 5696 | Energy Harvesting Systems | 4 SH |
| EECE 7201 | Solid State Devices | 4 SH |
| EECE 7240 | Analog Integrated Circuit Design | 4 SH |
| EECE 7241 | Advanced Solid State Devices | 4 SH |
| EECE 7242 | Integrated Circuits for Communications and Mixed-Signal Processing | 4 SH |
| EECE 7243 | Integrated Circuit Fabrication | 4 SH |
| EECE 7244 | Introduction to Microelectromechanical Systems (MEMS) | 4 SH |
| EECE 7245 | Microwave Circuit Design for Wireless Communication | 4 SH |
| EECE 7246 | Design and Analysis of Digital Integrated Circuits | 4 SH |
| EECE 7247 | Radio Frequency Integrated Circuit Design | 4 SH |
| EECE 7276 | Microwave Properties of Materials | 4 SH |
| EECE 7284 | Optical Properties of Matter | 4 SH |
| EECE 7295 | Applied Magnetism | 4 SH |
| EECE 7296 | Electronic Materials | 4 SH |
| EECE 7297 | Advanced Magnetic Materials—Magnetic Devices | 4 SH |
| EECE 7298 | Magnetic Materials—Fundamentals and Measurements | 4 SH |
| EECE 7353 | VLSI Design | 4 SH |

***Breadth Courses***

| | | |
|---|---|---|
| EECE 5576 | Wireless Communication Systems | 4 SH |
| EECE 5580 | Classical Control Systems | 4 SH |
| EECE 5610 | Digital Control Systems | 4 SH |
| EECE 5626 | Image Processing and Pattern Recognition | 4 SH |
| EECE 5627 | Arithmetic and Circuit Design for Inexact Computing with Nanoscaled CMOS | 4 SH |
| EECE 5639 | Computer Vision | 4 SH |
| EECE 5640 | High-Performance Computing | 4 SH |
| EECE 5642 | Data Visualization | 4 SH |
| EECE 5644 | Introduction to Machine Learning and Pattern Recognition | 4 SH |
| EECE 5645 | (pending approval) | |
| EECE 5664 | Biomedical Signal Processing | 4 SH |
| EECE 5666 | Digital Signal Processing | 4 SH |
| EECE 5682 | Power Systems Analysis 1 | 4 SH |
| EECE 5684 | Power Electronics | 4 SH |
| EECE 5686 | Electrical Machines | 4 SH |
| EECE 5688 | Analysis of Unbalanced Power Grids | 4 SH |
| EECE 5694 | Electromagnetic Photonic Devices | 4 SH |
| EECE 5695 | Radio-Frequency and Optical Antennas | 4 SH |
| EECE 5697 | Acoustics and Sensing | 4 SH |
| EECE 7200 | Linear Systems Analysis | 4 SH |
| EECE 7202 | Electromagnetic Theory 1 | 4 SH |
| EECE 7205 | Fundamentals of Computer Engineering | 4 SH |
| EECE 7211 | Nonlinear Control | 4 SH |
| EECE 7212 | Multivariable Control Systems | 4 SH |
| EECE 7213 | System Identification and Adaptive Control | 4 SH |
| EECE 7214 | Optimal and Robust Control | 4 SH |
| EECE 7220 | Power System Analysis 2 | 4 SH |
| EECE 7221 | Power System Operation and Control | 4 SH |
| EECE 7224 | Power Systems State Estimation | 4 SH |
| EECE 7226 | Modeling and Simulation of Power System Transients | 4 SH |
| EECE 7236 | Special Topics in Control | 4 SH |
| EECE 7237 | Special Topics in Power Electronics | 4 SH |
| EECE 7238 | Special Topics in Electric Drives | 4 SH |
| EECE 7239 | Special Topics in Power Systems | 4 SH |
| EECE 7310 | Modern Signal Processing | 4 SH |
| EECE 7311 | Two Dimensional Signal and Image Processing | 4 SH |
| EECE 7312 | Statistical and Adaptive Signal Processing | 4 SH |
| EECE 7313 | Pattern Recognition | 4 SH |
| EECE 7315 | Digital Image Processing | 4 SH |
| EECE 7323 | Numerical Optimization Methods | 4 SH |
| EECE 7327 | Special Topics in Signal Processing 1 | 4 SH |
| EECE 7332 | Error Correcting Codes | 4 SH |
| EECE 7334 | Wireless Communications | 4 SH |
| EECE 7335 | Detection and Estimation Theory | 4 SH |
| EECE 7336 | Digital Communications | 4 SH |
| EECE 7337 | Information Theory | 4 SH |
| EECE 7347 | Special Topics in Communications 1 | 4 SH |

| | | |
|---|---|---|
| EECE 7352 | Computer Architecture | 4 SH |
| EECE 7357 | Fault-Tolerant Computers | 4 SH |
| EECE 7360 | Combinatorial Optimization | 4 SH |
| EECE 7364 | Mobile and Wireless Networking | 4 SH |
| EECE 7368 | High-Level Design of Hardware-Software Systems | 4 SH |
| EECE 7370 | Advanced Computer Vision | 4 SH |
| EECE 7374 | Fundamentals of Computer Networks | 4 SH |
| EECE 7375 | (pending approval) | |
| EECE 7376 | Operating Systems: Interface and Implementation | 4 SH |
| EECE 7390 | Computer Hardware Security | |
| EECE 7394 | Networks and Systems Security | 4 SH |
| EECE 7397 | Advanced Machine Learning | 4 SH |
| EECE 7399 | Preparing High-Stakes Written and Oral Materials | 4 SH |
| ENGR 5670 | Sustainable Energy: Materials, Conversion, Storage, and Usage | 4 SH |
| MATH 7232 | Combinatorial Analysis | 4 SH |
| MATH 7233 | Graph Theory | 4 SH |
| CS 5100 | Foundations of Artificial Intelligence | 4 SH |
| CS 5200 | Database Management Systems | 4 SH |
| CS 5310 | Computer Graphics | 4 SH |
| CS 5340 | Computer/Human Interaction | 4 SH |
| CS 5400 | Principles of Programming Language | 4 SH |
| CS 5500 | Managing Software Development | 4 SH |
| CS 5600 | Computer Systems | 4 SH |
| CS 5770 | Software Vulnerabilities and Security | 4 SH |
| CS 6110 | Knowledge-Based Systems | 4 SH |
| CS 6200 | Information Retrieval | 4 SH |
| CS 6310 | Computational Imaging | 4 SH |
| CS 6410 | Compilers | 4 SH |
| CS 6510 | Advanced Software Development | 4 SH |
| CS 6520 | Methods of Software Development | 4 SH |
| CS 6530 | Analysis of Software Artifacts | 4 SH |
| CS 6540 | Foundations of Formal Methods and Software Analysis | 4 SH |
| CS 6610 | Parallel Computing | 4 SH |
| CS 6740 | Network Security | 4 SH |
| CS 6750 | Cryptography and Communications Security | 4 SH |
| CS 6760 | Privacy, Security, and Usability | 4 SH |
| CS 6810 | Distributed Algorithms | 4 SH |
| CS 7800 | Advanced Algorithms | 4 SH |

## PROGRAM CREDIT/GPA REQUIREMENTS

32 total semester hours required

Minimum 3.000 GPA required

# MSECE—Master of Science in Electrical and Computer Engineering with Concentration in Power Systems

Complete all courses and requirements listed below unless otherwise indicated.

## OPTIONS

Complete one of the following options:

***Course Work Option***

DEPTH COURSES

Complete five courses (20 semester hours) from the list of depth courses below.

BREADTH COURSES

Complete two courses (8 semester hours) from the list of breadth courses below. *Note:* Depth courses cannot be taken for breadth.

ADDITIONAL ELECTIVE

Complete one additional course (4 semester hours) from either the list of depth courses below or the list of breadth courses below.

***Thesis Option***

DEPTH COURSES

Complete three courses (12 semester hours) from the list of depth courses below.

BREADTH COURSES

Complete two courses (8 semester hours) from the list of breadth courses below. *Note:* Depth courses cannot be taken for breadth.

ADDITIONAL ELECTIVE

Complete one additional course (4 semester hours) from either the list of depth courses below or the list of breadth courses below.

THESIS

Requires 8 semester hours:

| | | |
|---|---|---|
| EECE 7990 | Thesis | 4 to 8 SH |

## COURSE LISTS

***Depth Courses***

| | | |
|---|---|---|
| EECE 5580 | Classical Control Systems | 4 SH |
| EECE 5610 | Digital Control Systems | 4 SH |
| EECE 5666 | Digital Signal Processing | 4 SH |
| EECE 5680 | Electric Drives | 4 SH |
| EECE 5682 | Power Systems Analysis 1 | 4 SH |
| EECE 5684 | Power Electronics | 4 SH |
| EECE 5686 | Electrical Machines | 4 SH |
| EECE 5688 | Analysis of Unbalanced Power Grids | 4 SH |
| EECE 5696 | Energy Harvesting Systems | 4 SH |
| EECE 7200 | Linear Systems Analysis | 4 SH |
| EECE 7211 | Nonlinear Control | 4 SH |
| EECE 7212 | Multivariable Control Systems | 4 SH |
| EECE 7213 | System Identification and Adaptive Control | 4 SH |
| EECE 7214 | Optimal and Robust Control | 4 SH |

| | | |
|---|---|---|
| EECE 7220 | Power System Analysis 2 | 4 SH |
| EECE 7221 | Power System Operation and Control | 4 SH |
| EECE 7224 | Power Systems State Estimation | 4 SH |
| EECE 7226 | Modeling and Simulation of Power System Transients | 4 SH |
| EECE 7236 | Special Topics in Control | 4 SH |
| EECE 7237 | Special Topics in Power Electronics | 4 SH |
| EECE 7238 | Special Topics in Electric Drives | 4 SH |
| EECE 7239 | Special Topics in Power Systems | 4 SH |
| EECE 7323 | Numerical Optimization Methods | 4 SH |
| EECE 7335 | Detection and Estimation Theory | 4 SH |
| ENGR 5670 | Sustainable Energy: Materials, Conversion, Storage, and Usage | 4 SH |

***Breadth Courses***

| | | |
|---|---|---|
| EECE 5606 | Micro- and Nanofabrication | 4 SH |
| EECE 5626 | Image Processing and Pattern Recognition | 4 SH |
| EECE 5627 | Arithmetic and Circuit Design for Inexact Computing with Nanoscaled CMOS | 4 SH |
| EECE 5639 | Computer Vision | 4 SH |
| EECE 5640 | High-Performance Computing | 4 SH |
| EECE 5642 | Data Visualization | 4 SH |
| EECE 5644 | Introduction to Machine Learning and Pattern Recognition | 4 SH |
| EECE 5645 | (pending approval) | |
| EECE 5647 | Nanophotonics | 4 SH |
| EECE 5649 | Design of Analog Integrated Circuits with Complementary Metal-Oxide-Semiconductor Technology | 4 SH |
| EECE 5664 | Biomedical Signal Processing | 4 SH |
| EECE 5694 | Electromagnetic Photonic Devices | 4 SH |
| EECE 5695 | Radio-Frequency and Optical Antennas | 4 SH |
| EECE 5697 | Acoustics and Sensing | 4 SH |
| EECE 7105 | Optics for Engineers | 4 SH |
| EECE 7201 | Solid State Devices | 4 SH |
| EECE 7202 | Electromagnetic Theory 1 | 4 SH |
| EECE 7203 | Complex Variable Theory and Differential Equations | 4 SH |
| EECE 7204 | Applied Probability and Stochastic Processes | 4 SH |
| EECE 7205 | Fundamentals of Computer Engineering | 4 SH |
| EECE 7240 | Analog Integrated Circuit Design | 4 SH |
| EECE 7241 | Advanced Solid State Devices | 4 SH |
| EECE 7242 | Integrated Circuits for Communications and Mixed-Signal Processing | 4 SH |
| EECE 7243 | Integrated Circuit Fabrication | 4 SH |
| EECE 7244 | Introduction to Microelectromechanical Systems (MEMS) | 4 SH |
| EECE 7245 | Microwave Circuit Design for Wireless Communication | 4 SH |
| EECE 7246 | Design and Analysis of Digital Integrated Circuits | 4 SH |
| EECE 7247 | Radio Frequency Integrated Circuit Design | 4 SH |
| EECE 7270 | Electromagnetic Theory 2 | 4 SH |
| EECE 7271 | Computational Methods in Electromagnetics | 4 SH |
| EECE 7275 | Antennas and Radiation | 4 SH |
| EECE 7276 | Microwave Properties of Materials | 4 SH |
| EECE 7284 | Optical Properties of Matter | 4 SH |
| EECE 7285 | Opto-electronics and Fiber Optics | 4 SH |
| EECE 7287 | Optical Detection | 4 SH |
| EECE 7293 | Modern Imaging | 4 SH |
| EECE 7295 | Applied Magnetism | 4 SH |
| EECE 7296 | Electronic Materials | 4 SH |
| EECE 7297 | Advanced Magnetic Materials—Magnetic Devices | 4 SH |
| EECE 7298 | Magnetic Materials—Fundamentals and Measurements | 4 SH |
| EECE 7309 | Special Topics in Electromagnetics, Plasma, and Optics | 4 SH |
| EECE 7310 | Modern Signal Processing | 4 SH |
| EECE 7312 | Statistical and Adaptive Signal Processing | 4 SH |
| EECE 7327 | Special Topics in Signal Processing 1 | 4 SH |
| EECE 7347 | Special Topics in Communications 1 | 4 SH |
| EECE 7352 | Computer Architecture | 4 SH |
| EECE 7353 | VLSI Design | 4 SH |
| EECE 7357 | Fault-Tolerant Computers | 4 SH |
| EECE 7360 | Combinatorial Optimization | 4 SH |
| EECE 7368 | High-Level Design of Hardware-Software Systems | 4 SH |
| EECE 7370 | Advanced Computer Vision | 4 SH |
| EECE 7374 | Fundamentals of Computer Networks | 4 SH |
| EECE 7375 | (pending approval) | |
| EECE 7376 | Operating Systems: Interface and Implementation | 4 SH |
| EECE 7390 | Computer Hardware Security | 4 SH |
| EECE 7394 | Networks and Systems Security | 4 SH |
| EECE 7397 | Advanced Machine Learning | 4 SH |
| EECE 7399 | Preparing High-Stakes Written and Oral Materials | 4 SH |
| MATH 7232 | Combinatorial Analysis | 4 SH |
| MATH 7233 | Graph Theory | 4 SH |
| CS 5100 | Foundations of Artificial Intelligence | 4 SH |
| CS 5200 | Database Management Systems | 4 SH |
| CS 5310 | Computer Graphics | 4 SH |
| CS 5340 | Computer/Human Interaction | 4 SH |
| CS 5400 | Principles of Programming Language | 4 SH |
| CS 5500 | Managing Software Development | 4 SH |
| CS 5600 | Computer Systems | 4 SH |
| CS 5770 | Software Vulnerabilities and Security | 4 SH |

| | | |
|---|---|---|
| CS 6110 | Knowledge-Based Systems | 4 SH |
| CS 6200 | Information Retrieval | 4 SH |
| CS 6310 | Computational Imaging | 4 SH |
| CS 6410 | Compilers | 4 SH |
| CS 6510 | Advanced Software Development | 4 SH |
| CS 6520 | Methods of Software Development | 4 SH |
| CS 6530 | Analysis of Software Artifacts | 4 SH |
| CS 6540 | Foundations of Formal Methods and Software Analysis | 4 SH |
| CS 6610 | Parallel Computing | 4 SH |
| CS 6740 | Network Security | 4 SH |
| CS 6750 | Cryptography and Communications Security | 4 SH |
| CS 6760 | Privacy, Security, and Usability | 4 SH |
| CS 6810 | Distributed Algorithms | 4 SH |
| CS 7800 | Advanced Algorithms | 4 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

32 total semester hours required
Minimum 3.000 GPA required

## MSECEL—Master of Science in Electrical and Computer Engineering Leadership

Complete all courses and requirements listed below unless otherwise indicated.

### REQUIREMENTS

***Approved Concentration Courses***

Complete four of the following courses:

| | | |
|---|---|---|
| CS 5100 | Foundations of Artificial Intelligence | 4 SH |
| CS 5200 | Database Management Systems | 4 SH |
| CS 5310 | Computer Graphics | 4 SH |
| CS 5340 | Computer/Human Interaction | 4 SH |
| CS 5400 | Principles of Programming Language | 4 SH |
| CS 5500 | Managing Software Development | 4 SH |
| CS 5600 | Computer Systems | 4 SH |
| CS 5770 | Software Vulnerabilities and Security | 4 SH |
| CS 6110 | Knowledge-Based Systems | 4 SH |
| CS 6200 | Information Retrieval | 4 SH |
| CS 6310 | Computational Imaging | 4 SH |
| CS 6410 | Compilers | 4 SH |
| CS 6510 | Advanced Software Development | 4 SH |
| CS 6520 | Methods of Software Development | 4 SH |
| CS 6530 | Analysis of Software Artifacts | 4 SH |
| CS 6540 | Foundations of Formal Methods and Software Analysis | 4 SH |
| CS 6610 | Parallel Computing | 4 SH |
| CS 6740 | Network Security | 4 SH |
| CS 6750 | Cryptography and Communications Security | 4 SH |
| CS 6760 | Privacy, Security, and Usability | 4 SH |
| CS 6810 | Distributed Algorithms | 4 SH |
| CS 7800 | Advanced Algorithms | 4 SH |
| EECE 5639 | Computer Vision | 4 SH |
| EECE 5640 | High-Performance Computing | 4 SH |
| EECE 5688 | Analysis of Unbalanced Power Grids | 4 SH |
| EECE 5698 | Special Topics in Electrical and Computer Engineering | 4 SH |
| EECE 7205 | Fundamentals of Computer Engineering | 4 SH |
| EECE 7240 | Analog Integrated Circuit Design | 4 SH |
| EECE 7313 | Pattern Recognition | 4 SH |
| EECE 7332 | Error Correcting Codes | 4 SH |
| EECE 7334 | Wireless Communications | 4 SH |
| EECE 7352 | Computer Architecture | 4 SH |
| EECE 7353 | VLSI Design | 4 SH |
| EECE 7357 | Fault-Tolerant Computers | 4 SH |
| EECE 7360 | Combinatorial Optimization | 4 SH |
| EECE 7364 | Mobile and Wireless Networking | 4 SH |
| EECE 7366 | Special Topics in Computer Engineering 1 | 4 SH |
| EECE 7368 | High-Level Design of Hardware-Software Systems | 4 SH |
| EECE 7374 | Fundamentals of Computer Networks | 4 SH |
| EECE 7388 | Special Topics in Computer Engineering 2 | 4 SH |
| EECE 7398 | Special Topics | 4 SH |
| MATH 7232 | Combinatorial Analysis | 4 SH |
| MATH 7233 | Graph Theory | 4 SH |
| ***Leadership*** | | |
| ENLR 5121 | Engineering Leadership 1 | 2 SH |
| ENLR 5122 | Engineering Leadership 2 | 2 SH |
| ***Foundations*** | | |
| ENLR 5131 | Scientific Foundations of Engineering 1 | 2 SH |
| ENLR 5132 | Scientific Foundations of Engineering 2 | 2 SH |
| ***Project*** | | |
| ENLR 7440 | Engineering Leadership Challenge Project 1 | 4 SH |
| ENLR 7442 | Engineering Leadership Challenge Project 2 | 4 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

32 total semester hours required
Minimum 3.000 GPA required

## PhD in Computer Engineering—Advanced Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

### MILESTONES

Qualifying exam and comprehensive exam
Annual review
Dissertation proposal
Dissertation committee
Dissertation defense

**GENERAL REQUIREMENTS**

Complete 16 semester hours of approved course work. At least 8 semester hours must be graduate-level EECE courses. Consult your faculty advisor for acceptable courses.

**DISSERTATION**

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| EECE 9990 | Dissertation | 0 SH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

16 total semester hours required
Minimum 3.000 GPA required

## PhD in Computer Engineering—Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

**MILESTONES**

Qualifying exam and comprehensive exam
Annual review
Dissertation proposal
Dissertation committee
Dissertation defense

**GENERAL REQUIREMENTS**

Complete 48 semester hours of approved course work. At least 8 semester hours must be graduate-level EECE courses. Consult faculty advisor for acceptable courses.

**DISSERTATION**

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| EECE 9990 | Dissertation | 0 SH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

48 total semester hours required
Minimum 3.000 GPA required

## PhD in Electrical Engineering—Advanced Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

**MILESTONES: ENGINEERING PHD**

Qualifying exam and comprehensive exam
Annual review
Dissertation proposal
Dissertation committee
Dissertation defense

**GENERAL REQUIREMENTS**

Complete 16 semester hours of approved course work. At least 8 semester hours must be graduate-level EECE courses. Consult your faculty advisor for acceptable courses.

**DISSERTATION**

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| EECE 9990 | Dissertation | 0 SH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

16 total semester hours required
Minimum 3.000 GPA required

## PhD in Electrical Engineering—Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

**MILESTONES**

Qualifying exam and comprehensive exam
Annual review
Dissertation proposal
Dissertation committee
Dissertation defense

**GENERAL REQUIREMENTS**

Complete 48 semester hours of approved course work. At least 8 semester hours must be graduate-level EECE courses. Consult faculty advisor for acceptable courses.

**DISSERTATION**

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| EECE 9990 | Dissertation | 0 SH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

48 total semester hours required
Minimum 3.000 GPA required

# ENERGY SYSTEMS

**www.coe.neu.edu/degrees/master-science-energy-systems**

GREGORY J. KOWALSKI, PHD
*Associate Professor and Program Director*

205 Snell Engineering
617.373.2971
617.373.2921 (fax)
Gregory J. Kowalski, PhD, *Associate Professor and Director of Energy Systems,* gkowal@coe.neu.edu

The Master of Science degree program in energy systems (MSES) integrates the technology side of energy systems development with the financial planning needed to effectively implement them. The goal of the MSES is to create a high-level signature, interdisciplinary graduate program for the engineer or technical business major who is pursuing an industrial or public-planning-based career.

The program curriculum is firmly rooted in energy technology and includes exposure to the interface with business and financial decision processes. 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 at this interface who have successfully implemented energy systems or devices and policies are actively involved in the program as adjunct professors and invited speakers. The curriculum is flexibly designed with a set of six core courses in engineering knowledge and finance and four electives that can be taken from any department within the College of Engineering.

Through this curriculum and interaction with practitioners, the students will 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.

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.

The degree requirements are successful completion of a minimum 35.5 semester hours of course work. The curriculum can be completed through either a cooperative education (co-op) or non–co-op track. The six-month co-op rotation in companies or the public sector involved in energy activities is a recommended component of the program. To provide flexibility to satisfy the mission of the program, a program of study will be prepared by the student and program director during the first term of study. This program of study will reflect the student's career goals and will insure that all technical and financial educational competencies are satisfied. All successful degree candidates will have demonstrated sufficient engineering competency as measured by the successful completion of the courses. The required course distribution is shown in the table below.

## Mission Statement

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.

## Admission Criteria

Applicants to the program are expected to have either an undergraduate degree from an accredited engineering school or have a quantitative business or finance degree. Applicants are expected to have adequate computer skills and college-level calculus. Foundational course work in these fields is available to students to bridge any gap in their technical backgrounds. However, credit for such courses will not count toward the degree. The successful applicant should have an undergraduate grade-point average of 3.000/4.000 or higher from an accredited U.S. school. International applicants, in addition to the minimum 3.000/4.000 GPA requirement, should submit GRE and TOEFL scores with a minimum 151 (650) (Quantitative) and 550 (paper-based), 213 (computer-based), or 80 (Internet-based), respectively. The applicant will also submit:

- An application to the Graduate School of Engineering.
- A one-page description of their interest and expectations of the program, focusing on their career path. This essay should be placed in the application under the heading "PhD Applicants, Area of Interest."

## Sample Curriculum

Below is a sample curriculum for either the co-op or non–co-op tracks.

### TECHNICAL BACKGROUND TRACK WITH CO-OP

| Fall 1 | Spring 1 | Summer 1 |
|---|---|---|
| ENSY 5000 (4 SH) | ACCT 6200 (3 SH) | Co-op (ENSY 6964) |
| EMGT 6225 (4 SH) | ENCP 6000 (1 SH) | |
| ME 6200 (4 SH) | Elective (4 SH) | |
| **Fall 2** | **Spring 2** | **Fall/Summer** |
| Co-op (ENSY 6964) | ACCT 6201 (1.5 SH) | Elective (4 SH) |
| | FINA 6200 (3 SH) | Elective (4 SH) |
| | Elective (4 SH) | |

### NON–CO-OP TRACK

| Fall 1 | Spring 1 | Summer 1 |
|---|---|---|
| ENSY 5000 (4 SH) | ACCT 6200 (3 SH) | No classes |
| ME 6200 (4 SH) | EMGT 6225 (4 SH) | |
| | Elective (4 SH) | |
| **Fall 2** | **Spring 2** | |
| FINA 6200 (3 SH) | Elective (4 SH) | |
| ACCT 6201 (1.5 SH) | Elective (4 SH) | |
| Elective (4 SH) | | |

## Master of Science in Energy Systems Engineering

This program includes an online/hybrid delivery option. Course work for this option is offered online. Students enrolled at a regional campus may enroll in specific hybrid delivery sections of these courses. Hybrid courses have periodic face-to-face regional campus meetings.

Complete all courses and requirements listed below unless otherwise indicated.

### OPTIONS

Complete one of the following options:

***General Option***

CORE COURSES

| | | |
|---|---|---|
| ACCT 6200 | Financial Reporting and Managerial Decision Making 1 | 3 SH |
| ACCT 6201 | Financial Reporting and Managerial Decision Making 2 | 1.5 SH |
| EMGT 6225 | Economic Decision Making | 4 SH |
| ENSY 5000 | Fundamentals of Energy System Integration | 4 SH |
| FINA 6200 | Value Creation through Financial Decision Making | 3 SH |
| ME 6200 | Mathematical Methods for Mechanical Engineers 1 | 4 SH |

ELECTIVES

Complete four of the following courses (16 semester hours):

| | | |
|---|---|---|
| ARCH 5210 | Environmental Systems | 4 SH |
| with ARCH 5211 | Recitation for ARCH 5210 | 0 SH |
| CHEM 5651 | Materials Chemistry of Renewable Energy | 3 SH |
| CHEM 5652 | Fundamental Science of Photovoltaics | 3 SH |
| CHME 5204 | Heterogeneous Catalysis | 4 SH |
| CHME 5630 | Biochemical Engineering | 4 SH |
| CIVE 5270 | Environmental Protection and Management | 4 SH |
| EECE 5680 | Electric Drives | 4 SH |
| EECE 5682 | Power Systems Analysis 1 | 4 SH |
| EECE 5684 | Power Electronics | 4 SH |
| EECE 5686 | Electrical Machines | 4 SH |
| EECE 7239 | Special Topics in Power Systems | 4 SH |
| EECE 7398 | Special Topics | 4 SH |
| EMGT 5220 | Engineering Project Management | 4 SH |
| ENSY 5XXX | (pending approval) | |
| ENSY 7374 | Special Topics in Energy Systems | 4 SH |
| ENSY 7978 | Independent Study | 1 to 4 SH |
| LPSC 7312 | Cities, Sustainability, and Climate Change | 3 SH |
| OR 6205 | Deterministics Operations Research | 4 SH |
| ME 5645 | Environmental Issues in Manufacturing and Product Use | 4 SH |
| ME 5685 | Solar Thermal Engineering | 4 SH |
| ME 5690 | Gas Turbine Combustion | 4 SH |
| ME 7270 | General Thermodynamics | 4 SH |
| ME 7300 | Combustion and Air Pollution | 4 SH |
| ME 7305 | Fundamentals of Combustion | 4 SH |
| PPUA 7238 | Climate Change and Urbanization in Developing Countries | 3 SH |

***Online/Hybrid Option***

CORE COURSES

| | | |
|---|---|---|
| ACCT 6272 | Financial Statement Preparation and Analysis | 2.25 SH |
| ACCT 6273 | Identifying Strategic Implications in Accounting Data | 2.25 SH |
| EMGT 6225 | Economic Decision Making | 4 SH |
| ENSY 5000 | Fundamentals of Energy System Integration | 4 SH |
| FINA 6200 | Value Creation through Financial Decision Making | 3 SH |
| ME 6200 | Mathematical Methods for Mechanical Engineers 1 | 4 SH |

ELECTIVES

Complete four of the following courses (16 semester hours):

| | | |
|---|---|---|
| CIVE 5270 | Environmental Protection and Management | 4 SH |
| EECE 5682 | Power Systems Analysis 1 | 4 SH |
| EECE 7398 | Special Topics | 4 SH |
| EMGT 5220 | Engineering Project Management | 4 SH |
| ENSY 5XXX | (pending approval) | |
| IE 6200 | Engineering Probability and Statistics | 4 SH |
| OR 6205 | Deterministics Operations Research | 4 SH |
| ME 5645 | Environmental Issues in Manufacturing and Product Use | 4 SH |
| ME 5685 | Solar Thermal Engineering | 4 SH |
| ME 7270 | General Thermodynamics | 4 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

35.5 total semester hours required

Minimum 3.000 GPA required

## ENGINEERING LEADERSHIP

**www.northeastern.edu/gordonleadership**

SIMON PITTS, BS
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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' 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 course work required for the Master of Science degree can be pursued before, after, or in parallel with GEL.

### Graduate Certificate in Engineering Leadership

Complete all courses and requirements listed below unless otherwise indicated.

**REQUIREMENTS**

***Engineering Leadership 1 and 2***

| | | |
|---|---|---|
| ENLR 5121 | Engineering Leadership 1 | 2 SH |
| ENLR 5122 | Engineering Leadership 2 | 2 SH |

***Scientific Foundations of Engineering Leadership 1 and 2***

| | | |
|---|---|---|
| ENLR 5131 | Scientific Foundations of Engineering 1 | 2 SH |
| ENLR 5132 | Scientific Foundations of Engineering 2 | 2 SH |

***Engineering Leadership Challenge Project 1 and 2***

| | | |
|---|---|---|
| ENLR 7440 | Engineering Leadership Challenge Project 1 | 4 SH |
| ENLR 7442 | Engineering Leadership Challenge Project 2 | 4 SH |

## PROGRAM CREDIT/GPA REQUIREMENTS

16 total semester hours required
Minimum 3.000 GPA required

# ENGINEERING MANAGEMENT

**www.coe.neu.edu/degrees/master-science-engineering-management**

THOMAS P. CULLINANE, PHD
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The Master of Science in Engineering Management offers graduate students an opportunity to develop both the technical expertise and the 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 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 product managers, or leaders of teams in technical 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 management. As a result, many of these assignments 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."

## MSEM—Master of Science in Engineering Management

Complete all courses and requirements listed below unless otherwise indicated.

### GENERAL REQUIREMENTS

| | | |
|---|---|---|
| OR 6205 | Deterministics Operations Research | 4 SH |
| EMGT 5220 | Engineering Project Management | 4 SH |
| EMGT 6225 | Economic Decision Making | 4 SH |
| IE 6200 | Engineering Probability and Statistics | 4 SH |

### OPTIONS

Complete one of the following options:

***Course Work Option***

Complete 16 semester hours from the following courses:

| | | |
|---|---|---|
| CSYE 6200 | Concepts of Object-Oriented Design | 4 SH |
| CSYE 6210 | Component Software Development | 4 SH |
| CSYE 6220 | Enterprise Software Design | 4 SH |
| CSYE 7230 | Software Engineering | 4 SH |
| CSYE 7270 | Building Virtual Environments | 4 SH |
| CSYE 7280 | Advanced User Experience Design and Testing | 4 SH |
| ENSY 5000 | Fundamentals of Energy System Integration | 4 SH |
| EMGT 5300 | Engineering/Organizational Psychology | 4 SH |
| EMGT 6305 | Financial Management for Engineers | 4 SH |
| EMGT 7978 | Independent Study | 1 to 4 SH |
| ENTR 6200 | Enterprise Growth and Innovation | 3 SH |
| ENTR 6212 | Business Planning for New Ventures | 3 SH |
| ENTR 6218 | Business Model Design and Innovation | 3 SH |
| ENTR 6219 | Financing Ventures from Early Stage to Exit | 3 SH |
| GE 5100 | Product Development for Engineers | 4 SH |
| IE 5400 | Healthcare Systems Modeling and Analysis | 4 SH |
| IE 5500 | Systems Engineering in Public Programs | 4 SH |
| IE 5620 | Mass Customization | 4 SH |
| IE 7200 | Supply Chain Engineering | 4 SH |
| IE 7210 | Production System | 4 SH |
| IE 7255 | Manufacturing Processes | 4 SH |
| IE 7270 | Intelligent Manufacturing | 4 SH |
| IE 7275 | Data Mining in Engineering | 4 SH |
| IE 7280 | Statistical Methods in Engineering | 4 SH |
| IE 7285 | Statistical Quality Control | 4 SH |
| IE 7290 | Reliability Analysis and Risk Assessment | 4 SH |
| IE 7315 | Human Factors Engineering | 4 SH |
| IE 7615 | Neural Networks in Engineering | 4 SH |
| INFO 6210 | Data Management and Database Design | 4 SH |
| INFO 6215 | Business Analysis and Information Engineering | 4 SH |
| INFO 7245 | Agile Software Development | 4 SH |
| INFO 7260 | Business Process Engineering | 4 SH |
| INFO 7285 | Organizational Change and IT | 4 SH |
| INFO 7290 | Data Warehousing and Integration | 4 SH |
| INFO 7330 | Information Systems for Healthcare-Services Delivery | 4 SH |
| INFO 7390 | Advances in Data Sciences and Architecture | 4 SH |
| MGSC 6206 | Management of Service and Manufacturing Operations | 3 SH |
| OR 7230 | Probabilistic Operation Research | 4 SH |
| OR 7235 | Inventory Theory | 4 SH |
| OR 7240 | Integer and Nonlinear Optimization | 4 SH |
| OR 7245 | Network Analysis and Advanced Optimization | 4 SH |
| OR 7250 | Multi-Criteria Decision Making | 4 SH |
| OR 7310 | Logistics, Warehousing, and Scheduling | 4 SH |
| SCHM 6210 | Supply Chain Management | 3 SH |
| SCHM 6211 | The Transportation Industries | 3 SH |
| SCHM 6212 | Executive Roundtable in Supply Chain Management | 3 SH |
| SCHM 6213 | Global Supply Chain Management | 3 SH |
| SCHM 6215 | IT Applications in Supply Chain Management | 3 SH |
| TECE 6200 | Innovation and Entrepreneurial Growth | 3 SH |
| TECE 6222 | Emerging and Disruptive Technologies | 3 SH |
| TECE 6230 | Entrepreneurial Marketing and Selling | 3 SH |
| TECE 6340 | The Technical Entrepreneur as Leader | 3 SH |
| TECE 6250 | Lean Design and Development | 3 SH |

| | | |
|---|---|---|
| TECE 6300 | Managing a Technology-Based Business | 3 SH |
| TELE 5310 | Fundamentals of Communication Systems | 4 SH |
| TELE 5330 | Data Networking | 4 SH |

***Project Option***

ELECTIVES

Complete three of the following courses (12 semester hours):

| | | |
|---|---|---|
| CSYE 6200 | Concepts of Object-Oriented Design | 4 SH |
| CSYE 6210 | Component Software Development | 4 SH |
| CSYE 6220 | Enterprise Software Design | 4 SH |
| CSYE 7230 | Software Engineering | 4 SH |
| CSYE 7270 | Building Virtual Environments | 4 SH |
| CSYE 7280 | Advanced User Experience Design and Testing | 4 SH |
| ENSY 5000 | Fundamentals of Energy System Integration | 4 SH |
| EMGT 5300 | Engineering/Organizational Psychology | 4 SH |
| EMGT 6305 | Financial Management for Engineers | 4 SH |
| EMGT 7978 | Independent Study | 1 to 4 SH |
| ENTR 6200 | Enterprise Growth and Innovation | 3 SH |
| ENTR 6212 | Business Planning for New Ventures | 3 SH |
| ENTR 6218 | Business Model Design and Innovation | 3 SH |
| ENTR 6219 | Financing Ventures from Early Stage to Exit | 3 SH |
| GE 5100 | Product Development for Engineers | 4 SH |
| IE 5400 | Healthcare Systems Modeling and Analysis | 4 SH |
| IE 5500 | Systems Engineering in Public Programs | 4 SH |
| IE 5620 | Mass Customization | 4 SH |
| IE 7200 | Supply Chain Engineering | 4 SH |
| IE 7210 | Production System | 4 SH |
| IE 7255 | Manufacturing Processes | 4 SH |
| IE 7270 | Intelligent Manufacturing | 4 SH |
| IE 7275 | Data Mining in Engineering | 4 SH |
| IE 7280 | Statistical Methods in Engineering | 4 SH |
| IE 7285 | Statistical Quality Control | 4 SH |
| IE 7290 | Reliability Analysis and Risk Assessment | 4 SH |
| IE 7315 | Human Factors Engineering | 4 SH |
| IE 7615 | Neural Networks in Engineering | 4 SH |
| INFO 6210 | Data Management and Database Design | 4 SH |
| INFO 6215 | Business Analysis and Information Engineering | 4 SH |
| INFO 7245 | Agile Software Development | 4 SH |
| INFO 7260 | Business Process Engineering | 4 SH |
| INFO 7285 | Organizational Change and IT | 4 SH |
| INFO 7290 | Data Warehousing and Integration | 4 SH |
| INFO 7330 | Information Systems for Healthcare-Services Delivery | 4 SH |
| INFO 7390 | Advances in Data Sciences and Architecture | 4 SH |
| MGSC 6206 | Management of Service and Manufacturing Operations | 3 SH |
| OR 7230 | Probabilistic Operation Research | 4 SH |
| OR 7235 | Inventory Theory | 4 SH |
| OR 7240 | Integer and Nonlinear Optimization | 4 SH |
| OR 7245 | Network Analysis and Advanced Optimization | 4 SH |
| OR 7250 | Multi-Criteria Decision Making | 4 SH |
| OR 7310 | Logistics, Warehousing, and Scheduling | 4 SH |
| SCHM 6210 | Supply Chain Management | 3 SH |
| SCHM 6211 | The Transportation Industries | 3 SH |
| SCHM 6212 | Executive Roundtable in Supply Chain Management | 3 SH |
| SCHM 6213 | Global Supply Chain Management | 3 SH |
| SCHM 6215 | IT Applications in Supply Chain Management | 3 SH |
| TECE 6200 | Innovation and Entrepreneurial Growth | 3 SH |
| TECE 6222 | Emerging and Disruptive Technologies | 3 SH |
| TECE 6230 | Entrepreneurial Marketing and Selling | 3 SH |
| TECE 6340 | The Technical Entrepreneur as Leader | 3 SH |
| TECE 6250 | Lean Design and Development | 3 SH |
| TECE 6300 | Managing a Technology-Based Business | 3 SH |
| TELE 5310 | Fundamentals of Communication Systems | 4 SH |
| TELE 5330 | Data Networking | 4 SH |

PROJECT

| | | |
|---|---|---|
| EMGT 7945 | Master's Project | 4 SH |

***Thesis Option***

ELECTIVES

Complete two of the following courses (8 semester hours):

| | | |
|---|---|---|
| CSYE 6200 | Concepts of Object-Oriented Design | 4 SH |
| CSYE 6210 | Component Software Development | 4 SH |
| CSYE 6220 | Enterprise Software Design | 4 SH |
| CSYE 7230 | Software Engineering | 4 SH |
| CSYE 7270 | Building Virtual Environments | 4 SH |
| CSYE 7280 | Advanced User Experience Design and Testing | 4 SH |
| ENSY 5000 | Fundamentals of Energy System Integration | 4 SH |
| EMGT 5300 | Engineering/Organizational Psychology | 4 SH |
| EMGT 6305 | Financial Management for Engineers | 4 SH |
| EMGT 7978 | Independent Study | 1 to 4 SH |
| ENTR 6200 | Enterprise Growth and Innovation | 3 SH |
| ENTR 6212 | Business Planning for New Ventures | 3 SH |
| ENTR 6218 | Business Model Design and Innovation | 3 SH |

| | | |
|---|---|---|
| ENTR 6219 | Financing Ventures from Early Stage to Exit | 3 SH |
| GE 5100 | Product Development for Engineers | 4 SH |
| IE 5400 | Healthcare Systems Modeling and Analysis | 4 SH |
| IE 5500 | Systems Engineering in Public Programs | 4 SH |
| IE 5620 | Mass Customization | 4 SH |
| IE 7200 | Supply Chain Engineering | 4 SH |
| IE 7210 | Production System | 4 SH |
| IE 7255 | Manufacturing Processes | 4 SH |
| IE 7270 | Intelligent Manufacturing | 4 SH |
| IE 7275 | Data Mining in Engineering | 4 SH |
| IE 7280 | Statistical Methods in Engineering | 4 SH |
| IE 7285 | Statistical Quality Control | 4 SH |
| IE 7290 | Reliability Analysis and Risk Assessment | 4 SH |
| IE 7315 | Human Factors Engineering | 4 SH |
| IE 7615 | Neural Networks in Engineering | 4 SH |
| INFO 6210 | Data Management and Database Design | 4 SH |
| INFO 6215 | Business Analysis and Information Engineering | 4 SH |
| INFO 7245 | Agile Software Development | 4 SH |
| INFO 7260 | Business Process Engineering | 4 SH |
| INFO 7285 | Organizational Change and IT | 4 SH |
| INFO 7290 | Data Warehousing and Integration | 4 SH |
| INFO 7330 | Information Systems for Healthcare-Services Delivery | 4 SH |
| INFO 7390 | Advances in Data Sciences and Architecture | 4 SH |
| MGSC 6206 | Management of Service and Manufacturing Operations | 3 SH |
| OR 7230 | Probabilistic Operation Research | 4 SH |
| OR 7235 | Inventory Theory | 4 SH |
| OR 7240 | Integer and Nonlinear Optimization | 4 SH |
| OR 7245 | Network Analysis and Advanced Optimization | 4 SH |
| OR 7250 | Multi-Criteria Decision Making | 4 SH |
| OR 7310 | Logistics, Warehousing, and Scheduling | 4 SH |
| SCHM 6210 | Supply Chain Management | 3 SH |
| SCHM 6211 | The Transportation Industries | 3 SH |
| SCHM 6212 | Executive Roundtable in Supply Chain Management | 3 SH |
| SCHM 6213 | Global Supply Chain Management | 3 SH |
| SCHM 6215 | IT Applications in Supply Chain Management | 3 SH |
| TECE 6200 | Innovation and Entrepreneurial Growth | 3 SH |
| TECE 6222 | Emerging and Disruptive Technologies | 3 SH |
| TECE 6230 | Entrepreneurial Marketing and Selling | 3 SH |
| TECE 6340 | The Technical Entrepreneur as Leader | 3 SH |
| TECE 6250 | Lean Design and Development | 3 SH |
| TECE 6300 | Managing a Technology-Based Business | 3 SH |
| TELE 5310 | Fundamentals of Communication Systems | 4 SH |
| TELE 5330 | Data Networking | 4 SH |

THESIS

Requires 8 semester hours:

| | | |
|---|---|---|
| EMGT 7990 | Thesis | 1 to 8 SH |

***Engineering Leadership Option***

Students completing this option receive the graduate certificate in engineering leadership in addition to the master's degree.

LEADERSHIP

| | | |
|---|---|---|
| ENLR 5121 | Engineering Leadership 1 | 2 SH |
| ENLR 5122 | Engineering Leadership 2 | 2 SH |

FOUNDATIONS

| | | |
|---|---|---|
| ENLR 5131 | Scientific Foundations of Engineering 1 | 2 SH |
| ENLR 5132 | Scientific Foundations of Engineering 2 | 2 SH |

PROJECT

| | | |
|---|---|---|
| ENLR 7440 | Engineering Leadership Challenge Project 1 | 4 SH |
| ENLR 7442 | Engineering Leadership Challenge Project 2 | 4 SH |

***Hybrid/Online Option***

Complete four of the following courses:

| | | |
|---|---|---|
| CIVE 5270 | Environmental Protection and Management | 4 SH |
| EMGT 5300 | Engineering/Organizational Psychology | 4 SH |
| EMGT 6305 | Financial Management for Engineers | 4 SH |
| ENSY 5000 | Fundamentals of Energy System Integration | 4 SH |
| IE 5620 | Mass Customization | 4 SH |
| IE 7200 | Supply Chain Engineering | 4 SH |
| IE 7280 | Statistical Methods in Engineering | 4 SH |
| IE 7285 | Statistical Quality Control | 4 SH |
| IE 7315 | Human Factors Engineering | 4 SH |
| INFO 6210 | Data Management and Database Design | 4 SH |
| INFO 7245 | Agile Software Development | 4 SH |
| ME 5645 | Environmental Issues in Manufacturing and Product Use | 4 SH |
| OR 7230 | Probabilistic Operation Research | 4 SH |
| OR 7310 | Logistics, Warehousing, and Scheduling | 4 SH |

## PROGRAM CREDIT/GPA REQUIREMENTS

32 total semester hours required

Minimum 3.000 GPA required

## INDUSTRIAL ENGINEERING

**www.mie.neu.edu/mie/degrees-programs/graduate-studies**

HANCHEN HUANG, PHD
*Professor and Chair*
NADER JALILI, PHD
*Professor and Associate Chair for Graduate Studies and Research*

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The Department of Mechanical and Industrial Engineering (MIE) offers MS and PhD degree programs in industrial engineering.

## Master of Science Degrees

### REQUIREMENTS

To be eligible for admission to any of the Master of Science (MS) degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, or 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 GPA of 3.000. Students may pursue any program either on a full- or part-time basis; however, certain restrictions may apply as described below.

Students who receive financial support from the university in the form of a research, teaching, or tuition assistantship must complete an 8-semester-hour thesis. Other students may choose to complete a thesis, project, or pursue their degree on a course-work-only (also known as nonthesis) basis. Students who complete the thesis option must make a presentation at a thesis defense before approval by the department.

### SPECIAL COURSE REQUIREMENTS

All MIE MS students in thesis or project options (excluding MS students in engineering management and the Gordon Engineering Leadership programs), who have entered in or after the fall 2012 semester, must complete MEIE 6800 Technical Writing and MEIE 6850 Research Seminar in Mechanical and Industrial Engineering, preferably during their first year of full-time study. If appropriate, part-time students may petition the graduate affairs committee to waive these requirements. Students in combined BS/MS programs who entered in or after fall 2014 must take MEIE 6850 as part of their course work requirement, while MEIE 6800 is optional for these students.

All MIE graduate students are also required to complete a brief online session on Responsible Conduct of Research and Plagiarism in one of these courses. The outcome of the online session will be filed with the student's records.

### ACADEMIC AND RESEARCH ADVISORS

All nonthesis students are advised by the academic advisor designated for their respective concentration or program. Thesis-option MS students must find a research advisor within their first year of study and may have thesis reader(s) at the discretion of their research advisor. The research advisor must be a full-time faculty or affiliated member of the MIE department; otherwise, a petition must be filed and approved by the MIE graduate affairs committee. If the research advisor is outside the MIE department, a faculty member with 50 percent or more appointment in the MIE department must be chosen as co-advisor. Thesis-option students are advised by the academic advisor of their concentration before they select their research advisor(s).

### 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 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 signed Plan of Study (PS) to the department before enrolling in second-semester courses. This form helps the students manage their course work as well as helps the department plan for offering the requested courses. The PS form may be modified at any time as the students proceed in their degree programs. However, requests for changes in PS must be processed before the requested change actually takes place. A revised PS form must also be approved and signed by the academic advisor.

Industrial engineering students must select all required course work, typically consisting of six or more courses, from the list below. Each student's academic advisor must approve all courses prior to registration. Students may not use any courses taken without the approval of the academic advisor toward the 32-semester-hour minimum requirement. However, students may petition the MIE graduate affairs committee to substitute no more than one (4-semester-hour) graduate-level course from outside the approved list of electives. This may include independent study. An independent study must be approved by the research advisor (for thesis option) or academic advisor (for nonthesis option). The petition must clearly state the reason for taking the course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

| Degree Requirements | Course Work Only | With Project | With Thesis |
|---|---|---|---|
| Required core courses | 16 SH | 16 SH | 16 SH |
| Elective courses | 16 SH | 12 SH | 8 SH |
| MEIE 6800 Technical Writing | N/A | 0 SH | 0 SH |
| MEIE 6850 Research Seminar in Mechanical and Industrial Engineering | N/A | 0 SH | 0 SH |
| Project/thesis | | 4 SH | 8 SH |
| **Minimum semester hours required** | **32 SH** | **32 SH** | **32 SH** |

## MSIE—Master of Science in Industrial Engineering

Complete all courses and requirements listed below unless otherwise indicated.

### GENERAL REQUIREMENTS

***General Requirements***

| | | |
|---|---|---|
| IE 6200 | Engineering Probability and Statistics | 4 SH |
| OR 6205 | Deterministics Operations Research | 4 SH |

***Core Requirements***

Complete two of the following courses:

| | | |
|---|---|---|
| IE 5400 | Healthcare Systems Modeling and Analysis | 4 SH |
| IE 7200 | Supply Chain Engineering | 4 SH |
| IE 7215 | Simulation Analysis | 4 SH |
| IE 7315 | Human Factors Engineering | 4 SH |
| IE 7275 | Data Mining in Engineering | 4 SH |

### OPTIONS

Complete one of the following options:

***Course Work Option***

Complete 16 semester hours from the following courses:

| | | |
|---|---|---|
| CSYE 6200 | Concepts of Object-Oriented Design | 4 SH |
| CSYE 6205 | Concepts of Object-Oriented Design with C++ | 4 SH |
| CSYE 6210 | Component Software Development | 4 SH |
| CSYE 6220 | Enterprise Software Design | 4 SH |
| CSYE 7230 | Software Engineering | 4 SH |
| CSYE 7270 | Building Virtual Environments | 4 SH |
| CSYE 7280 | Advanced User Experience Design and Testing | 4 SH |
| EMGT 5220 | Engineering Project Management | 4 SH |
| EMGT 5300 | Engineering/Organizational Psychology | 4 SH |
| EMGT 6225 | Economic Decision Making | 4 SH |
| EMGT 6305 | Financial Management for Engineers | 4 SH |
| IE 5617 | Lean Concepts and Applications | 4 SH |
| IE 5620 | Mass Customization | 4 SH |
| IE 5630 | Biosensor and Human Behavior Measurement | 4 SH |
| IE 7255 | Manufacturing Processes | 4 SH |
| IE 7270 | Intelligent Manufacturing | 4 SH |
| IE 7275 | Data Mining in Engineering | 4 SH |
| IE 7280 | Statistical Methods in Engineering | 4 SH |
| IE 7285 | Statistical Quality Control | 4 SH |
| IE 7315 | Human Factors Engineering | 4 SH |
| IE 7290 | Reliability Analysis and Risk Assessment | 4 SH |
| OR 7230 | Probabilistic Operation Research | 4 SH |
| OR 7235 | Inventory Theory | 4 SH |
| OR 7240 | Integer and Nonlinear Optimization | 4 SH |
| OR 7245 | Network Analysis and Advanced Optimization | 4 SH |
| OR 7250 | Multi-Criteria Decision Making | 4 SH |
| OR 7260 | Constraint Programming | 4 SH |
| OR 7310 | Logistics, Warehousing, and Scheduling | 4 SH |

***Project Option***

PROJECT

| | | |
|---|---|---|
| IE 7945 | Master's Project | 4 SH |
| MEIE 6800 | Technical Writing Seminar | 0 SH |
| MEIE 6850 | Research Seminar in Mechanical and Industrial Engineering | 0 SH |

ELECTIVES

Complete three of the following courses:

| | | |
|---|---|---|
| CSYE 6200 | Concepts of Object-Oriented Design | 4 SH |
| CSYE 6205 | Concepts of Object-Oriented Design with C++ | 4 SH |
| CSYE 6210 | Component Software Development | 4 SH |
| CSYE 6220 | Enterprise Software Design | 4 SH |
| CSYE 7230 | Software Engineering | 4 SH |
| CSYE 7270 | Building Virtual Environments | 4 SH |
| CSYE 7280 | Advanced User Experience Design and Testing | 4 SH |
| EMGT 5220 | Engineering Project Management | 4 SH |
| EMGT 5300 | Engineering/Organizational Psychology | 4 SH |
| EMGT 6225 | Economic Decision Making | 4 SH |
| EMGT 6305 | Financial Management for Engineers | 4 SH |
| IE 5617 | Lean Concepts and Applications | 4 SH |
| IE 5620 | Mass Customization | 4 SH |
| IE 5630 | Biosensor and Human Behavior Measurement | 4 SH |
| IE 7255 | Manufacturing Processes | 4 SH |
| IE 7270 | Intelligent Manufacturing | 4 SH |
| IE 7275 | Data Mining in Engineering | 4 SH |
| IE 7280 | Statistical Methods in Engineering | 4 SH |
| IE 7285 | Statistical Quality Control | 4 SH |
| IE 7315 | Human Factors Engineering | 4 SH |
| IE 7290 | Reliability Analysis and Risk Assessment | 4 SH |
| OR 7230 | Probabilistic Operation Research | 4 SH |
| OR 7235 | Inventory Theory | 4 SH |
| OR 7240 | Integer and Nonlinear Optimization | 4 SH |

| | | |
|---|---|---|
| OR 7245 | Network Analysis and Advanced Optimization | 4 SH |
| OR 7250 | Multi-Criteria Decision Making | 4 SH |
| OR 7260 | Constraint Programming | 4 SH |
| OR 7310 | Logistics, Warehousing, and Scheduling | 4 SH |

***Thesis Option***

THESIS

Requires 8 semester hours:

| | | |
|---|---|---|
| IE 7990 | Thesis | 1 to 8 SH |
| MEIE 6800 | Technical Writing Seminar | 0 SH |
| MEIE 6850 | Research Seminar in Mechanical and Industrial Engineering | 0 SH |

ELECTIVES

Complete two of the following courses:

| | | |
|---|---|---|
| CSYE 6200 | Concepts of Object-Oriented Design | 4 SH |
| CSYE 6205 | Concepts of Object-Oriented Design with C++ | 4 SH |
| CSYE 6210 | Component Software Development | 4 SH |
| CSYE 6220 | Enterprise Software Design | 4 SH |
| CSYE 7230 | Software Engineering | 4 SH |
| CSYE 7270 | Building Virtual Environments | 4 SH |
| CSYE 7280 | Advanced User Experience Design and Testing | 4 SH |
| EMGT 5220 | Engineering Project Management | 4 SH |
| EMGT 5300 | Engineering/Organizational Psychology | 4 SH |
| EMGT 6225 | Economic Decision Making | 4 SH |
| EMGT 6305 | Financial Management for Engineers | 4 SH |
| IE 5617 | Lean Concepts and Applications | 4 SH |
| IE 5620 | Mass Customization | 4 SH |
| IE 5630 | Biosensor and Human Behavior Measurement | 4 SH |
| IE 7255 | Manufacturing Processes | 4 SH |
| IE 7270 | Intelligent Manufacturing | 4 SH |
| IE 7275 | Data Mining in Engineering | 4 SH |
| IE 7280 | Statistical Methods in Engineering | 4 SH |
| IE 7285 | Statistical Quality Control | 4 SH |
| IE 7315 | Human Factors Engineering | 4 SH |
| IE 7290 | Reliability Analysis and Risk Assessment | 4 SH |
| OR 7230 | Probabilistic Operation Research | 4 SH |
| OR 7235 | Inventory Theory | 4 SH |
| OR 7240 | Integer and Nonlinear Optimization | 4 SH |
| OR 7245 | Network Analysis and Advanced Optimization | 4 SH |
| OR 7250 | Multi-Criteria Decision Making | 4 SH |
| OR 7260 | Constraint Programming | 4 SH |
| OR 7310 | Logistics, Warehousing, and Scheduling | 4 SH |

***Engineering Leadership Option***

Students completing this option receive the graduate certificate in engineering leadership in addition to the master's degree.

LEADERSHIP

| | | |
|---|---|---|
| ENLR 5121 | Engineering Leadership 1 | 2 SH |
| ENLR 5122 | Engineering Leadership 2 | 2 SH |

FOUNDATIONS

| | | |
|---|---|---|
| ENLR 5131 | Scientific Foundations of Engineering 1 | 2 SH |
| ENLR 5132 | Scientific Foundations of Engineering 2 | 2 SH |

PROJECT

| | | |
|---|---|---|
| IE 7440 | Industrial Engineering Leadership Challenge Project 1 | 4 SH |
| IE 7442 | Industrial Engineering Leadership Challenge Project 2 | 4 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

32 total semester hours required

Minimum 3.000 GPA required

## Doctor of Philosophy

### REQUIREMENTS

The PhD is awarded to students who demonstrate high academic achievement and research competence in the fields of mechanical or industrial engineering. To earn a PhD, a student must complete an approved, rigorous program of advanced course work and submit and defend an original dissertation of independent research. The mechanical and industrial engineering (MIE) department 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 or after earning a suitable master's degree. 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) as well as all the required course work.

### 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 faculty or affiliated member of the MIE department; otherwise, a petition must be filed and approved by the MIE graduate affairs committee. If the research advisor is outside the MIE department, a faculty member with 50 percent or more appointments in the MIE department must be chosen as co-advisor. Students are advised by the academic advisor of their discipline before they select their research advisor(s).

### COURSE REQUIREMENTS AND PLAN OF STUDY

A typical program of study includes at least 48 semester hours of course work beyond the bachelor's degree or 24 semester hours of course work beyond the master's degree.

A minor field of study is also required, comprising at least 8 semester hours of course work in a discipline other than that in which the candidate is concentrating (and that may also be

taken outside the MIE department). Doctoral candidates must attain a minimum 3.000 GPA in minor area course work.

All MIE PhD students, who have entered in or after the fall 2012 semester, must complete MEIE 6800 Technical Writing and MEIE 6850 Research Seminar in Mechanical and Industrial Engineering, preferably during their first year of full-time study. If appropriate, part-time students may petition the graduate affairs committee to waive these requirements.

All MIE graduate students are also required to complete a brief online session on Responsible Conduct of Research and Plagiarism in one of these courses. The outcome of the online session will be filed with the student's record.

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 area examining committee, who will add the program of study to the student's record upon admission to doctoral candidacy.

Students may petition the MIE graduate affairs committee to substitute no more than one (4-semester-hour) graduate-level course from outside the approved program. This may include independent study. 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 preliminary exam and an oral area exam) as well as all the required course work.

## DOCTORAL QUALIFYING EXAMINATIONS

The doctoral qualifying examinations consist of two parts: a written preliminary examination and an oral area examination.

### *Written Preliminary Examination*

All doctoral students who hold a master's degree must take the preliminary exam no later than the first time that it is offered after their first academic year of study. Those admitted directly with a bachelor's degree must take the preliminary exam no later than the first time that it is offered after their first two years of study. The MIE department offers the written preliminary exam twice during each academic year, in the morning and afternoon of Thursday and Friday of the first week of each regular semester. The objective of this exam is to test the student's fundamental knowledge of core subjects in a specific engineering discipline and to test skill in implementing the methods of inquiry in that field. Each student's research advisor must approve the student's list of selected exams. A complete list of these exams along with detailed policies and procedures of taking these exams are provided at the MIE department graduate website at: www.mie.neu.edu/mie/degrees-programs/graduate-studies. Students may find further guidance in the *Doctoral Qualifying Examination Handbook*, as prepared and distributed by the MIE graduate affairs committee and accessible from the above website. Students should also consult extensively with their research advisor regarding all aspects of the qualifying exams. The MIE graduate affairs committee will review all students' performance in the preliminary exam. Upon successful completion of the preliminary exam, the student is prepared to develop a research plan and literature survey. However, in some cases, the MIE graduate affairs committee may recommend additional course work in any subject(s) where the preliminary exam indicated some weakness.

These students, in consultation with their research advisor, must form a dissertation committee no later than six months after successfully passing their PhD preliminary exams. The dissertation committee must be comprised of at least three members, two or more of which must be full-time MIE faculty members.

If the student fails the preliminary exam, he or she will not be permitted to continue as a doctoral student in any of the programs offered by the MIE department. The student may continue to fulfill the requirements for an MS degree in industrial engineering (IE), mechanical engineering (ME), or operations research (OR).

The results of the preliminary exam and any recommended course work 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 on their first attempt. Only the student's research advisor may request the MIE graduate affairs committee to re-evaluate a student's failed exams using the appeal form provided on the MIE department graduate website.

### *Oral Area Examination*

Students must take the area examination no more than 12 months after successfully completing the preliminary exam. The area exam, administered in a single session, is comprised of two parts: (i) an oral presentation by the student of a written literature survey and initial plan of research (independently developed results are not required at this stage); and (ii) an oral exam of the student covering topics specifically related to the student's field of research.

The objective of the area exam is to assess the student's potential to perform independent research in the chosen field of specialization. The student's dissertation committee will invite any additional faculty deemed appropriate to that field; this area examining committee will then conduct the area exam. Each student's dissertation committee must comprise at least three members; two of those three must be full-time MIE faculty members.

The area examining committee may either recommend passing or may allow the student a single additional opportunity to complete the area exam successfully. Students not passing after a second attempt at the area exam will not be permitted to continue as a doctoral student in any of the PhD programs offered by the MIE department. The student may continue to fulfill the requirements for an MS degree in industrial engineering (IE), mechanical engineering (ME), or operations research (OR). The committee's recommendation, the literature survey, and the initial research plan are added to the student's record upon admission to doctoral candidacy.

### DISSERTATION COURSE REQUIREMENTS

Upon successful completion of the doctoral qualifying examinations (both written preliminary and oral area exams) as well as all the required course work, the doctoral candidate, in consultation with his or her research advisor, must register in two consecutive semesters (excluding the summer term) for IE 9990 Dissertation. Upon completion of this sequence, the student must then register for IE 9996 Dissertation Continuation in every semester (excluding the summer term) until the dissertation is completed. Students may not register for IE 9996 until they fulfill the two-semester sequence. 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, IE 8960 Doctoral Candidacy Preparation, can be taken if needed to fulfill full-time course registration. The course is an individual instruction course, billed at 1 semester hour, and graded S or U. There is no course content, and students must register in a section with their research or academic advisor 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 in a form appropriate for formal presentation and after completion of all other requirements for the PhD, including all course work 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 themselves for an additional final oral exam.

### 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 the dissertation.

## PhD in Industrial Engineering—Advanced 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

### GENERAL REQUIREMENTS

***Seminars***

| | | |
|---|---|---|
| MEIE 6800 | Technical Writing Seminar | 0 SH |
| MEIE 6850 | Research Seminar in Mechanical and Industrial Engineering | 0 SH |

***Approved Course Work***

Requires 24 semester hours. Consult your faculty advisor for acceptable courses.

### DISSERTATION COURSES

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| IE 9990 | Dissertation | 0 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

24 total semester hours required
Minimum 3.000 GPA required

## PhD in Industrial Engineering—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

### GENERAL REQUIREMENTS

***Seminars***

| | | |
|---|---|---|
| MEIE 6800 | Technical Writing Seminar | 0 SH |
| MEIE 6850 | Research Seminar in Mechanical and Industrial Engineering | 0 SH |

***Approved Course Work***

Requires 48 semester hours. Consult your faculty advisor for acceptable courses.

### DISSERTATION COURSES

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| IE 9990 | Dissertation | 0 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

48 total semester hours required
Minimum 3.000 GPA required

## INFORMATION ASSURANCE

**www.ccs.neu.edu/graduate/degree-programs/ph-d-in-information-assurance**

202 West Village H
617.373.2462
Bryan Lackaye, *Assistant Dean of Graduate Programs, College of Computer Science*, phd-ia@lists.ccs.neu.edu

The College of Computer and Information Science offers a Doctor of Philosophy in Information Assurance in conjunction with the College of Engineering and the College of Social Sciences and Humanities. The PhD in Information Assurance program is designed for both students with a strong background in a technical field and those with nontechnical backgrounds and a strong desire to pursue interdisciplinary work in areas related to information assurance. Applicants are expected to have a minimum 3.000 undergraduate GPA.

Students who do not have the necessary technical background may be required to take courses such as Fundamentals of Information Assurance, Network and Systems, and Fundamentals of Computer Engineering to prepare for the program.

The PhD in Information Assurance 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 have the option of obtaining an MS degree from one of the departments participating in the program. To do so, they must meet all of the department's degree requirements.

Students who enter the program with a master's degree will be required to complete 16 semester credit hours beyond the master's degree. They also must complete the required core courses.

For detailed program requirements, see the Information Assurance entry in the College of Computer and Information Science on page 89.

## INFORMATION SYSTEMS

**www.coe.neu.edu/degrees/master-science-information-systems**

KAL BUGRARA, PHD
*Program Director*

130 Snell Engineering
617.373.4448
616.373.2501 (fax)
Kal Bugrara, PhD, *Program Director*, kmb@coe.neu.edu

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 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. In addition to the general requirements, the program offers multiple tracks (20 semester hours):

- Track 1: Web Engineering and Development
- Track 2: Data Architecture and Engineering
- Track 3: Application-Level Security Analysis and Engineering
- Track 4: Business Process Engineering
- Track 5: Software Project Planning and Management
- Track 6: Information Systems Auditing and Compliance
- Track 7: Enterprise Architecture and Governance
- Track 8: Engineering Clinical Information Systems

### MSIS—Master of Science in Information Systems

Complete all courses and requirements listed below unless otherwise indicated.

#### GENERAL REQUIREMENTS

***Required Course***

| | | |
|---|---|---|
| INFO 5100 | Application Engineering and Development | 4 SH |

## OPTIONS

Complete one of the following options:

***Course Work Option***

Complete seven of the following courses (28 semester hours):

| | | |
|---|---|---|
| CSYE 6200 | Concepts of Object-Oriented Design | 4 SH |
| CSYE 6210 | Component Software Development | 4 SH |
| CSYE 6220 | Enterprise Software Design | 4 SH |
| CSYE 6225 | Network Structures and Cloud Computing | 4 SH |
| CSYE 6230 | Operating Systems | 4 SH |
| CSYE 6XXX | (pending approval) | |
| CSYE 7215 | Foundations of Parallel, Concurrent, and Multithreaded Programming | 4 SH |
| CSYE 7225 | Mobile Wireless Computing | 4 SH |
| CSYE 7230 | Software Engineering | 4 SH |
| CSYE 7280 | User Experience Design and Testing | 4 SH |
| CSYE 7374 | Special Topics in Computer Systems Engineering | 4 SH |
| INFO 5000 | C Programming and Development | 4 SH |
| INFO 6150 | Web Design and User Experience Engineering | 4 SH |
| INFO 6205 | Program Structure and Algorithms | 4 SH |
| INFO 6210 | Data Management and Database Design | 4 SH |
| INFO 6215 | Business Analysis and Information Engineering | 4 SH |
| INFO 6240 | C++ Object-Oriented Design | 4 SH |
| INFO 6245 | Planning and Managing Information Systems Development | 4 SH |
| INFO 6250 | Web Development Tools and Methods | 4 SH |
| INFO 6255 | Software Quality Control and Management | 4 SH |
| INFO 6260 | Business Process Engineering and Management | 4 SH |
| INFO 6350 | Smartphones-Based Web Development | 4 SH |
| INFO 6640 | People, Processes, and Products: Ethics for Engineers | 2 SH |
| INFO 6650 | People, Problems, and Patents: Basics of Intellectual Property | 2 SH |
| INFO 6660 | People, Problems, and Patents: Ethical Principles and Basics of Intellectual Property | 4 SH |
| INFO 7205 | Advanced Application Engineering and Development | 4 SH |
| INFO 7225 | Accounting and Budgetary Systems for Engineers | 4 SH |
| INFO 7245 | Agile Software Development | 4 SH |
| INFO 7250 | Engineering of Big-Data Systems | 4 SH |
| INFO 7260 | Business Process Engineering | 4 SH |
| INFO 7265 | Enterprise Systems Architecture and Engineering | 4 SH |
| INFO 7270 | PERL Programming | 4 SH |
| INFO 7275 | Advanced Database Management Systems | 4 SH |
| INFO 7280 | Model-Driven Architecture | 4 SH |
| INFO 7285 | Organizational Change and IT | 4 SH |
| INFO 7290 | Data Warehousing and Integration | 4 SH |
| INFO 7300 | Engineering Secure Software Systems | 4 SH |
| INFO 7305 | System Architecture and Technology Management | 4 SH |
| INFO 7310 | Introduction to Distributed Security | 4 SH |
| INFO 7315 | Web Services/Service-Oriented Architecture | 4 SH |
| INFO 7320 | Global Technology Outsourcing | 3 SH |
| INFO 7325 | Introduction to Information Technology Auditing | 4 SH |
| INFO 7330 | Information Systems for Healthcare-Services Delivery | 4 SH |
| INFO 7365 | Enterprise Architecture Planning and Management | 4 SH |
| INFO 7374 | Special Topics in Information Systems | 1 to 4 SH |
| INFO 7390 | Advances in Data Sciences and Architecture | 4 SH |
| INFO 7420 | Drug Development Processes and Information Systems Compliance | 4 SH |
| INFO 7978 | Independent Study | 1 to 4 SH |

***Engineering Leadership Option***

Students completing this option receive the graduate certificate in engineering leadership in addition to the master's degree.

| | | |
|---|---|---|
| LEADERSHIP | | |
| ENLR 5121 | Engineering Leadership 1 | 2 SH |
| ENLR 5122 | Engineering Leadership 2 | 2 SH |
| FOUNDATIONS | | |
| ENLR 5131 | Scientific Foundations of Engineering 1 | 2 SH |
| ENLR 5132 | Scientific Foundations of Engineering 2 | 2 SH |
| PROJECT | | |
| ENLR 7440 | Engineering Leadership Challenge Project 1 | 4 SH |
| ENLR 7442 | Engineering Leadership Challenge Project 2 | 4 SH |

ELECTIVES

Complete three of the following courses (12 semester hours):

| | | |
|---|---|---|
| CSYE 6200 | Concepts of Object-Oriented Design | 4 SH |
| CSYE 6210 | Component Software Development | 4 SH |
| CSYE 6220 | Enterprise Software Design | 4 SH |
| CSYE 6225 | Network Structures and Cloud Computing | 4 SH |
| CSYE 6230 | Operating Systems | 4 SH |
| CSYE 6XXX | (pending approval) | |
| CSYE 7215 | Foundations of Parallel, Concurrent, and Multithreaded Programming | 4 SH |
| CSYE 7225 | Mobile Wireless Computing | 4 SH |

| | | |
|---|---|---|
| CSYE 7230 | Software Engineering | 4 SH |
| CSYE 7280 | User Experience Design and Testing | 4 SH |
| CSYE 7374 | Special Topics in Computer Systems Engineering | 4 SH |
| INFO 5000 | C Programming and Development | 4 SH |
| INFO 6150 | Web Design and User Experience Engineering | 4 SH |
| INFO 6205 | Program Structure and Algorithms | 4 SH |
| INFO 6210 | Data Management and Database Design | 4 SH |
| INFO 6215 | Business Analysis and Information Engineering | 4 SH |
| INFO 6240 | C++ Object-Oriented Design | 4 SH |
| INFO 6245 | Planning and Managing Information Systems Development | 4 SH |
| INFO 6250 | Web Development Tools and Methods | 4 SH |
| INFO 6255 | Software Quality Control and Management | 4 SH |
| INFO 6260 | Business Process Engineering and Management | 4 SH |
| INFO 6350 | Smartphones-Based Web Development | 4 SH |
| INFO 6640 | People, Processes, and Products: Ethics for Engineers | 2 SH |
| INFO 6650 | People, Problems, and Patents: Basics of Intellectual Property | 2 SH |
| INFO 6660 | People, Problems, and Patents: Ethical Principles and Basics of Intellectual Property | 4 SH |
| INFO 7205 | Advanced Application Engineering and Development | 4 SH |
| INFO 7225 | Accounting and Budgetary Systems for Engineers | 4 SH |
| INFO 7245 | Agile Software Development | 4 SH |
| INFO 7250 | Engineering of Big-Data Systems | 4 SH |
| INFO 7260 | Business Process Engineering | 4 SH |
| INFO 7265 | Enterprise Systems Architecture and Engineering | 4 SH |
| INFO 7270 | PERL Programming | 4 SH |
| INFO 7275 | Advanced Database Management Systems | 4 SH |
| INFO 7280 | Model-Driven Architecture | 4 SH |
| INFO 7285 | Organizational Change and IT | 4 SH |
| INFO 7290 | Data Warehousing and Integration | 4 SH |
| INFO 7300 | Engineering Secure Software Systems | 4 SH |
| INFO 7305 | System Architecture and Technology Management | 4 SH |
| INFO 7310 | Introduction to Distributed Security | 4 SH |
| INFO 7315 | Web Services/Service-Oriented Architecture | 4 SH |
| INFO 7320 | Global Technology Outsourcing | 3 SH |
| INFO 7325 | Introduction to Information Technology Auditing | 4 SH |
| INFO 7330 | Information Systems for Healthcare-Services Delivery | 4 SH |
| INFO 7365 | Enterprise Architecture Planning and Management | 4 SH |
| INFO 7374 | Special Topics in Information Systems | 1 to 4 SH |
| INFO 7390 | Advances in Data Sciences and Architecture | 4 SH |
| INFO 7420 | Drug Development Processes and Information Systems Compliance | 4 SH |
| INFO 7978 | Independent Study | 1 to 4 SH |

## PROGRAM CREDIT/GPA REQUIREMENTS

32 total semester hours required
Minimum 3.000 GPA required

## INTERDISCIPLINARY ENGINEERING PHD PROGRAM

**www.coe.neu.edu/degrees/interdisciplinary-engineering**

SARA WADIA-FASCETTI, PHD
*Associate Dean for Research and Graduate Studies, Graduate School of Engineering*

130 Snell Engineering Center
617.373.2711
grad-eng@coe.neu.edu

The Graduate School of Engineering offers an interdisciplinary Doctor of Philosophy degree involving substantial work in two or more academic departments or disciplines. Those interested in this program of study must submit a detailed proposal of the areas of inquiry and research with their application for admission. Interdisciplinary study requires favorable recommendation by a sponsoring doctoral-degree-granting department and approval by authorized representatives of the graduate committees of the departments appropriate to the disciplines covered under the applicant's proposal. The sponsoring department serves as the student's registration department.

### Formation of Interdisciplinary Committee

Students admitted for interdisciplinary study must obtain the consent of a faculty advisor who will direct his or her doctoral dissertation. This advisor, who may or may not be a member of the registration department, will chair the student's interdisciplinary committee. The chair of the registration department, or his or her designee, will then appoint a second member to the committee. These two members will invite one or more additional members or request that the director of the Graduate School of Engineering do so. The committee must represent at least two academic departments or programs, and a majority of the committee members must represent doctoral-degree-granting departments. The chair of the registration department, or his or her designee, will notify the director of the Graduate School of Engineering of the membership of the committee as soon as arrangements are finalized.

### Duties of Interdisciplinary Committee

A member of the interdisciplinary committee who is also a member of the registration department will serve as the registration officer to approve course registration for the student. The registration officer will file a copy of the approved course registration with the other committee members and with the graduate committee of the registration department. The interdisciplinary committee is responsible for overseeing the completion of all requirements. The committee must also certify to the registration department and to the Graduate School of Engineering the completion of all requirements for the award of the doctoral degree.

The interdisciplinary committee must assure that the student's program represents standards comparable to those of the registration department and that the program is not so broad that it has inadequate depth in any area. The director of the Graduate School of Engineering may review a student's interdisciplinary program at any time to verify that the student meets program objectives.

# MECHANICAL ENGINEERING

**www.mie.neu.edu/mie/degrees-programs/graduate-studies**

HANCHEN HUANG, PHD
*Professor and Chair*
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The Department of Mechanical and Industrial Engineering (MIE) offers MS and PhD degree programs in mechanical engineering.

## Master of Science Degrees

### REQUIREMENTS

To be eligible for admission to any of the Master of Science (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 GPA of 3.000. Students may pursue any program either on a full- or part-time basis; however, certain restrictions may apply as described below.

Students who receive financial support from the university in the form of a research, teaching, or tuition assistantship must complete an 8-semester-hour thesis. Other students may choose to complete a thesis, project, or pursue their degree on a course-work-only (also known as nonthesis) basis. Students who complete the thesis option must make a presentation at a thesis defense before approval by the department.

### SPECIAL COURSE REQUIREMENTS

All MIE MS students in thesis or project options (excluding MS students in engineering management and Gordon Engineering Leadership programs), who have entered in or after the fall 2012 semester, must complete MEIE 6800 Technical Writing and MEIE 6850 Research Seminar in Mechanical and Industrial Engineering, preferably during their first year of full-time study. If appropriate, part-time students may petition the graduate affairs committee to waive these requirements. Students in combined BS/MS programs who entered in or after fall 2014 must take MEIE 6850 as part of their course work requirement, while MEIE 6800 is optional for these students.

All MIE graduate students are also required to complete a brief online session on Responsible Conduct of Research and Plagiarism in one of these courses. The outcome of the online session will be filed with the student's records

### ACADEMIC AND RESEARCH ADVISORS

All nonthesis students are advised by the academic advisor designated for their respective concentration or program. Thesis-option MS students must find a research advisor within their first year of study and may have thesis reader(s) at the discretion of their research advisor. The research advisor must be a full-time faculty or affiliated member of the MIE department; otherwise, a petition must be filed and approved by the MIE graduate affairs committee. If the research advisor is outside the MIE department, a faculty member with 50 percent or more appointments in the MIE department must be chosen as co-advisor. Thesis-option students are advised by the academic advisor of their concentration before they select their research advisor(s).

### 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 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 helps the students manage their course work as well as helps the department to plan for offering the requested courses. The PS form may be modified at any time as the students proceed in their degree programs. However, requests for changes in PS must be processed before the requested change actually takes place. A revised PS form must also be approved and signed.

Mechanical engineering students must select all required course work from the list below. A typical program consists of six or more mechanical engineering or materials engineering courses (courses with the ME or MATL subject code). Each student's academic advisor must approve all courses prior to registration. Students may not use any courses taken without the approval of the academic advisor toward the 32-semester-hour minimum requirement. However, students may petition the MIE graduate affairs committee to substitute no more than one (4-semester-hour) graduate-level course from outside the approved list of electives. This may include independent study. An independent study must be approved by the research advisor (for thesis option) and academic advisor (for nonthesis option). The petition must clearly state the reason for taking the course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

| Degree Requirements | Course Work Only | With Project | With Thesis |
|---|---|---|---|
| Required and elective courses | 32 SH | 28 SH | 24 SH |
| MEIE 6800 Technical Writing | N/A | 0 SH | 0 SH |
| MEIE 6850 Research Seminar in Mechanical and Industrial Engineering | N/A | 0 SH | 0 SH |
| Project/thesis | | 4 SH | 8 SH |
| **Minimum semester hours required** | **32 SH** | **32 SH** | **32 SH** |

The MIE department offers MS degree programs in one of the following concentrations:

- Material science and engineering
- Mechanics and design
- Mechatronics
- Thermofluids engineering
- Mechanical engineering with graduate certificate in engineering leadership

## MSME—Master of Science in Mechanical Engineering with Concentration in Mechanics

Complete all courses and requirements listed below unless otherwise indicated.

### GENERAL REQUIREMENTS

***Core***

| | | |
|---|---|---|
| ME 6200 | Mathematical Methods for Mechanical Engineers 1 | 4 SH |
| or ME 6201 | Mathematical Methods for Mechanical Engineers 2 | 4 SH |

***Mechanics***

Complete three of the following courses:

| | | |
|---|---|---|
| ME 5650 | Advanced Mechanics of Materials | 4 SH |
| ME 5655 | Dynamics and Mechanical Vibration | 4 SH |
| ME 5657 | Finite Element Method | 4 SH |
| ME 5659 | Control and Mechatronics | 4 SH |
| ME 7210 | Elasticity and Plasticity | 4 SH |

### OPTION

Complete one of the following options:

***Course Work Option***

Complete four courses (16 semester hours) in the following subject areas:

ME, MATL

***Thesis Option***

THESIS

Requires 8 semester hours:

| | | |
|---|---|---|
| ME 7990 | Thesis | 1 to 8 SH |
| MEIE 6800 | Technical Writing Seminar | 0 SH |
| MEIE 6850 | Research Seminar in Mechanical and Industrial Engineering | 0 SH |

ELECTIVES

Complete two courses (8 semester hours) in the following subject areas:

ME, MATL

***Project Option***

PROJECT

Requires 4 semester hours:

| | | |
|---|---|---|
| ME 7945 | (pending approval) | |
| MEIE 6800 | Technical Writing Seminar | 0 SH |
| MEIE 6850 | Research Seminar in Mechanical and Industrial Engineering | 0 SH |

ELECTIVES

Complete three courses (12 semester hours) in the following subject areas:

ME, MATL

***Engineering Leadership Option***

Students completing this option receive the graduate certificate in engineering leadership in addition to the master's degree.

LEADERSHIP

| | | |
|---|---|---|
| ENLR 5121 | Engineering Leadership 1 | 2 SH |
| ENLR 5122 | Engineering Leadership 2 | 2 SH |

FOUNDATIONS

| | | |
|---|---|---|
| ENLR 5131 | Scientific Foundations of Engineering 1 | 2 SH |
| ENLR 5132 | Scientific Foundations of Engineering 2 | 2 SH |

PROJECT

| | | |
|---|---|---|
| ME 7440 | Mechanical Engineering Leadership Challenge Project 1 | 4 SH |
| ME 7442 | Mechanical Engineering Leadership Challenge Project 2 | 4 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

32 total semester hours required

Minimum 3.000 GPA required

## MSME—Master of Science in Mechanical Engineering with Concentration in Thermofluids

Complete all courses and requirements listed below unless otherwise indicated.

### GENERAL REQUIREMENTS

***Required Courses***

| | | |
|---|---|---|
| ME 6200 | Mathematical Methods for Mechanical Engineers 1 | 4 SH |
| or ME 6201 | Mathematical Methods for Mechanical Engineers 2 | 4 SH |
| ME 7270 | General Thermodynamics | 4 SH |
| ME 7275 | Essentials of Fluid Dynamics | 4 SH |
| ME 7285 | Heat Conduction and Thermal Radiation | 4 SH |
| or ME 7290 | Convective Heat Transfer | 4 SH |

***Thermofluids Concentration Course***

Complete one of the following courses:

| | | |
|---|---|---|
| ME 5690 | Gas Turbine Combustion | 4 SH |
| ME 5695 | Aerodynamics | 4 SH |
| ME 7280 | Statistical Thermodynamics | 4 SH |
| ME 7295 | Multiscale Flow and Transport Phenomena | 4 SH |
| ME 7300 | Combustion and Air Pollution | 4 SH |
| ME 7305 | Fundamentals of Combustion | 4 SH |
| ME 7310 | Computational Fluid Dynamics with Heat Transfer | 4 SH |
| ME 7330 | Turbulent Flow | 4 SH |
| ME 7340 | Turbomachinery Design | 4 SH |

***Elective***

Complete one ME course or MATL course (4 semester hours).

## OPTIONS

Complete one of the following options:

***Course Work Option***

Complete two of the following courses:

| | | |
|---|---|---|
| ME 5690 | Gas Turbine Combustion | 4 SH |
| ME 5695 | Aerodynamics | 4 SH |
| ME 7280 | Statistical Thermodynamics | 4 SH |
| ME 7295 | Multiscale Flow and Transport Phenomena | 4 SH |
| ME 7300 | Combustion and Air Pollution | 4 SH |
| ME 7305 | Fundamentals of Combustion | 4 SH |
| ME 7310 | Computational Fluid Dynamics with Heat Transfer | 4 SH |
| ME 7330 | Turbulent Flow | 4 SH |
| ME 7340 | Turbomachinery Design | 4 SH |

***Thesis Option***

Requires 8 semester hours:

| | | |
|---|---|---|
| MEIE 6800 | Technical Writing Seminar | 0 SH |
| MEIE 6850 | Research Seminar in Mechanical and Industrial Engineering | 0 SH |
| ME 7990 | Thesis | 1 to 8 SH |

***Report Option***

Complete four of the following courses (8 semester hours).

MEIE 6800, MEIE 6850, and ME 7945 are required:

| | | |
|---|---|---|
| MEIE 6800 | Technical Writing Seminar | 0 SH |
| MEIE 6850 | Research Seminar in Mechanical and Industrial Engineering | 0 SH |
| ME 7945 | (pending approval) | |
| ME 5690 | Gas Turbine Combustion | 4 SH |
| ME 5695 | Aerodynamics | 4 SH |
| ME 7280 | Statistical Thermodynamics | 4 SH |
| ME 7295 | Multiscale Flow and Transport Phenomena | 4 SH |
| ME 7300 | Combustion and Air Pollution | 4 SH |
| ME 7305 | Fundamentals of Combustion | 4 SH |
| ME 7310 | Computational Fluid Dynamics with Heat Transfer | 4 SH |
| ME 7330 | Turbulent Flow | 4 SH |
| ME 7340 | Turbomachinery Design | 4 SH |

## PROGRAM CREDIT/GPA REQUIREMENTS

32 total semester hours required

Minimum 3.000 GPA required

# MSME—Master of Science in Mechanical Engineering with Concentration in Material Science Engineering

Complete all courses and requirements listed below unless otherwise indicated.

## OPTIONS

Complete one of the following options:

***Course Work Option***

MATERIAL SCIENCE

Complete four MATL courses (16 semester hours).

ELECTIVES

Complete four courses (16 semester hours) in the following subject areas: ME, MATL

***Thesis Option***

MATERIAL SCIENCE

Complete four MATL courses (16 semester hours).

SEMINAR

| | | |
|---|---|---|
| MEIE 6800 | Technical Writing Seminar | 0 SH |
| MEIE 6850 | Research Seminar in Mechanical and Industrial Engineering | 0 SH |

THESIS

Requires 8 semester hours:

| | | |
|---|---|---|
| ME 7990 | Thesis | 1 to 8 SH |

ELECTIVES

Complete two courses (8 semester hours) in the following subject areas: ME, MATL

***Project Option***

MATERIAL SCIENCE

Complete four MATL courses (16 semester hours).

SEMINAR

| | | |
|---|---|---|
| MEIE 6800 | Technical Writing Seminar | 0 SH |
| MEIE 6850 | Research Seminar in Mechanical and Industrial Engineering | 0 SH |

PROJECT

Requires 4 semester hours:

| | | |
|---|---|---|
| ME 7945 | (pending approval) | |

ELECTIVES

Complete three courses (12 semester hours) in the following subject areas:

ME, MATL

## PROGRAM CREDIT/GPA REQUIREMENTS

32 total semester hours required

Minimum 3.000 GPA required

## MSME—Master of Science in Mechanical Engineering with Concentration in Mechatronics Engineering

Complete all courses and requirements listed below unless otherwise indicated.

### GENERAL REQUIREMENTS

***Mathematics Competency***

| | | |
|---|---|---|
| ME 5657 | Finite Element Method | 4 SH |
| or ME 6200 | Mathematical Methods for Mechanical Engineers 1 | 4 SH |
| or ME 6201 | Mathematical Methods for Mechanical Engineers 2 | 4 SH |

***Mechanics Competency***

Requires 4 semester hours:

| | | |
|---|---|---|
| ME 5655 | Dynamics and Mechanical Vibration | 4 SH |
| or ME 5XXX | (pending approval) | |

***Mechatronics Concentration***

Requires three courses (12 semester hours):

| | | |
|---|---|---|
| ME 5659 | Control and Mechatronics | 4 SH |
| ME 5XXX | (pending approval) | |
| ME 5XXX | (pending approval) | |

***Electrical Competency***

| | | |
|---|---|---|
| EECE 5610 | Digital Control Systems | 4 SH |
| or EECE 5666 | Digital Signal Processing | 4 SH |

### OPTIONS

Complete one of the following options:

***Course Work Option***

Complete two of the following courses:

| | | |
|---|---|---|
| EECE 5606 | Micro- and Nanofabrication | 4 SH |
| ME 6260 | Introduction to Microelectromechanical Systems (MEMS) | 4 SH |
| ME 7374 | Special Topics in Mechanical Engineering | 4 SH |
| ME 7315 | Heat Transfer Processes in Microelectronic Devices | 4 SH |

***Engineering Project Option***

Requires two courses (8 semester hours):

| | | |
|---|---|---|
| MEIE 6800 | Technical Writing Seminar | 0 SH |
| MEIE 6850 | Research Seminar in Mechanical and Industrial Engineering | 0 SH |
| ME 7945 | (pending approval) | |

Also complete an additional ME elective course.

***Thesis Option***

Requires 8 semester hours:

| | | |
|---|---|---|
| ME 7990 | Thesis | 1 to 8 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

32 total semester hours required
Minimum 3.000 GPA required

## Doctor of Philosophy

### REQUIREMENTS

The PhD is awarded to students who demonstrate high academic achievement and research competence in the fields of mechanical or industrial engineering. To earn a PhD, a student must complete an approved, rigorous program of advanced course work and submit and defend an original dissertation of independent research. The mechanical and industrial engineering (MIE) department 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 or after earning a master's degree. 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) as well as all the required course work.

### 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 faculty or affiliated member of the MIE department; otherwise, a petition must be filed and approved by the MIE graduate affairs committee. If the research advisor is outside the MIE department, a faculty member with 50 percent or more appointments in the MIE department must be chosen as co-advisor. Students are advised by the academic advisor of their discipline before they select their research advisor(s).

### COURSE REQUIREMENTS AND PLAN OF STUDY

A typical program of study includes at least 48 semester hours of course work beyond the bachelor's degree or 24 semester hours of course work beyond the master's degree.

A minor field of study is also required, comprising at least 8 semester hours of course work in a discipline other than that in which the candidate is concentrating (and which may also be taken outside the MIE department). Doctoral candidates must attain a minimum 3.000 GPA in minor area course work.

All MIE PhD students, who have entered in or after the fall 2012 semester, must complete MEIE 6800 Technical Writing and MEIE 6850 Research Seminar in Mechanical and Industrial Engineering, preferably during their first year of full-time study. If appropriate, part-time students may petition the graduate affairs committee to waive these requirements.

All MIE graduate students are also required to complete a brief online session on Responsible Conduct of Research and Plagiarism in one of these courses. The outcome of the online session will be filed with the student's records.

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 area examining committee, who will add the program of study to the student's record upon admission to doctoral candidacy.

Students may petition the MIE graduate affairs committee to substitute no more than one (4-semester-hour) graduate-level course from outside the approved program. This may include independent study. 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 preliminary exam and an oral area exam) as well as all the required course work.

## DOCTORAL QUALIFYING EXAMINATIONS

The doctoral qualifying examinations consist of two parts: a written preliminary examination and an oral area examination.

***Written Preliminary Examination***

All doctoral students who hold a master's degree must take the preliminary exam no later than the first time that it is offered after their first academic year of study. Those admitted directly with a bachelor's degree must take the preliminary exam no later than the first time that it is offered after their first two years of study. The MIE department offers the written preliminary exam twice during each academic year, in the morning and afternoon of Thursday and Friday of the first week of each regular semester. The objective of this exam is to test the student's fundamental knowledge of core subjects in a specific engineering discipline and to test skill in implementing the methods of inquiry in that field. Each student's research advisor must approve the student's list of selected exams. A complete list of these exams, along with detailed policies and procedures of taking these exams, are provided on the MIE department graduate website at: www.mie.neu.edu/mie/degrees-programs/graduate-studies. Students may find further guidance in the *Doctoral Qualifying Examination Handbook*, as prepared and distributed by the MIE graduate affairs committee and accessible from the above website. Students should also consult extensively with their research advisor regarding all aspects of the qualifying exams. The MIE graduate affairs committee will review all students' performance in the preliminary exam.

Upon successful completion of the preliminary exam, the student is prepared to develop a research plan and literature survey. However, in some cases, the MIE graduate affairs committee may recommend additional course work in any subject(s) where the preliminary exam indicated some weakness.

These students, in consultation with their research advisor, must form a dissertation committee no later than six months after successfully passing their PhD preliminary exams. The dissertation committee must be comprised of at least three members, two or more of which must be full-time MIE faculty members.

If the student fails the preliminary exam, he or she will not be permitted to continue as a doctoral student in any of the programs offered by the MIE department. The student may continue to fulfill the requirements for an MS degree in industrial engineering (IE), mechanical engineering (ME), or operations research (OR).

The results of the preliminary exam and any recommended course work 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 on their first attempt. Only the student's research advisor may request the MIE graduate affairs committee to re-evaluate the student's failed exams using the appeal form provided on the MIE department graduate website.

***Oral Area Examination***

Students must take the area examination no more than 12 months after successfully completing the preliminary exam. The area exam, administered in a single setting, comprises of two parts: (i) an oral presentation by the student of a written literature survey and initial plan of research (independently developed results are not required at this stage); and (ii) an oral exam of the student covering topics specifically related to the student's field of research.

The objective of the area exam is to assess the student's potential to perform independent research in the chosen field of specialization. The student's dissertation committee will invite any additional faculty deemed appropriate to that field; this area examining committee will then conduct the area exam. Each student's dissertation committee must comprise at least three members; two of those three must be full-time MIE faculty members.

The area examining committee may either recommend passing or may allow the student a single additional opportunity to complete the area exam successfully. Students not passing after a second attempt at the area exam will not be permitted to continue as a doctoral student in any of the PhD programs offered by the MIE department. The student may continue to fulfill the requirements for an MS degree in industrial engineering (IE), mechanical engineering (ME), or operations research (OR). The committee's recommendation, the literature survey, and the initial research plan are added to the student's record upon admission to doctoral candidacy.

## DISSERTATION COURSE REQUIREMENTS

Upon successful completion of the doctoral qualifying examinations (both written preliminary and oral area exams) as well as all the required course work, the doctoral candidate, in consultation with his or her research advisor, must register in two consecutive semesters (excluding the summer term) for ME 9990 Dissertation. Upon completion of this sequence, the student must then register for ME 9996 Dissertation Continuation in every semester (excluding the summer term) until the dissertation is completed. Students may not register for ME 9996 until they fulfill the two-semester sequence.

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, ME 8960 Doctoral Candidacy Preparation, can be taken if needed to fulfill full-time course registration. The course is an individual instruction course, billed at 1 semester hour, and graded S or U.

There is no course content, and students must register in a section with their research or academic advisor 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 in a form appropriate for formal presentation and after completion of all other requirements for the PhD, including all course work 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 themselves for an additional final oral exam.

### 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 the dissertation.

## PhD in Mechanical Engineering—Advanced 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

### GENERAL REQUIREMENTS

***Seminars***

| | | |
|---|---|---|
| MEIE 6800 | Technical Writing Seminar | 0 SH |
| MEIE 6850 | Research Seminar in Mechanical and Industrial Engineering | 0 SH |

***Approved Course Work***

Requires 24 semester hours. Consult your faculty advisor for acceptable courses.

### DISSERTATION COURSES

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| ME 9990 | Dissertation | 0 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

24 total semester hours required
Minimum 3.000 GPA required

## PhD in Mechanical Engineering—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

### GENERAL REQUIREMENTS

***Seminars***

| | | |
|---|---|---|
| MEIE 6800 | Technical Writing Seminar | 0 SH |
| MEIE 6850 | Research Seminar in Mechanical and Industrial Engineering | 0 SH |

***Approved Course Work***

Requires 48 semester hours. Consult your faculty advisor for acceptable courses.

### DISSERTATION COURSES

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| ME 9990 | Dissertation | 0 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

48 total semester hours required
Minimum 3.000 GPA required

# OPERATIONS RESEARCH

**www.coe.neu.edu/degrees/interdisciplinary-engineering**

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Operations research (OR) deals with the application of scientific methods to decision making. Students have an opportunity to learn how to develop and solve mathematical and computer models of systems using optimization and statistical methods. OR graduates work in a wide variety of fields, such as transportation, supply chain operations, communications and computer operations, manufacturing, finance, and healthcare. The OR program is offered jointly by the Department of Mechanical and Industrial Engineering (MIE) and the Department of Mathematics, thus achieving a unique balance of theory and application.

## Master of Science Degrees

### REQUIREMENTS

To be eligible for admission to any of the Master of Science (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 GPA of 3.000. Students may pursue any program either on a full- or part-time basis; however, certain restrictions may apply as described below.

Students who receive financial support from the university in the form of a research, teaching, or tuition assistantship must complete an 8-semester-hour thesis. Other students may choose to complete a thesis, project, or pursue their degree on a course-work-only (also known as nonthesis) basis. Students who complete the thesis option must make a presentation at a thesis defense before approval by the department.

### SPECIAL COURSE REQUIREMENTS

All MIE MS students in thesis or project options (excluding MS students in engineering management and Gordon Engineering Leadership programs), who have entered in or after the fall 2012 semester, must complete MEIE 6800 Technical Writing and MEIE 6850 Research Seminar in Mechanical and Industrial Engineering, preferably during their first year of full-time study. If appropriate, part-time students may petition the graduate affairs committee to waive these requirements. Students in combined BS/MS programs who entered in or after fall 2014 must take MEIE 6850 as part of their course work requirement, while MEIE 6800 is optional for these students.

All MIE graduate students are also required to complete a brief online session on Responsible Conduct of Research and Plagiarism in one of these courses. The outcome of the online session will be filed with the student's records.

### ACADEMIC AND RESEARCH ADVISORS

All nonthesis students are advised by the academic advisor designated for their respective concentration or program. Thesis-option MS students must find a research advisor within their first year of study and may have thesis reader(s) at the discretion of their research advisor. The research advisor must be a full-time faculty or affiliated member of the MIE department; otherwise, a petition must be filed and approved by the MIE graduate affairs committee. If the research advisor is outside the MIE department, a faculty member with 50 percent or more appointments in the MIE department must be chosen as co-advisor. Thesis-option students are advised by the academic advisor of their concentration before they select their research advisor(s).

### 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 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 signed Plan of Study (PS) to the department before enrolling in second-semester courses. This form helps the students in managing their course work as well as helping the department to plan for offering the requested courses. The PS form may be modified at any time as the students proceed in their degree programs. However, requests for changes in PS must be processed before the requested change actually takes place. A revised PS form must also be approved and signed by the student's academic advisor.

Operations research students must select all required course work, typically consisting of six or more courses, from the list below. Each student's academic advisor must approve all courses prior to registration. Students may not use any courses taken without the approval of the academic advisor toward the 32-semester-hour minimum requirement. However, students may petition the MIE graduate affairs committee to substitute no more than one (4-semester-hour) graduate-level course from outside the approved list of electives. This may include independent study. An independent study must be approved by the research advisor (for thesis option) and academic advisor (for nonthesis option). The petition must clearly state the reason

for taking the course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

| Degree Requirements | Course Work Only | With Project | With Thesis |
|---|---|---|---|
| Required core courses | 16 SH | 16 SH | 16 SH |
| Elective courses | 16 SH | 12 SH | 8 SH |
| MEIE 6800 Technical Writing | N/A | 0 SH | 0 SH |
| MEIE 6850 Research Seminar in Mechanical and Industrial Engineering | N/A | 0 SH | 0 SH |
| Project/thesis | | 4 SH | 8 SH |
| **Minimum semester hours required** | **32 SH** | **32 SH** | **32 SH** |

## MSOR—Master of Science in Operations Research

Complete all courses and requirements listed below unless otherwise indicated.

### GENERAL REQUIREMENTS

***Required Courses***

| | | |
|---|---|---|
| IE 6200 | Engineering Probability and Statistics | 4 SH |
| or MATH 7241 | Probability 1 | 4 SH |
| OR 7245 | Network Analysis and Advanced Optimization | 4 SH |
| or MATH 7234 | Optimization and Complexity | 4 SH |
| OR 7230 | Probabilistic Operation Research | 4 SH |
| or MATH 7341 | Probability 2 | 4 SH |
| OR 6205 | Deterministics Operations Research | 4 SH |

### OPTIONS

Select one of the following options:

***Course Work Option***

Complete four of the following courses:

| | | |
|---|---|---|
| CS 5800 | Algorithms | 4 SH |
| CS 6140 | Machine Learning | 4 SH |
| CS 7805 | Theory of Computation | 4 SH |
| CSYE 6200 | Concepts of Object-Oriented Design | 4 SH |
| CSYE 6210 | Component Software Development | 4 SH |
| EECE 7313 | Pattern Recognition | 4 SH |
| EECE 7360 | Combinatorial Optimization | 4 SH |
| EMGT 5220 | Engineering Project Management | 4 SH |
| EMGT 5300 | Engineering/Organizational Psychology | 4 SH |
| EMGT 6225 | Economic Decision Making | 4 SH |
| EMGT 6305 | Financial Management for Engineers | 4 SH |
| IE 5400 | Healthcare Systems Modeling and Analysis | 4 SH |
| IE 5500 | Systems Engineering in Public Programs | 4 SH |
| IE 5617 | Lean Concepts and Applications | 4 SH |
| IE 5620 | Mass Customization | 4 SH |
| IE 5630 | Biosensor and Human Behavior Measurement | 4 SH |
| IE 6300 | Manufacturing Methods and Processes | 4 SH |
| IE 7200 | Supply Chain Engineering | 4 SH |
| IE 7215 | Simulation Analysis | 4 SH |
| IE 7275 | Data Mining in Engineering | 4 SH |
| IE 7280 | Statistical Methods in Engineering | 4 SH |
| IE 7285 | Statistical Quality Control | 4 SH |
| IE 7290 | Reliability Analysis and Risk Assessment | 4 SH |
| IE 7315 | Human Factors Engineering | 4 SH |
| INFO 6205 | Program Structure and Algorithms | 4 SH |
| INFO 6210 | Data Management and Database Design | 4 SH |
| MATH 7232 | Combinatorial Analysis | 4 SH |
| MATH 7233 | Graph Theory | 4 SH |
| MATH 7342 | Mathematical Statistics | 4 SH |
| MATH 7346 | Time Series | 4 SH |
| MATH 7347 | Statistical Decision Theory | 4 SH |
| MATH 7349 | Stochastic Calculus and Introduction to No-Arbitrage Finance | 4 SH |
| OR 7235 | Inventory Theory | 4 SH |
| OR 7240 | Integer and Nonlinear Optimization | 4 SH |
| OR 7245 | Network Analysis and Advanced Optimization | 4 SH |
| OR 7250 | Multi-Criteria Decision Making | 4 SH |
| OR 7260 | Constraint Programming | 4 SH |
| OR 7310 | Logistics, Warehousing, and Scheduling | 4 SH |

***Project Option***

PROJECT

| | | |
|---|---|---|
| OR 7945 | Master's Project | 4 SH |
| MEIE 6800 | Technical Writing Seminar | 0 SH |
| MEIE 6850 | Research Seminar in Mechanical and Industrial Engineering | 0 SH |

ELECTIVES

Complete three of the following courses:

| | | |
|---|---|---|
| CS 5800 | Algorithms | 4 SH |
| CS 6140 | Machine Learning | 4 SH |
| CS 7805 | Theory of Computation | 4 SH |
| CSYE 6200 | Concepts of Object-Oriented Design | 4 SH |
| CSYE 6210 | Component Software Development | 4 SH |
| EECE 7313 | Pattern Recognition | 4 SH |
| EECE 7360 | Combinatorial Optimization | 4 SH |
| EMGT 5220 | Engineering Project Management | 4 SH |
| EMGT 5300 | Engineering/Organizational Psychology | 4 SH |
| EMGT 6225 | Economic Decision Making | 4 SH |
| EMGT 6305 | Financial Management for Engineers | 4 SH |
| IE 5400 | Healthcare Systems Modeling and Analysis | 4 SH |
| IE 5500 | Systems Engineering in Public Programs | 4 SH |
| IE 5617 | Lean Concepts and Applications | 4 SH |
| IE 5620 | Mass Customization | 4 SH |
| IE 5630 | Biosensor and Human Behavior Measurement | 4 SH |

| | | |
|---|---|---|
| IE 6300 | Manufacturing Methods and Processes | 4 SH |
| IE 7200 | Supply Chain Engineering | 4 SH |
| IE 7215 | Simulation Analysis | 4 SH |
| IE 7275 | Data Mining in Engineering | 4 SH |
| IE 7280 | Statistical Methods in Engineering | 4 SH |
| IE 7285 | Statistical Quality Control | 4 SH |
| IE 7290 | Reliability Analysis and Risk Assessment | 4 SH |
| IE 7315 | Human Factors Engineering | 4 SH |
| INFO 6205 | Program Structure and Algorithms | 4 SH |
| INFO 6210 | Data Management and Database Design | 4 SH |
| MATH 7232 | Combinatorial Analysis | 4 SH |
| MATH 7233 | Graph Theory | 4 SH |
| MATH 7342 | Mathematical Statistics | 4 SH |
| MATH 7346 | Time Series | 4 SH |
| MATH 7347 | Statistical Decision Theory | 4 SH |
| MATH 7349 | Stochastic Calculus and Introduction to No-Arbitrage Finance | 4 SH |
| OR 7235 | Inventory Theory | 4 SH |
| OR 7240 | Integer and Nonlinear Optimization | 4 SH |
| OR 7245 | Network Analysis and Advanced Optimization | 4 SH |
| OR 7250 | Multi-Criteria Decision Making | 4 SH |
| OR 7260 | Constraint Programming | 4 SH |
| OR 7310 | Logistics, Warehousing, and Scheduling | 4 SH |

***Thesis Option***

THESIS

Requires 8 semester hours:

| | | |
|---|---|---|
| OR 7990 | Thesis | 1 to 8 SH |
| MEIE 6800 | Technical Writing Seminar | 0 SH |
| MEIE 6850 | Research Seminar in Mechanical and Industrial Engineering | 0 SH |

ELECTIVES

Complete two of the following courses:

| | | |
|---|---|---|
| CS 5800 | Algorithms | 4 SH |
| CS 6140 | Machine Learning | 4 SH |
| CS 7805 | Theory of Computation | 4 SH |
| CSYE 6200 | Concepts of Object-Oriented Design | 4 SH |
| CSYE 6210 | Component Software Development | 4 SH |
| EECE 7313 | Pattern Recognition | 4 SH |
| EECE 7360 | Combinatorial Optimization | 4 SH |
| EMGT 5220 | Engineering Project Management | 4 SH |
| EMGT 5300 | Engineering/Organizational Psychology | 4 SH |
| EMGT 6225 | Economic Decision Making | 4 SH |
| EMGT 6305 | Financial Management for Engineers | 4 SH |
| IE 5400 | Healthcare Systems Modeling and Analysis | 4 SH |
| IE 5500 | Systems Engineering in Public Programs | 4 SH |
| IE 5617 | Lean Concepts and Applications | 4 SH |
| IE 5620 | Mass Customization | 4 SH |
| IE 5630 | Biosensor and Human Behavior Measurement | 4 SH |
| IE 6300 | Manufacturing Methods and Processes | 4 SH |
| IE 7200 | Supply Chain Engineering | 4 SH |
| IE 7215 | Simulation Analysis | 4 SH |
| IE 7275 | Data Mining in Engineering | 4 SH |
| IE 7280 | Statistical Methods in Engineering | 4 SH |
| IE 7285 | Statistical Quality Control | 4 SH |
| IE 7290 | Reliability Analysis and Risk Assessment | 4 SH |
| IE 7315 | Human Factors Engineering | 4 SH |
| INFO 6205 | Program Structure and Algorithms | 4 SH |
| INFO 6210 | Data Management and Database Design | 4 SH |
| MATH 7232 | Combinatorial Analysis | 4 SH |
| MATH 7233 | Graph Theory | 4 SH |
| MATH 7342 | Mathematical Statistics | 4 SH |
| MATH 7346 | Time Series | 4 SH |
| MATH 7347 | Statistical Decision Theory | 4 SH |
| MATH 7349 | Stochastic Calculus and Introduction to No-Arbitrage Finance | 4 SH |
| OR 7235 | Inventory Theory | 4 SH |
| OR 7240 | Integer and Nonlinear Optimization | 4 SH |
| OR 7245 | Network Analysis and Advanced Optimization | 4 SH |
| OR 7250 | Multi-Criteria Decision Making | 4 SH |
| OR 7260 | Constraint Programming | 4 SH |
| OR 7310 | Logistics, Warehousing, and Scheduling | 4 SH |

***Engineering Leadership Option***

Students completing this option receive the graduate certificate in engineering leadership in addition to the master's degree.

LEADERSHIP

| | | |
|---|---|---|
| ENLR 5121 | Engineering Leadership 1 | 2 SH |
| ENLR 5122 | Engineering Leadership 2 | 2 SH |

FOUNDATIONS

| | | |
|---|---|---|
| ENLR 5131 | Scientific Foundations of Engineering 1 | 2 SH |
| ENLR 5132 | Scientific Foundations of Engineering 2 | 2 SH |

PROJECT

| | | |
|---|---|---|
| OR 7440 | Operations Research Engineering Leadership Challenge Project 1 | 4 SH |
| OR 7442 | Operations Research Engineering Leadership Challenge Project 2 | 4 SH |

## PROGRAM CREDIT/GPA REQUIREMENTS

32 total semester hours required

Minimum 3.000 GPA required

## SUSTAINABLE BUILDING SYSTEMS

**www.northeastern.edu/camd/architecture/academic-programs/master-science-sustainable-building-systems**

SARA WADIA-FASCETTI, PHD
*Associate Dean for Research and Graduate Studies, Graduate School of Engineering*

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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 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.

### Sample Curriculum

Below is a typical course sequence for graduation in two semesters.

| Fall | Spring |
|---|---|
| ARCH 5210 (4 SH) | ARCH 5220 or elective (4 SH) |
| CIVE 7220 or elective (4 SH) | CIVE 5270 or elective (4 SH) |
| CIVE 7230 or elective (4 SH) | SBSY 5200 (4 SH) |
| SBSY 5100 (4 SH) | SBSY 5300 or elective (4 SH) |

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.

### MSSBS—Master of Science in Sustainable Building Systems

Complete all courses and requirements listed below unless otherwise indicated.

#### REQUIRED COURSE WORK

***Core***

| | | |
|---|---|---|
| ARCH 5210 | Environmental Systems | 4 SH |
| with ARCH 5211 | Recitation for ARCH 5210 | 0 SH |
| SBSY 5100 | Sustainable Design and Technologies in Construction | 4 SH |
| SBSY 5200 | Sustainable Engineering Systems for Buildings | 4 SH |

***Open Electives***

Complete three of the following courses (12 semester hours):

| | | |
|---|---|---|
| ACCT 6200 | Financial Reporting and Managerial Decision Making 1 | 3 SH |
| ACCT 6201 | Financial Reporting and Managerial Decision Making 2 | 1.5 SH |
| CIVE 5270 | Environmental Protection and Management | 4 SH |
| CIVE 7350 | Behavior of Concrete Structures | 4 SH |
| CIVE 7351 | Behavior of Steel Structures | 4 SH |
| FINA 6200 | Value Creation through Financial Decision Making | 3 SH |
| FINA 6216 | Valuation and Value Creation | 3 SH |
| FINA 6217 | Real Estate Finance and Investment | 3 SH |
| ME 5645 | Environmental Issues in Manufacturing and Product Use | 4 SH |

***Restricted Electives***

Complete two of the following courses (8 semester hours):

| | | |
|---|---|---|
| ARCH 5220 | Integrated Building Systems | 4 SH |
| CIVE 5275 | Life Cycle Assessment of Materials, Products, and Infrastructure | 4 SH |
| CIVE 7220 | Construction Management | 4 SH |
| CIVE 5221 | Construction Project Control and Organization | 2 SH |
| CIVE 7230 | Legal Aspects of Civil Engineering | 4 SH |
| CIVE 5231 | Alternative Project Delivery Systems in Construction | 2 SH |
| EMGT 6305 | Financial Management for Engineers | 4 SH |
| SBSY 5300 | Information Systems for Integrated Project Delivery | 4 SH |

#### PROGRAM CREDIT/GPA REQUIREMENTS

32 total semester hours required
Minimum 3.000 GPA required

# TELECOMMUNICATION SYSTEMS MANAGEMENT

**www.coe.neu.edu/degrees/master-science-telecommunication-systems-management**

PETER O'REILLY, PHD
*Program Director*

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The Master of Science in Telecommunication Systems Management degree 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.

## MSTSM—Master of Science in Telecommunication Systems Management

### DEGREE REQUIREMENTS

A minimum of 30 semester hours must be earned toward completion of the MSTSM degree. A minimum grade-point average of 3.000 is required over all courses applied toward the degree.

To qualify for any degree from the Graduate School of Engineering, a student must attain a cumulative grade-point average (GPA) of 3.000 or higher with no more than 8 semester hours below the grade of B– in all courses applied toward that degree, exclusive of any prerequisite courses. However, prerequisite courses are calculated into GPA. The committee on graduate study in engineering allows students to take 8 semester hours of credit beyond stated minimum degree requirements for the purpose of repeating failed required courses or substituting for elective courses in order to attain the required 3.000 GPA for the completion of degree requirements. Within the above limitations for extra or repeated courses, a student must repeat any required course in which he or she earns a grade of C+ or less and earn a grade of B– or better.

| Degree Requirements | Full-Time Study | Part-Time Study |
|---|---|---|
| Required core courses | 16 SH | 16 SH |
| Approved business and technical elective courses | 14 SH | 14 SH |
| **Minimum semester hours required** | **30 SH** | **30 SH** |

The program requires that a mix of core required courses and elective courses be taken. Although there are some dependencies among the core courses, the program may be started in either the fall or spring semester.

There are four core courses and a wide range of technical and business electives available. The core courses each carry 4 semester hours of credit. Students must receive a grade of at least a B– in each of the core courses, otherwise they will need to repeat the course. A maximum of two of the core courses may be waived—and only if a student has taken similar course material at another university with a satisfactory grade. Students should apply for such waivers during their first semester at Northeastern. If a technical core course is waived, it must be replaced with a technical elective. Similarly, if the business core course is waived, it must be replaced with a business elective.

At least one of the electives must be a business elective and at least one must be a technical elective. The technical electives include courses on network and communications technology and on the development of software systems and applications. The list of business electives is focused on engineering management and marketing. Electives come from an approved list of courses supplied by the colleges of engineering, business administration, and computer and information science. All students must take at least one technical elective and one business elective. These electives must be courses of at least 3 semester hours. Students may take elective course work outside this list with the prior approval of their program advisor.

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. Participants may elect TELE 6945 Master's Project (4 semester hours) in place of one of the electives with approval of the program director.

All transfer credits must be approved by petition before course enrollment.

TELE 5978 Independent Study, usually for 1 or 2 semester hours, is sometimes available for students. Independent study must be carried out under the supervision of a professor and must have prior approval of the TELE program director. Proposals for independent study need to be submitted at least one month before the start of the semester.

TELE 5976 Directed Study, also for 1 or 2 semester hours, is sometimes available for students. On directed study projects, a student follows a prescribed curriculum, usually with some form of an exam at the end of the semester.

Complete all courses and requirements listed below unless otherwise indicated.

## CORE REQUIREMENTS

A grade of B– or higher is required:

| | | |
|---|---|---|
| TELE 5310 | Fundamentals of Communication Systems | 4 SH |
| TELE 5320 | Telecommunications Architecture and Systems | 4 SH |
| TELE 5330 | Data Networking | 4 SH |
| with TELE 5331 | Lab for TELE 5330 | 0 SH |
| TELE 5340 | Telecommunications Public Policy and Business Management | 4 SH |

## OPTIONS

Complete one of the following options:

***Telecommunication Engineering Electives Option***

Complete four of the following courses (14 semester hours). At least one course must be a business course, and at least one course must be a technical course. A grade of C or higher is required in all elective courses:

BUSINESS COURSES

| | | |
|---|---|---|
| ACCT 6200 | Financial Reporting and Managerial Decision Making 1 | 3 SH |
| EMGT 5220 | Engineering Project Management | 4 SH |
| EMGT 6225 | Economic Decision Making | 4 SH |
| EMGT 6305 | Financial Management for Engineers | 4 SH |
| ENTR 6200 | Enterprise Growth and Innovation | 3 SH |
| ENTR 6212 | Business Planning for New Ventures | 3 SH |
| HRMG 6200 | Managing People and Organizations | 3 SH |
| HRMG 6210 | Managing Professionals and High Performance Teams | 3 SH |
| INFO 6245 | Planning and Managing Information Systems Development | 4 SH |
| INFO 7285 | Organizational Change and IT | 4 SH |
| MGMT 6214 | Negotiations | 2 or 3 SH |
| MGSC 6206 | Management of Service and Manufacturing Operations | 3 SH |
| MKTG 6200 | Creating and Sustaining Customer Markets | 3 SH |
| MKTG 6208 | Marketing and Customer Value | 4 SH |
| MKTG 6214 | New Product Development | 3 SH |
| TECE 6200 | Innovation and Entrepreneurial Growth | 3 SH |
| TECE 6250 | Lean Design and Development | 3 SH |
| TELE 6370 | Perspectives in Telecommunications Policy | 4 SH |
| TELE 6380 | Consulting Project in Telecommunications | 4 SH |
| TELE 6600 | Special Topics—Telecommunication Policy | 1 to 4 SH |
| TELE 6602 | Special Topics—Business | 1 to 4 SH |

TECHNICAL COURSES

| | | |
|---|---|---|
| CS 5500 | Managing Software Development | 4 SH |
| CS 5010 | Programming Design Paradigm | 4 SH |
| with CS 5011 | Recitation for CS 5010 | 0 SH |
| CS 5520 | Mobile Application Development | 4 SH |
| CS 5700 | Fundamentals of Computer Networking | 4 SH |
| CS 6520 | Methods of Software Development | 4 SH |
| CS 6710 | Wireless Network | 4 SH |
| CS 6740 | Network Security | 4 SH |
| CSYE 6200 | Concepts of Object-Oriented Design | 4 SH |
| EECE 5576 | Wireless Communication Systems | 4 SH |
| EECE 7364 | Mobile and Wireless Networking | 4 SH |
| EECE 7374 | Fundamentals of Computer Networks | 4 SH |
| IA 5150 | Network Security Practices | 4 SH |
| with IA 5151 | Lab for IA 5150 | 0 SH |
| INFO 6210 | Data Management and Database Design | 4 SH |
| INFO 6215 | Business Analysis and Information Engineering | 4 SH |
| TELE 5600 | Linux/UNIX Systems Management for Network Engineers | 4 SH |
| TELE 6100 | Telecommunications Convergence | 4 SH |
| TELE 6200 | Advanced Data Networking | 4 SH |
| TELE 6350 | IP Telephony | 4 SH |
| TELE 6360 | Operation Support Systems in Telecommunications | 4 SH |
| TELE 6601 | Special Topics—Systems | 1 to 4 SH |
| TELE 6603 | Special Topics—Networking | 1 to 4 SH |

***Engineering Leadership Option***

Students completing this option receive the graduate certificate in engineering leadership in addition to the master's degree.

LEADERSHIP

| | | |
|---|---|---|
| ENLR 5121 | Engineering Leadership 1 | 2 SH |
| ENLR 5122 | Engineering Leadership 2 | 2 SH |

FOUNDATIONS

| | | |
|---|---|---|
| ENLR 5131 | Scientific Foundations of Engineering 1 | 2 SH |
| ENLR 5132 | Scientific Foundations of Engineering 2 | 2 SH |

PROJECT

| | | |
|---|---|---|
| ENLR 7440 | Engineering Leadership Challenge Project 1 | 4 SH |
| ENLR 7442 | Engineering Leadership Challenge Project 2 | 4 SH |

## PROGRAM CREDIT/GPA REQUIREMENTS

30 total semester hours required

Minimum 3.000 GPA required

# Bouvé College of Health Sciences

www.northeastern.edu/bouve/grad

**JOHN R. REYNOLDS, PHARMD, RPH,** *Interim Dean*

**Jeanine Mount, PhD, RPh,** *Associate Dean for Academic Affairs*
**Margaret K. Schnabel,** *Interim Assistant Dean, Director of Graduate Admissions and Student Services*

*Dean's Office*
215 Behrakis Health Sciences Center
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The Bouvé College of Health Sciences (BCHS) strongly supports the mission of Northeastern University as a practice-oriented, student-centered, urban research institution. The college is committed to the goals of the institution, which include excellence in education, research, scholarship, access to educational opportunity, and a strong professional orientation. Each of the programs within the college supports these aims both individually and collectively.

Graduate programs in the Schools of Nursing, Pharmacy (Pharmaceutical Sciences and PharmD), and the health professions (audiology, applied psychology, exercise sciences, physical therapy, physician assistant, public health, speech-language pathology, population health, occupational ergonomics and health) and the interdisciplinary programs of biotechnology, health informatics, and personal health informatics incorporate experience in the related field of study. Students have an opportunity to interact with faculty contributing to research advances, as well as with Boston's world-class healthcare and educational institutions, and study in a comprehensive health-sciences college, where interdisciplinary approaches to complex issues reflect professional practice.

The result: At Northeastern, you have an opportunity to acquire the knowledge and capability needed for a lifetime of social contribution and professional achievement.

## Health Certification

All new students must complete the University Health Report form following acceptance to the university. These forms may be obtained at the University Health and Counseling Services (UHCS) located at 135 Forsyth Building or downloaded from www.northeastern.edu/uhcs/forms/index.html. Graduate students may additionally be expected to provide UHCS with proof of a physical exam or statement of good health prior to registration; this may vary among programs.

As a condition of matriculation at Northeastern University, all students are required to submit the completed University Health Report form to UHCS. Graduate students must return the form **no later than one month** prior to entering the university. The health center will block the registration of those who do not file correct forms. All documentation must be signed by a medical doctor, nurse practitioner, or physician assistant.

The Commonwealth of Massachusetts requires all university students to provide documentation of immunity to the following:

- Hepatitis B (series of three immunizations or one positive titre)
- Measles (two immunizations or positive antibody titre)
- Mumps (one immunization or positive antibody titre)
- Rubella (one immunization or positive antibody titre)
- Meningitis (optional; students may decline immunization)
- Tetanus/Diphtheria (immunization within last 10 years)

Graduate students in the Bouvé College of Health Sciences are additionally required to provide documentation of immunity to the following:

- Varicella/chicken pox
- Tuberculin skin test (PPD): within six months of registration

Refer to page two of the University Health Report for further clarification. The University Health Report is to be completed once prior to students beginning their graduate studies; however, some programs in the Bouvé College of Health Sciences may require that students provide proof of physical examination annually. Similarly, some programs may require proof of additional immunities. Consult your program handbook or your program advisor for more information. Medical documentation and health certification are maintained by UHCS. Additional clinical clearance may be required by some programs prior to your presence in any clinical setting.

## Practicum/Internship Policies

Students taking practicum courses or doing internships in their field of study may be required to submit certification of health status to each of their clinical placement coordinators. Each program has its own regulations for practicum health clearance. Students should consult their program handbooks or clinical placement coordinator for these requirements. Students who do not present the appropriate health certification will be blocked from registering for, or attending, practicum until satisfactory evidence is provided. An annual update of the student's health certification is also required in some internships and practica. Students taking practicum courses may also be required to submit to and successfully clear criminal history/background checks (CORI; see below). International nursing students must have a current U.S. nursing license and social security number.

## Background Checks

An increasing number of clinical sites require background checks for employees as well as students who come to their facilities. Northeastern University students will need to have background checks done *only* if their assigned clinical agency requires it. The most common background check required is the Massachusetts Criminal Offender Record Information (CORI), although some clinical sites require other types of checks, such as drug testing.

Bouvé College contracts with a national company, CertifiedBackground.com, to perform these checks. The company provides this service for universities nationwide. Log onto their website to learn more about them: certifiedbackground.com.

CertifiedBackground.com charges fees to conduct background checks. The fee varies depending on the type of background check needed. All fees will be paid by the student directly to CertifiedBackground.com.

All background check information is confidential. Results are sent to the designated clearance officer for Bouvé College, who is the only person who has access to the results. A student will be contacted by the clearance officer *only* if there is a question about the results. Neither the student nor the clearance officer is required to reveal the actual results of a background check to an on-campus clinical coordinator/clinical placement office, a clinical site, or anyone else at the university.

If an assigned clinical site requires students to have a background check, the on-campus clinical coordinator/clinical placement officer will inform the student of the requirements and provide the student with instructions and a deadline for completing the check. It is crucial that the student complete the check by the deadline given to assure adequate processing time prior to the start of a clinical experience. Failure to complete the check in a timely manner could jeopardize the student's progression in the program.

## Liability Insurance

All students on practicum/internship must register each semester while on practicum/internship to be covered by liability insurance. As long as they are registered, all Northeastern University matriculated students in fields of study requiring malpractice insurance are covered under a professional liability insurance for which they pay a yearly fee. This insurance covers injury to third parties by students doing work or professional studies outside Northeastern University premises that are clearly part of their duties. It does not cover willful misconduct. Students or the clinical placement coordinator can request that the institutional audit, compliance, and risk services office send evidence-confirming coverage to their field site. Students should consult their practicum placement officer, program coordinator, and specialization policies for information about further requirements for liability insurance. If you are not sure if your program is covered under this policy, coverage can be verified through the Office of Institutional Audit, Compliance and Risk Services at extension x5997 or www.northeastern.edu/risk_services/index.php.

## Grading

Although credit can be transferred, grades transferred from another institution are not calculated in the grade-point average (GPA) on the Northeastern University transcript. Therefore, courses repeated due to failure must be completed at Northeastern.

## Transfer of Credit

A maximum of 9 semester/12 quarter hours of credit obtained at another institution may be accepted toward the degree, provided the credits consist of work taken at the graduate level for graduate credit, carry grades of 3.000 or better, have been earned at an accredited institution, have not been used toward any other degree, and are completed prior to the last semester of graduate study. These courses must have been taken within five years prior to the transfer and cannot be taken in the last semester prior to graduation.

The exact requirements for fulfillment of a degree in the BCHS graduate school vary by program. Students must consult their individual academic program catalogs and policies, as well as program directors, if applicable, for specific credit and non-credit requirements necessary to achieve a specific degree.

If the course had been taken prior to matriculation at Bouvé, the student must submit to his or her academic advisor a petition requesting transfer along with the official transcript indicating successful completion of the course to be transferred. Upon obtaining the advisor's approval, the student submits the documentation to the graduate school office on the appropriate petition form. A student may petition to transfer credit only after matriculation in Bouvé. The Graduate Petition to Transfer Credit form can be found on the Office of the Registrar's website: www.northeastern.edu/registrar/form-gs-xfer-cred.pdf.

Courses that have not been taken but will be taken for transfer from another institution must receive preapproval from the student's academic advisor. Students should submit the

petition with the course description attached to their advisor for approval and then submit the completed petition to the Bouvé graduate school office.

Graduate courses at the Northeastern University College of Professional Studies (CPS) can be considered for transfer only with prior approval of the academic advisor. Courses taken in the CPS cannot be considered to fulfill full-time requirements for international students. For consideration of financial aid for CPS courses, check with your financial aid officer.

**Students may not transfer courses required for the completion of their program in the last semester of their program.**

## Course Waiver

A student must obtain approval from their academic advisor to waive a course that was taken for credit toward a prior degree. To obtain approval by the academic advisor, the student must provide an official transcript and a syllabus of the content of the course to the program director, in order to verify equivalency with the course to be waived. The student must submit the signed appropriate petition form to the Bouvé graduate office. If approved to waive the course, the student must take another course in its place for equivalent credit.

## Academic Progression

All students should register by the first week of the semester for course work or continuation credit each semester of the academic year (fall, spring, and, where indicated, summer) once they are matriculated as full- or part-time students. All physician assistant students must register all three semesters. If a student does not register for two consecutive semesters, the student's file will be placed in the "inactive" archives and kept there for no longer than five years. Therefore, if a student plans on being absent more than one semester, he or she must notify the Bouvé graduate student office and file a Leave-of-Absence Request Form; see page 20 for additional information about leaves of absence.

For information about withdrawal and refund policies, refer to www.northeastern.edu/financialaid/studentaccounts/refunds.html.

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 his or her particular program with his or her advisor. A student's failure or inability to register does not extend the amount of time allowed to complete the program. Course credits earned in programs of graduate study are valid for a maximum of seven years unless an extension is granted by the Bouvé associate dean of 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 (see "Extension Procedures," below). In order to progress in clinical courses that are sequenced, students 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 College graduate office. Course material related to the student's failure (examination reports, clinical reports) must be made available to the student for review.

## Student's Academic Standing

Academic standing in BCHS is determined by the student's grade-point average (GPA) and performance in academic and clinical courses that are required by his or her program. All BCHS 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 probation. Additionally, some programs require students to earn a grade of B (3.000) or better in each specified course.(See "Deficiency Information," below). Students must also earn a grade of B (3.000) or better in graduate courses taken at another institution that are subject to transfer credit.

### DEFICIENCY INFORMATION BY PROGRAM

- Audiology: 3.000 GPA and B lowest grade approved
- Biotechnology: 3.000 GPA and C– lowest grade approved
- Exercise science: 3.000 GPA and B lowest grade approved
- Health informatics: 3.000 GPA and B– lowest grade approved
- Nursing: 3.000 GPA and B lowest grade approved (Direct Entry has exceptions for undergraduate courses taken during the program)
- Physical therapy: 3.000 GPA and C lowest grade approved
- Physician assistant: 3.000 GPA and C lowest grade approved
- Public health: 3.000 GPA and B– lowest grade approved
- Pharmaceutical sciences: 3.000 GPA and B lowest grade approved
- Psychology: 3.000 GPA and B lowest grade approved
- Speech: 3.000 GPA and B lowest grade approved

## 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 by the Office of Graduate 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 his or her 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 graduate office 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. The Academic Probation Contract/Plan form will be sent to the student with the probationary letter, but it can be picked up in the Office of Graduate Student Services. Students will be placed on probation for the following deficiencies:

- A cumulative GPA below 3.000. If the student remains on academic probation for two semesters, he or she may be terminated from the graduate program.
- In some programs, a grade of B– or below in a specified course.
- Unsatisfactory final grade in a clinical course, practicum, internship, or research course, etc.

A BCHS graduate student may repeat a course only once to achieve a passing grade and may only repeat two courses during his or her entire program of study. A student may be on probation for only one semester, 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 BCHS 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-upon 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 he or she is subject to dismissal from BCHS. Note that individual graduate programs may have additional requirements that must be included in the probation action plan.

Once the student has regained a GPA of 3.000, earned a grade of B or better in a repeated course, and/or demonstrated satisfactory performance in a clinical course, he or she will be removed from probation.

## APPLIED PSYCHOLOGY

**www.northeastern.edu/bouve/caep**

KARIN LIFTER, PHD
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Graduate programs in the Department of Applied Psychology 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 and (2) promote mental and physical health from birth through 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 produce students who are well prepared to become counseling and psychology 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. As a Bouvé student, you have an opportunity to acquire knowledge and competency needed for a lifetime of personal fulfillment and professional achievement.

### Graduate Certificate in Applied Behavior Analysis

The Graduate Certificate in Applied Behavior Analysis program seeks to provide students with the knowledge base necessary for eligibility to take the Behavior Analysis Certification Board (BACB) exam. The curriculum, which is based on the BACB Fourth Edition Task List, includes six courses, all of which are offered online. Four standard programs of study are available; students may take one or two courses each term and may elect not to enroll at all during the summer, regardless of course load chosen. Special programs of study may also be arranged.

A representative program in which students take two courses during the academic year and the summer off follows. "Behavior Assessment" and "Research and Design Methods" are taken first as they are prerequisites for enrolling in the remaining four courses.

Complete all courses and requirements listed below unless otherwise indicated.

## REQUIREMENTS

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

***Basic Core***

| | | |
|---|---|---|
| CAEP 6327 | Behavior Assessment | 3 SH |
| CAEP 6328 | Research and Design Methods | 3 SH |
| CAEP 6329 | Service Administration | 3 SH |
| CAEP 6331 | Advanced Learning Seminar 1 | 3 SH |
| CAEP 6334 | Applied Programming Seminar 1 | 3 SH |
| CAEP 6336 | Systematic Inquiry 1 | 3 SH |

## INTENSIVE PRACTICUM

*Note:* The intensive practicum is optional. Consult your faculty advisor.

| | | |
|---|---|---|
| CAEP 8417 | Intensive Practicum in Applied Behavior Analysis 1 | 2 SH |
| CAEP 8418 | Intensive Practicum in Applied Behavior Analysis 2 | 2 SH |

## PROGRAM CREDIT/GPA REQUIREMENTS

18 total semester hours required
Minimum 3.000 GPA required

# Certificate of Advanced Graduate Study (CAGS) in Applied Behavior Analysis

The Certificate of Advanced Graduate Study (CAGS) program seeks to prepare graduates to assume supervisory behavior analyst roles in service agencies and in private and public school settings and to serve as independent consultants. Additionally, it seeks to give graduates expertise in a specific clinical area within applied behavior analysis. The six-course sequence that seeks to prepare students to take the BACB exam is followed by four additional courses in behavior analysis. These courses, which are related, explore the particular clinical issue in-depth.

Four standard programs of study are offered; students may take one or two courses each academic term and choose from a number of summer enrollment options. These options include taking one or two courses or not enrolling at all.

A representative program in which the student takes two courses during the academic year and one course in the summer follows. “Behavior Assessment” and “Research and Design Methods” must be taken first as they are prerequisites for enrolling in the remaining four courses. Specialization courses are indicated only generally; specific courses are determined by the area chosen.

The capstone for the program is the Professional Portfolio (see curriculum listing for MS in Applied Behavior Analysis, following, for description). This portfolio, which is compiled electronically, documents the student’s acquisition of critical behavioral procedures.

Complete all courses and requirements listed below unless otherwise indicated.

## PROFESSIONAL PORTFOLIO

Preference assessment
Reinforcer assessment
Functional analysis
Task analysis
Antecedent intervention
Consequence intervention
Discrimination training
Literature review

## REQUIREMENTS

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

***Basic Core***

| | | |
|---|---|---|
| CAEP 6327 | Behavior Assessment | 3 SH |
| CAEP 6328 | Research and Design Methods | 3 SH |
| CAEP 6329 | Service Administration | 3 SH |
| CAEP 6331 | Advanced Learning Seminar 1 | 3 SH |
| CAEP 6334 | Applied Programming Seminar 1 | 3 SH |
| CAEP 6336 | Systematic Inquiry 1 | 3 SH |

***Advanced Core***

| | | |
|---|---|---|
| CAEP 6337 | Systematic Inquiry 2 | 3 SH |

***Specialization Area***

Complete specialization area (9 semester hours) in consultation with your faculty advisor.

## INTENSIVE PRACTICUM

*Note:* The intensive practicum is optional. Consult your faculty advisor.

| | | |
|---|---|---|
| CAEP 8417 | Intensive Practicum in Applied Behavior Analysis 1 | 2 SH |
| CAEP 8418 | Intensive Practicum in Applied Behavior Analysis 2 | 2 SH |

## PROGRAM CREDIT/GPA REQUIREMENTS

30 total semester hours required
Minimum 3.000 GPA required

# MS in Applied Behavior Analysis

The Master of Science in Applied Behavior Analysis program seeks to prepare graduates to assume supervisory behavior analyst roles in service agencies and in private and public school settings and to serve as independent consultants. The six-course sequence that seeks to prepare students to take the BACB exam is followed by four additional courses in behavior analysis. These courses explore the principles and procedures of applied behavior analysis in more depth and address its philosophical underpinnings.

Four standard programs of study are offered; students may take one or two courses each academic term and choose from a number of summer enrollment options. These options include taking one or two courses or not enrolling at all.

A representative program in which the student takes two courses during the academic year and one course in the summer follows. “Behavior Assessment” and “Research and Design Methods” must be taken first as they are prerequisites for enrolling

in the remaining four courses. Similarly, "Systematic Inquiry 1" must be taken before "Systematic Inquiry 2."

The capstone for the program is the Professional Portfolio (see below). This portfolio, which is compiled electronically, documents the student's acquisition of critical behavioral procedures.

Complete all courses and requirements listed below unless otherwise indicated.

### PROFESSIONAL PORTFOLIO

Preference assessment
Reinforcer assessment
Functional analysis
Task analysis
Antecedent intervention
Consequence intervention
Discrimination training
Literature review

### REQUIREMENTS

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

***Basic Core***

| | | |
|---|---|---|
| CAEP 6327 | Behavior Assessment | 3 SH |
| CAEP 6328 | Research and Design Methods | 3 SH |
| CAEP 6329 | Service Administration | 3 SH |
| CAEP 6331 | Advanced Learning Seminar 1 | 3 SH |
| CAEP 6334 | Applied Programming Seminar 1 | 3 SH |
| CAEP 6336 | Systematic Inquiry 1 | 3 SH |

***Advanced Core***

| | | |
|---|---|---|
| CAEP 6324 | Programmed Learning | 3 SH |
| CAEP 6332 | Advanced Learning Seminar 2 | 3 SH |
| CAEP 6335 | Applied Programming Seminar 2 | 3 SH |
| CAEP 6337 | Systematic Inquiry 2 | 3 SH |

### INTENSIVE PRACTICUM

*Note:* The intensive practicum is optional. Consult your faculty advisor.

| | | |
|---|---|---|
| CAEP 8417 | Intensive Practicum in Applied Behavior Analysis 1 | 2 SH |
| CAEP 8418 | Intensive Practicum in Applied Behavior Analysis 2 | 2 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

30 total semester hours required
Minimum 3.000 GPA required

### PROFESSIONAL PORTFOLIO

The Professional Portfolio is the capstone for both the Master of Science in Applied Behavior Analysis and the CAGS. This portfolio documents the student's behavioral competency in critical clinical skills. These skills, each of which is associated with a specific project, include:

- Intake assessment
- Preference assessment
- Reinforcer assessment
- Functional analysis
- Antecedent intervention
- Consequence intervention
- Task analysis
- Discrimination training
- Literature review

Course assignments are designed to assist the student in designing and executing the projects associated with the skills and in preparing the documentation required for their inclusion in the Professional Portfolio.

A faculty member reviews and signs each project in the Professional Portfolio. The signature indicates that student has achieved the faculty-established standards for the project. Graduates are encouraged to use their Professional Portfolios when applying for employment.

Although a thesis is not required for graduation from either the Master of Science or CAGS program in ABA, students interested in research may combine two or three of the Professional Portfolio items into a research project. For example, the student may complete a literature search on stereotypical behavior, then conduct a functional analysis and intervention with a participant who exhibits that behavior. The research project is then prepared in journal format for inclusion in the Professional Portfolio.

Projects may be submitted for inclusion in the Professional Portfolio at anytime during the graduate program. When the student has completed all Professional Portfolio requirements, the program director should be notified so that a final review may take place. A complete Professional Portfolio is required for graduation.

## MS in College Student Development and Counseling

The College Student Development and Counseling program (CSDC) at Northeastern University aims to create mindful, action-oriented leaders, specifically in the fields of higher education and student affairs. The program focuses on counseling, college student development, the history and philosophy of the student affairs profession, and the organization and administration of the field. The program offers emerging professionals the academic and experiential background that allows them to be able to design, create, and administer student personnel programs that teach leadership, foster development, value diversity, and complement the academic experience of college students.

Complete all courses and requirements listed below unless otherwise indicated.

### MILESTONE

Portfolio

## REQUIREMENTS

***Student Affairs Administration***

| | | |
|---|---|---|
| CAEP 6305 | Special Topics in Higher Education | 3 SH |
| CAEP 6301 | Planning and Administering Student Affairs | 3 SH |
| CAEP 6302 | Law and Ethics in Higher Education | 3 SH |
| CAEP 6303 | Financial Aspects of Higher Education | 3 SH |
| CAEP 6235 | Vocational, Education, and Career Development | 3 SH |

***College Student Development***

| | | |
|---|---|---|
| CAEP 6200 | Introduction to Counseling: Theory and Process in an Ecological Context | 3 SH |
| CAEP 6203 | Understanding Culture and Diversity | 3 SH |
| CAEP 6300 | Introduction to College Student Development | 3 SH |
| CAEP 6230 | Health Issues in Counseling | 3 SH |

***Professional Practice***

| | | |
|---|---|---|
| CAEP 6215 | Groups: Dynamics and Leadership | 3 SH |
| CAEP 8402 | College Student Development Practicum 1 | 3 SH |
| CAEP 8403 | College Student Development Practicum 2 | 3 SH |

***Research and Evaluation***

| | | |
|---|---|---|
| CAEP 6262 | Evaluation and Outcomes Assessment of Community, School, and Health-Related Programs | 3 SH |
| CAEP 6202 | Research, Evaluation, and Data Analysis | 3 SH |

## PROGRAM CREDIT/GPA REQUIREMENTS

42 total semester hours required
Minimum 3.000 GPA required

# MSCP—Master of Science in Counseling Psychology

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 and complies with licensing regulations for mental health counselors in the Commonwealth of Massachusetts. The program is unique in that within the general Master of Science program we offer students a choice of specific concentrations, in which students have an opportunity to gain additional depth in selected areas.

Complete all courses and requirements listed below unless otherwise indicated.

## COUNSELING PSYCHOLOGY MS REQUIREMENTS

A grade of B– or higher is required in all course work.

***Required Course Work***

COURSE WORK

| | | |
|---|---|---|
| CAEP 6200 | Introduction to Counseling: Theory and Process in an Ecological Context | 3 SH |
| CAEP 6201 | Introduction to Assessment | 3 SH |
| CAEP 6203 | Understanding Culture and Diversity | 3 SH |
| CAEP 6220 | Development Across the Life Span | 3 SH |
| CAEP 6235 | Vocational, Education, and Career Development | 3 SH |
| CAEP 6242 | Psychopathology: Diagnosis and Treatment Planning | 3 SH |
| CAEP 6250 | Individual Interventions | 3 SH |
| CAEP 6260 | Community Counseling Psychology | 3 SH |
| CAEP 6282 | Ethics and Professional Development | 3 SH |
| CAEP 6287 | Group Counseling | 3 SH |
| CAEP 6375 | Substance Use and Treatment | 3 SH |

SEMINAR

| | | |
|---|---|---|
| CAEP 6380 | Seminar in Feminist Psychology | 3 SH |

RESEARCH

| | | |
|---|---|---|
| CAEP 6202 | Research, Evaluation, and Data Analysis | 3 SH |

***Clinical Course Work***

COURSE WORK

| | | |
|---|---|---|
| CAEP 6399 | Clinical Skills in Counseling Psychology | 3 SH |

PRACTICUM

| | | |
|---|---|---|
| CAEP 8401 | Practicum in Counseling Psychology | 3 SH |

INTERNSHIP

| | | |
|---|---|---|
| CAEP 8510 | Internship in Counseling Psychology 1 | 3 SH |
| CAEP 8511 | Internship in Counseling Psychology 2 | 3 SH |

***Electives***

Complete three of the following courses (9 semester hours). Other electives or alternatives may be chosen in consultation with faculty advisor:

| | | |
|---|---|---|
| CAEP 6215 | Groups: Dynamics and Leadership | 3 SH |
| CAEP 6218 | Infant, Child, and Adolescent Development | 3 SH |
| CAEP 6222 | Human Sexuality | 3 SH |
| CAEP 6230 | Health Issues in Counseling | 3 SH |
| CAEP 6286 | Family Counseling Interventions | 3 SH |
| CAEP 6247 | Child and Adolesent Psychopathology | 3 SH |
| CAEP 6275 | Counseling Strategies for Children and Adolescents | 3 SH |
| CAEP 6283 | Brief Therapies | 3 SH |
| CAEP 6290 | Reality Therapy | 3 SH |
| CAEP 6330 | Community-Based Treatment | 3 SH |
| CAEP 6390 | History and Systems of Psychology | 3 SH |

| | | |
|---|---|---|
| CAEP 6394 | Advanced Multicultural Psychology | 3 SH |
| CAEP 7720 | Advanced Clinical Interventions | 3 SH |
| CAEP 7758 | Doctoral Seminar in Contemporary Theories of Psychotherapy | 3 SH |
| PHTH 6320 | Qualitative Methods in Health and Illness | 3 SH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

60 total semester hours required
Minimum 3.000 GPA required

## Certificate of Advanced Graduate Study (CAGS) in Counseling Psychology

The Certificate of Advanced Graduate Study (CAGS) in Counseling Psychology is for students with a highly related master's degree that does not meet LMHC licensure requirements in Massachusetts. It is a 30-semester-hour course of study—including eight didactic courses and two internship courses, which include 600 hours of supervised clinical experience in a mental health setting. Students who have not completed a formal practicum placement also will be required to do a 150-hour practicum placement. This program is individually tailored to fulfill a student's professional and licensing goals.

Complete all courses and requirements listed below unless otherwise indicated.

**COUNSELING PSYCHOLOGY CAGS REQUIREMENTS**

A grade of B– or higher is required in all course work.

***Core Courses***

Complete eight core courses (24 semester hours) to be chosen in consultation with faculty advisor.

***Internship***

| | | |
|---|---|---|
| CAEP 8510 | Internship in Counseling Psychology 1 | 3 SH |
| CAEP 8511 | Internship in Counseling Psychology 2 | 3 SH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

30 total semester hours required
Minimum 3.000 GPA required

## PhD in Counseling Psychology

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 prepares 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.

Complete all courses and requirements listed below unless otherwise indicated.

**MILESTONES**

Four qualifying exams—research, ethics, assessment, and intervention
Annual review
Research team
Dissertation proposal
Dissertation defense

**COUNSELING PSYCHOLOGY PHD REQUIREMENTS**

A grade of B– or higher is required in all course work.

***Basic Core***

| | | |
|---|---|---|
| CAEP 6390 | History and Systems of Psychology | 3 SH |
| CAEP 6394 | Advanced Multicultural Psychology | 3 SH |
| CAEP 7750 | Biological Bases of Behavior | 3 SH |
| CAEP 7755 | Cognitive and Affective Bases of Behavior | 3 SH |
| CAEP 7756 | Social Psychology in an Organizational and Ecological Context | 3 SH |

***Fieldwork***

Complete 8 semester hours from the following courses:

| | | |
|---|---|---|
| CAEP 7741 | Advanced Fieldwork 1 | 1 or 2 SH |
| CAEP 7742 | Advanced Fieldwork 2 | 1 or 2 SH |
| CAEP 7743 | Advanced Fieldwork 3 | 1 or 2 SH |
| CAEP 7744 | Advanced Fieldwork 4 | 1 or 2 SH |

***Clinical Core***

| | | |
|---|---|---|
| CAEP 6350 | Introduction to Cognitive Assessment | 3 SH |
| CAEP 6352 | Personality Assessment | 3 SH |
| CAEP 7720 | Advanced Clinical Interventions | 3 SH |
| CAEP 7723 | Rorschach | 3 SH |
| CAEP 7758 | Doctoral Seminar in Contemporary Theories of Psychotherapy | 3 SH |
| CAEP 7778 | Doctoral Seminar: Leadership, Consultation, and Supervision | 3 SH |

***Elective Core***

Complete 3 semester hours from the following courses:

| | | |
|---|---|---|
| CAEP 5200 | Motivational Interviewing in a Healthcare Setting | 3 SH |
| CAEP 7751 | Advanced Clinical Neuropsychology | 3 SH |
| CAEP 7771 to CAEP 7776 | | |
| CAEP 7976 | Directed Study | 1 to 4 SH |
| CAEP 8553 | Advanced Counseling Practicum | 1 or 2 SH |

***Professional Core***

Complete 6 semester hours from the following courses (CAEP 7701 is repeatable):

| | | |
|---|---|---|
| CAEP 7701 | Doctoral Seminar in Counseling Psychology | 0 to 1 SH |
| CAEP 7732 | Legal and Ethical Issues in Community and Educational Settings | 3 SH |

***Research Core***

| | | |
|---|---|---|
| CAEP 7711 | Measurement: Advanced Psychometric Principles | 3 SH |
| CAEP 7712 | Intermediate Statistical Data Analysis Techniques | 3 SH |
| CAEP 7716 | Advanced Research and Data Analyses 2 | 3 SH |

***Doctoral Internship***

Complete 3 semester hours from the following courses:

| | | |
|---|---|---|
| CAEP 7798 | Doctoral Internship 1 | 1 to 3 SH |
| CAEP 7799 | Doctoral Internship 2 | 2 SH |

**DISSERTATION**

| | | |
|---|---|---|
| CAEP 9990 | Dissertation | 0 SH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

62 total semester hours required
Minimum 3.000 GPA required

## MS/Certificate of Advanced Graduate Study (CAGS) in School Psychology

Northeastern University's MS/Certificate of Advanced Graduate Study 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.

Complete all courses and requirements listed below unless otherwise indicated.

**MS REQUIREMENTS**

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

***Clinical/Applied***

| | | |
|---|---|---|
| CAEP 6201 | Introduction to Assessment | 3 SH |
| CAEP 6347 | Behavior Management | 3 SH |
| CAEP 6350 | Introduction to Cognitive Assessment | 3 SH |
| CAEP 6400 | Prepracticum in School Psychology | 1 SH |

***Foundations***

| | | |
|---|---|---|
| CAEP 6203 | Understanding Culture and Diversity | 3 SH |
| CAEP 6206 | Learning Principles | 3 SH |
| CAEP 6218 | Infant, Child, and Adolescent Development | 3 SH |
| CAEP 6247 | Child and Adolesent Psychopathology | 3 SH |
| CAEP 7750 | Biological Bases of Behavior | 3 SH |

**MS OPTIONS**

Complete one of the following options:

***Option without Specialization***

| | | |
|---|---|---|
| CAEP 6240 | Family, School, and Community Systems | 3 SH |
| CAEP 6365 | Seminar in School Psychology | 3 SH |

***Applied Behavior Analysis Option***

| | | |
|---|---|---|
| CAEP 6240 | Family, School, and Community Systems | 3 SH |
| CAEP 6327 | Behavior Assessment | 3 SH |
| CAEP 6365 | Seminar in School Psychology | 3 SH |

***Early Intervention Option***

| | | |
|---|---|---|
| CAEP 5150 | Early Intervention: Family Systems | 3 SH |
| CAEP 8425 | Early Intervention Practicum 1 | 2 SH |
| SLPA 6335 | Early Intervention: Assessment and Intervention | 3 SH |
| CAEP 8426 | Early Intervention Practicum 2 | 2 SH |

**MS PROGRAM CREDIT/GPA REQUIREMENTS**

31 total semester hours required
Minimum 3.000 GPA required

**CAGS REQUIREMENTS**

A grade of B or higher is required in all course work.

***Clinical/Applied***

| | | |
|---|---|---|
| CAEP 6353 | Curriculum-Based Assessment and Instruction | 3 SH |
| CAEP 6354 | Social, Emotional, and Behavioral Assessment | 3 SH |
| CAEP 6345 | Learning Problems: Educational, Biological, and Ecological Perspectives | 3 SH |
| CAEP 6355 | School-Based Counseling | 3 SH |
| CAEP 6360 | Consultation and Program Evaluation | 3 SH |
| CAEP 6399 | Clinical Skills in Counseling Psychology | 3 SH |

***Research***

| | | |
|---|---|---|
| CAEP 6202 | Research, Evaluation, and Data Analysis | 3 SH |

***Practicum***

| | | |
|---|---|---|
| CAEP 8415 | Practicum in School Psychology 1 | 2 SH |
| CAEP 8416 | Practicum in School Psychology 2 | 2 SH |

***Internship***

| | | |
|---|---|---|
| CAEP 8501 | Internship in School Psychology 1 | 3 SH |
| CAEP 8502 | Internship in School Psychology 2 | 3 SH |

### CAGS OPTIONAL SPECIALIZATIONS

*Note:* A specialization is optional. Consult your faculty advisor for more information.

***Early Intervention Specialization***

| | | |
|---|---|---|
| CAEP 6365 | Seminar in School Psychology | 3 SH |

***Applied Behavior Analysis Specialization***

| | | |
|---|---|---|
| CAEP 6328 | Research and Design Methods | 3 SH |
| CAEP 6336 | Systematic Inquiry 1 | 3 SH |
| CAEP 8417 | Intensive Practicum in Applied Behavior Analysis 1 | 2 SH |
| CAEP 8418 | Intensive Practicum in Applied Behavior Analysis 2 | 2 SH |

### CAGS PROGRAM CREDIT/GPA REQUIREMENTS

31 total semester hours required
Minimum 3.000 GPA required

## PhD in School Psychology

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.

Complete all courses and requirements listed below unless otherwise indicated.

### MILESTONES

Comprehensive exam
Annual review
Mentored research project
Dissertation committee
Dissertation proposal
Dissertation defense

### SCHOOL PSYCHOLOGY PhD REQUIREMENTS

A grade of B or higher is required in all course work.

***Professional Core***

| | | |
|---|---|---|
| CAEP 6365 | Seminar in School Psychology | 3 SH |
| CAEP 7732 | Legal and Ethical Issues in Community and Educational Settings | 3 SH |
| CAEP 7778 | Doctoral Seminar: Leadership, Consultation, and Supervision | 3 SH |

***Basic Core***

| | | |
|---|---|---|
| CAEP 6206 | Learning Principles | 3 SH |
| CAEP 6218 | Infant, Child, and Adolescent Development | 3 SH |
| CAEP 6390 | History and Systems of Psychology | 3 SH |
| CAEP 7750 | Biological Bases of Behavior | 3 SH |
| CAEP 7755 | Cognitive and Affective Bases of Behavior | 3 SH |
| CAEP 7756 | Social Psychology in an Organizational and Ecological Context | 3 SH |

***Multicultural Competency Core***

| | | |
|---|---|---|
| CAEP 6203 | Understanding Culture and Diversity | 3 SH |
| CAEP 6394 | Advanced Multicultural Psychology | 3 SH |

***Assessment and Intervention Core***

Complete 50 semester hours from the following twenty courses (including course work, practicum, fieldwork, and internship):

COURSE WORK

| | | |
|---|---|---|
| CAEP 6240 | Family, School, and Community Systems | 3 SH |
| CAEP 6247 | Child and Adolesent Psychopathology | 3 SH |
| CAEP 6345 | Learning Problems: Educational, Biological, and Ecological Perspectives | 3 SH |
| CAEP 6347 | Behavior Management | 3 SH |
| CAEP 6350 | Introduction to Cognitive Assessment | 3 SH |
| CAEP 6353 | Curriculum-Based Assessment and Instruction | 3 SH |
| CAEP 6354 | Social, Emotional, and Behavioral Assessment | 3 SH |
| CAEP 6355 | School-Based Counseling | 3 SH |
| CAEP 6360 | Consultation and Program Evaluation | 3 SH |
| CAEP 6399 | Clinical Skills in Counseling Psychology | 3 SH |
| CAEP 7722 | Educational and Psychological Assessment and Interventions with Infants, Toddlers, and Children | 3 SH |

PRACTICUM

| | | |
|---|---|---|
| CAEP 6400 | Prepracticum in School Psychology | 1 SH |
| CAEP 8415 | Practicum in School Psychology 1 | 2 SH |
| CAEP 8416 | Practicum in School Psychology 2 | 2 SH |

FIELDWORK

| | | |
|---|---|---|
| CAEP 7741 | Advanced Fieldwork 1 | 1 or 2 SH |
| CAEP 7742 | Advanced Fieldwork 2 | 1 or 2 SH |
| CAEP 7743 | Advanced Fieldwork 3 | 1 or 2 SH |
| CAEP 7744 | Advanced Fieldwork 4 | 1 or 2 SH |

INTERNSHIP

| | | |
|---|---|---|
| CAEP 7798 | Doctoral Internship 1 | 1 to 3 SH |
| CAEP 7799 | Doctoral Internship 2 | 2 SH |

***Research Core***

RESEARCH COURSE WORK

| | | |
|---|---|---|
| CAEP 6202 | Research, Evaluation, and Data Analysis | 3 SH |
| CAEP 7711 | Measurement: Advanced Psychometric Principles | 3 SH |
| CAEP 7712 | Intermediate Statistical Data Analysis Techniques | 3 SH |
| CAEP 7715 | Advanced Research and Data Analyses 1 | 3 SH |
| CAEP 7716 | Advanced Research and Data Analyses 2 | 3 SH |
| CAEP 7752 | Neuropsychological Practicum Supervision 1 | 2 SH |

RESEARCH TEAMS

| | | |
|---|---|---|
| CAEP 7771 | Research Team Experience 1 | 1 SH |
| CAEP 7772 | Research Team Experience 2 | 1 SH |
| CAEP 7773 | Research Team Experience 3 | 1 SH |

## DISSERTATION

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| CAEP 9990 | Dissertation | 0 SH |

## PROGRAM CREDIT/GPA REQUIREMENTS

104 total semester hours required
Minimum 3.000 GPA required

# Graduate Certificate in Early Intervention

Northeastern University's Graduate Certificate in Early Intervention program 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 students from school psychology, physical therapy, speech and language pathology, human services, psychology, and other disciplines who participate in the program.

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

The program is delivered in a hybrid format: Classes meet on campus one day each month, and additional course content is delivered through online distance education. The program can be taken alone or integrated with master's or bachelor's degree programs. Personnel who are working in the field may use their work site for field training. Course sequence for the certificate-only program is as follows. Degree-bearing programs incorporate the courses in alternative arrangements (e.g., MS/Certificate of Advanced Graduate Study in School Psychology, MS in Counseling Psychology).

Complete all courses and requirements listed below unless otherwise indicated.

## REQUIRED COURSE WORK

A grade of B– or higher is required in all courses.

***Early Intervention***

| | | |
|---|---|---|
| CAEP 5150 | Early Intervention: Family Systems | 3 SH |
| CAEP 5151 | Early Intervention: Infant and Toddler Development, Risk, and Disability | 3 SH |
| CAEP 5152 | Early Intervention: Planning and Evaluating Services | 3 SH |
| SLPA 6335 | Early Intervention: Assessment and Intervention | 3 SH |

***Practicum***

| | | |
|---|---|---|
| CAEP 8425 | Early Intervention Practicum 1 | 2 SH |
| CAEP 8426 | Early Intervention Practicum 2 | 2 SH |

## PROGRAM CREDIT/GPA REQUIREMENTS

16 total semester hours required
Minimum 3.000 GPA required

## COMMUNICATION SCIENCES AND DISORDERS

**www.northeastern.edu/bouve/slpa**

ENNIO MINGOLLA, PHD
*Professor and Chair*
LORI BOOK, PHD, CCC-SLP
*Assistant Clinical Professor and SLP Program Director*
SANDRA CLEVELAND, AUD, CCC-A
*Clinical Professor and AuD Program Director*

*MS in Speech Language Pathology Program*
503 Behrakis Health Sciences Center
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*Doctor of Audiology Program*
503 Behrakis Health Sciences Center
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Sandra Cleveland
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We are a learning community in which faculty and students support each other's learning across the life span. Our department mission is to educate students to the highest levels of professionalism, consistent with American Speech-Language-Hearing Association (ASHA) and Northeastern University accreditation standards and Massachusetts licensure requirements; to 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; to provide them with clinical experiences with clients, patients, and families from a diverse population base using an evidence-informed practice approach; to evaluate their progress using both formative and summative assessment measures.

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 in their teaching technology that improves the hearing, communication, respiration, and swallowing skills of individuals at a variety of age and skill levels.

### MS in Speech-Language Pathology

Adhering to the highest professional standards, the 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.

Complete all courses and requirements listed below unless otherwise indicated.

#### CORE REQUIREMENTS

***Grade Requirement***

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

***Speech-Language Disorders***

Requires 31 semester hours:

| | | |
|---|---|---|
| SLPA 5201 | Diagnostic Testing in Speech-Language Pathology | 1 SH |
| SLPA 6219 | Aural Rehabilitation | 3 to 4 SH |
| or elective | | |
| SLPA 6303 | Stuttering | 3 SH |
| SLPA 6304 | Augmentative and Alternative Communication | 3 SH |
| SLPA 6305 | Articulation and Phonology | 3 SH |
| SLPA 6306 | Speech-Language Disorders in Children | 3 SH |
| SLPA 6307 | Voice Disorders | 3 SH |
| SLPA 6308 | Dysphagia | 3 SH |
| SLPA 6309 | Speech-Language Disorders in Adults | 3 SH |
| SLPA 6321 | Motor Speech Disorders | 3 SH |
| SLPA 6330 | Language Literacy 1 | 0.5 SH |
| SLPA 6337 | Language Literacy Experiential Program | 0.5 SH |
| SLPA 6338 | Language Literacy 2 | 2 SH |

***Speech-Language Science***

| | | |
|---|---|---|
| SLPA 5109 | Neurology of Communication | 3 SH |
| SLPA 6301 | Speech Science | 3 SH |

***Research***

| | | |
|---|---|---|
| SLPA 6211 | Research and Evidence-Based Practice | 3 SH |
| SLPA 6420 | Practical Statistics for Speech-Language Pathology and Audiology | 3 SH |

***Clinical Practicum***

| | | |
|---|---|---|
| SLPA 6415 | Speech-Language Pathology Advanced Clinical Practicum 1 | 3 SH |
| SLPA 6416 | Speech-Language Pathology Advanced Clinical Practicum 2 | 2 SH |
| SLPA 6417 | Speech-Language Pathology Advanced Clinical Practicum 3 | 2 SH |
| SLPA 6418 | Speech-Language Pathology Advanced Clinical Practicum 4 | 2 SH |

#### PROGRAM CREDIT/GPA REQUIREMENTS

52 total semester hours required
Minimum 3.000 GPA required

## AuD—Doctor of Audiology

Audiologists specialize in the prevention, identification, assessment, and rehabilitation of hearing and balance disorders and serve those with congenital and acquired hearing losses. They prescribe and dispense hearing aids and instruct patients in using amplification and provide aural rehabilitation and speech reading services to those with hearing aids or cochlear implants. Additionally, audiologists provide vestibular rehabilitation or balance retraining exercises for some balance disorders. Upon graduation, students are employed in a variety of settings that reflect the diverse populations served by audiologists. Some graduates are self-employed in private practice clinics that provide speech, language, and hearing services. Others function as members of interdisciplinary teams in healthcare settings or educational settings or in research laboratories.

Complete all courses and requirements listed below unless otherwise indicated.

### CORE COURSES

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

***Diagnostic***

Requires 15 semester hours:

| | | |
|---|---|---|
| SLPA 5100 | Diagnostic Audiometry | 3 SH |
| SLPA 5104 | Differential Diagnosis in Audiology | 3 SH |
| SLPA 5105 | Auditory Pathologies | 3 SH |
| SLPA 6722 | Evaluation and Treatment of Central Pathologies | 3 SH |
| SLPA 5110 | Language Disorders across the Life Span | 3 to 4 SH |

or elective

***Physiology***

| | | |
|---|---|---|
| SLPA 5109 | Neurology of Communication | 3 SH |
| SLPA 5111 | Anatomy and Physiology of the Auditory System | 3 SH |
| SLPA 6741 | Pharmacology for Audiologists | 2 SH |

***Electronics***

| | | |
|---|---|---|
| SLPA 6336 | Instrumentation and Electronics for Audiologists | 3 SH |

***Treatment***

| | | |
|---|---|---|
| SLPA 5108 | Rehabilitation Audiology | 3 SH |
| SLPA 6210 | Psychosocial Aspects of Communication Disorders | 2 SH |
| SLPA 6715 | Amplification 1 | 3 SH |
| SLPA 6716 | Amplification 2 | 3 SH |
| SLPA 6728 | Assessment of Vestibular Disorders | 3 SH |
| SLPA 6729 | Management of Vestibular Disorders | 3 SH |
| SLPA 6737 | Advanced Evoked Potential Measures | 3 SH |
| SLPA 6747 | Implantable Hearing Devices | 3 SH |

***Practice***

| | | |
|---|---|---|
| SLPA 6208 | Pediatric Audiology | 2 SH |
| SLPA 6211 | Research and Evidence-Based Practice | 3 SH |
| SLPA 6314 | Professional Practice | 2 SH |
| SLPA 6420 | Practical Statistics for Speech-Language Pathology and Audiology | 3 SH |
| SLPA 6711 | Scope of Practice in Audiology | 2 SH |
| SLPA 6773 | Topics Seminar | 3 SH |

***Hearing Science***

| | | |
|---|---|---|
| SLPA 6209 | Psychoacoustics | 2 SH |
| SLPA 6214 | Noise and Hearing | 2 SH |
| SLPA 6221 | Hearing Science | 3 SH |

***Elective***

Complete one elective course (3 semester hours).

### CLINIC AND INTERNSHIP

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

***Clinic***

| | | |
|---|---|---|
| SLPA 6751 | Advanced Audiology Clinic 1 | 2 SH |
| SLPA 6752 | Advanced Audiology Clinic 2 | 2 SH |
| SLPA 6753 | Advanced Audiology Clinic 3 | 2 SH |
| SLPA 6754 | Advanced Audiology Clinic 4 | 2 SH |
| SLPA 6755 | Advanced Audiology Clinic 5 | 2 SH |
| SLPA 6756 | Advanced Audiology Clinic 6 | 2 SH |
| SLPA 6757 | Advanced Audiology Clinic 7 | 3 SH |
| SLPA 6758 | Advanced Audiology Clinic 8 | 3 SH |

***Internship***

| | | |
|---|---|---|
| SLPA 6791 | AuD Clinic Internship 1 | 3 SH |
| SLPA 6792 | AuD Clinic Internship 2 | 3 SH |
| SLPA 6793 | AuD Clinic Internship 3 | 3 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

101 total semester hours required

Minimum 3.000 GPA required

## COUNSELING AND APPLIED EDUCATIONAL PSYCHOLOGY

See “Applied Psychology” on page 169.

## HEALTH SCIENCES

**www.northeastern.edu/bouve/hs**

JEAN FLATLEY MCGUIRE, PHD
*Professor of the Practice and Interim Chair*

316 Robinson Hall
617.373.4280
617.373.2968 (fax)

Welcome to the Department of Health Sciences at the Bouvé College of Health Sciences at Northeastern University. Our department 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 an engaging undergraduate academic program in health sciences as well as graduate degree programs, including the Master of Public Health, focusing in urban health, and Master of Science in Exercise Science with Concentration in Physical Activity and Public Health.

Our diverse faculty has expertise in the fields of population health, health disparities, nutritional epidemiology, social epidemiology, exercise science, medical sociology, public policy, personal health technologies, neurodevelopmental disorders, 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 departments in the university, including the Institute on Urban Health Research (IUHR), the Center for Community Health Education Research and Service (CCHERS), and our National Institutes of Health- (NIH) funded Center for Population Health and Health Disparities (CPHHD), as well as community agencies and neighborhood health centers in the local Boston area.

### MS in Exercise Science with Concentration in Physical Activity and Public Health

***Director: Carmen Castaneda Sceppa, MD, PhD***

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 inter-disciplinary 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 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.

Complete all courses and requirements listed below unless otherwise indicated.

## REQUIREMENTS

A grade of B or higher is required in all course work.

***Exercise Science Core***

| | | |
|---|---|---|
| EXSC 5200 | Cardiopulmonary Physiology | 3 SH |
| EXSC 5210 | Physical Activity and Exercise: Prescription, Measurement, and Testing | 3 SH |
| EXSC 5220 | Advanced Exercise Physiology | 3 SH |
| EXSC 5230 | Physical Activity and Exercise: Effects on Musculoskeletal Health and Disease | 3 SH |

***Electrocardiography***

| | | |
|---|---|---|
| EXSC 6202 | Electrocardiography | 3 SH |

***Public Health Core***

Requires 6 semester hours:

| | | |
|---|---|---|
| PHTH 5212 | Public Health Administration and Policy | 3 SH |
| PHTH 5540 | Health Education and Program Planning | 3 or 4 SH |

***Research Core***

Requires 9 semester hours:

| | | |
|---|---|---|
| PHTH 5202 | Epidemiology | 3 or 4 SH |
| PHTH 5210 | Biostatistics in Public Health | 3 SH |
| EXSC 6400 | Applied Research Methods | 3 SH |

***Electives***

Complete two of the following courses (6 semester hours):

| | | |
|---|---|---|
| HSCI 5230 | Clinical Nutrition Applications in Health and Disease | 3 or 4 SH |

EXSC 5000 to EXSC 6402
PHTH 5000 to PHTH 6800

## PROGRAM CREDIT/GPA REQUIREMENTS

36 total semester hours required
Minimum 3.000 GPA required

# MS in Health Informatics

***Director: Daniel Feinberg, MBA***

Northeastern's interdisciplinary MS in Health Informatics Program 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.

Complete all courses and requirements listed below unless otherwise indicated.

## REQUIREMENTS

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

***Core Requirements***

| | | |
|---|---|---|
| HINF 5101 | Introduction to Health Informatics and Health Information Systems | 3 SH |
| HINF 5105 | The American Healthcare System | 3 SH |
| HINF 7701 | Health Informatics Capstone Project | 3 SH |

***Business Management Core***

Complete two of the following courses:

| | | |
|---|---|---|
| HINF 6201 | Organizational Behavior, Work Flow Design, and Change Management | 3 SH |
| HINF 6215 | Project Management | 3 SH |
| HINF 6335 | Management Issues in Healthcare Information Technology | 3 SH |
| PHTH 5226 | Strategic Management and Leadership in Healthcare | 3 SH |

***Health Informatics Core***

Complete two of the following courses:

| | | |
|---|---|---|
| HINF 6202 | Business of Healthcare Informatics | 3 SH |
| HINF 6205 | Creation and Application of Medical Knowledge | 3 SH |

| | | |
|---|---|---|
| HINF 6225 | Health Systems Lab | 3 SH |
| PHTH 5232 | Evaluating Healthcare Quality | 3 SH |

***Technical Core***

Complete two of the following courses:

| | | |
|---|---|---|
| HINF 5102 | Data Management in Healthcare | 3 SH |
| HINF 6220 | Database Design, Access, Modeling, and Security | 3 SH |
| HINF 6230 | Strategic Topics in Programming For Health Professionals | 3 SH |
| HINF 6355 | Key Standards in Health Informatics Systems | 3 SH |

***Elective Core***

Complete two of the following courses (6 semester hours):

| | | |
|---|---|---|
| HINF 6325 | Legal and Social Issues in Health Informatics | 3 SH |
| HINF 6330 | Emerging Technologies in Healthcare | 3 SH |
| HINF 6345 | Design for Usability in Healthcare | 3 SH |
| HINF 6350 | Public Health Surveillance and Informatics | 3 SH |
| PHTH 5210 | Biostatistics in Public Health | 3 SH |
| PHTH 5202 | Epidemiology | 3 or 4 SH |

Also any HINF course(s)

**PROGRAM CREDIT/GPA REQUIREMENTS**

33 total semester hours required
Minimum 3.000 GPA required

## MS in Health Informatics—ALIGN Program

Our MS in Health Informatics ALIGN Program seeks to prepare students from diverse backgrounds to excel in the health informatics field. ALIGN's custom master's degree curricula are tailored to each student's professional and educational background, allowing successful students to transition into careers in high-demand industries. Learn more at www.northeastern.edu/align.

Complete all courses and requirements listed below unless otherwise indicated.

**REQUIREMENTS**

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

***Core Requirements***

| | | |
|---|---|---|
| HINF 0200 | Health and Medicine for Nonclinicians | 3 SH |
| HINF 5101 | Introduction to Health Informatics and Health Information Systems | 3 SH |
| HINF 5105 | The American Healthcare System | 3 SH |
| HINF 7701 | Health Informatics Capstone Project | 3 SH |
| IA 5001 | Cyberspace Technology and Applications | 3 SH |

***Business Management Core***

Complete two of the following courses:

| | | |
|---|---|---|
| HINF 6201 | Organizational Behavior, Work Flow Design, and Change Management | 3 SH |
| HINF 6215 | Project Management | 3 SH |
| HINF 6335 | Management Issues in Healthcare Information Technology | 3 SH |
| PHTH 5226 | Strategic Management and Leadership in Healthcare | 3 SH |

***Health Informatics Core***

Complete two of the following courses:

| | | |
|---|---|---|
| HINF 6202 | Business of Healthcare Informatics | 3 SH |
| HINF 6205 | Creation and Application of Medical Knowledge | 3 SH |
| HINF 6225 | Health Systems Lab | 3 SH |
| PHTH 5232 | Evaluating Healthcare Quality | 3 SH |

***Technical Core***

Complete two of the following courses:

| | | |
|---|---|---|
| HINF 5102 | Data Management in Healthcare | 3 SH |
| HINF 6220 | Database Design, Access, Modeling, and Security | 3 SH |
| HINF 6230 | Strategic Topics in Programming For Health Professionals | 3 SH |
| HINF 6355 | Key Standards in Health Informatics Systems | 3 SH |

***Elective Core***

Complete two of the following courses (6 semester hours):

| | | |
|---|---|---|
| HINF 6325 | Legal and Social Issues in Health Informatics | 3 SH |
| HINF 6330 | Emerging Technologies in Healthcare | 3 SH |
| HINF 6345 | Design for Usability in Healthcare | 3 SH |
| HINF 6350 | Public Health Surveillance and Informatics | 3 SH |
| PHTH 5210 | Biostatistics in Public Health | 3 SH |
| PHTH 5202 | Epidemiology | 3 or 4 SH |

Also any HINF course(s)

**PROGRAM CREDIT/GPA REQUIREMENTS**

39 total semester hours required
Minimum 3.000 GPA required

## Certificates in Health Informatics

Northeastern's graduate certificate programs provide high-quality, specialized training in health informatics and the opportunity to acquire and apply your knowledge quickly. In eight months, you can prepare for a key role in areas of the field offering ample career opportunities.

Three certificate programs enable you to choose the one that addresses your specific goals:

- 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.

## Graduate Certificate in Health Informatics Management and Exchange

Eight-month program
Five courses, 15 semester hours

The certificate program in health informatics management and exchange offers you 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.

Complete all courses and requirements listed below unless otherwise indicated.

### HEALTH INFORMATICS MANAGEMENT AND EXCHANGE REQUIREMENTS

A grade of B– or higher is required in all course work.

***Health Informatics Core***

| | | |
|---|---|---|
| HINF 5101 | Introduction to Health Informatics and Health Information Systems | 3 SH |
| HINF 5102 | Data Management in Healthcare | 3 SH |

***Management and Exchange***

| | | |
|---|---|---|
| HINF 6205 | Creation and Application of Medical Knowledge | 3 SH |
| HINF 6220 | Database Design, Access, Modeling, and Security | 3 SH |
| HINF 6355 | Key Standards in Health Informatics Systems | 3 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

15 total semester hours required
Minimum 3.000 GPA required

## Graduate Certificate in Health Informatics Privacy and Security

Eight-month program
Five courses, 15 semester hours

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.

Complete all courses and requirements listed below unless otherwise indicated.

### HEALTH INFORMATICS PRIVACY AND SECURITY REQUIREMENTS

A grade of B– or higher is required in all course work.

***Health Informatics Core***

| | | |
|---|---|---|
| HINF 5101 | Introduction to Health Informatics and Health Information Systems | 3 SH |
| HINF 5102 | Data Management in Healthcare | 3 SH |

***Privacy and Security***

| | | |
|---|---|---|
| IA 5130 | Computer System Security | 4 SH |
| IA 5150 | Network Security Practices | 4 SH |
| IA 5200 | Security Risk Management and Assessment | 4 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

18 total semester hours required
Minimum 3.000 GPA required

## Graduate Certificate in Health Informatics Software Engineering

Eight-month program
Five courses, 15 semester hours

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.

Complete all courses and requirements listed below unless otherwise indicated.

### HEALTH INFORMATICS SOFTWARE ENGINEERING REQUIREMENTS

A grade of B– or higher is required in all course work.

***Health Informatics Core***

| | | |
|---|---|---|
| HINF 5101 | Introduction to Health Informatics and Health Information Systems | 3 SH |
| HINF 5102 | Data Management in Healthcare | 3 SH |

***Management and Exchange***

| | | |
|---|---|---|
| HINF 6205 | Creation and Application of Medical Knowledge | 3 SH |
| HINF 6355 | Key Standards in Health Informatics Systems | 3 SH |
| HINF 6345 | Design for Usability in Healthcare | 3 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

15 total semester hours required
Minimum 3.000 GPA required

## MPH—Master of Public Health

***Director: Shan Mohammed, MD, MPH***

The Master of Public Health program at Northeastern University seeks to provide society with knowledgeable, professionally educated, racially and ethnically diverse individuals who promote and protect the health of urban communities through innovation in practice-oriented education, research, and service.

In order to help prepare the next generation of urban 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)

- 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
- Elective courses may be taken on a wide range of public health topics, including cross-departmental offerings from Northeastern's other colleges (law, business, social sciences, and more)
- A supportive learning environment that includes outstanding student mentoring

Complete all courses and requirements listed below unless otherwise indicated.

## REQUIREMENTS

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

***Required Courses***

Requires 30 semester hours:

| | | |
|---|---|---|
| PHTH 5120 | Race, Ethnicity, and Health in the United States | 3 or 4 SH |
| PHTH 5202 | Epidemiology | 3 or 4 SH |
| PHTH 5210 | Biostatistics in Public Health | 3 SH |
| PHTH 5212 | Public Health Administration and Policy | 3 SH |
| PHTH 5214 | Environmental Health | 3 SH |
| PHTH 5540 | Health Education and Program Planning | 3 or 4 SH |
| or PPUA 6509 | Techniques of Program Evaluation | 3 SH |
| PHTH 6200 | Principles and History of Urban Health | 3 SH |
| PHTH 6204 | Society, Behavior, and Health | 3 SH |
| PHTH 6208 | Urban Community Health Assessment | 3 SH |
| PHTH 6966 | Practicum | 1 to 4 SH |

***Capstone***

| | | |
|---|---|---|
| PHTH 6910 | Public Health Capstone | 3 SH |

***Electives***

Complete three of the following courses (9 semester hours). In consultation with your faculty advisor, you may complete electives from another discipline:

| | | |
|---|---|---|
| PHTH 5222 | Health Advocacy | 3 SH |
| PHTH 5224 | Social Epidemiology | 3 SH |
| PHTH 5226 | Strategic Management and Leadership in Healthcare | 3 SH |
| PHTH 5228 | Advances in Measuring Behavior | 3 SH |
| PHTH 5230 | Global Health | 3 SH |
| PHTH 5234 | Economic Perspectives on Health Policy | 3 SH |
| PHTH 5540 | Health Education and Program Planning | 3 or 4 SH |
| PHTH 5976 | Directed Study | 1 to 4 SH |
| PHTH 6202 | Intermediate Epidemiology | 3 SH |
| PHTH 6210 | Applied Regression Analysis | 3 SH |
| PHTH 6228 | Public Health Nutrition | 3 SH |
| PHTH 6320 | Qualitative Methods in Health and Illness | 3 SH |
| PHTH 6400 | Principles of Population Health 1 | 3 SH |
| PHTH 6410 | Principles of Population Health 2 | 3 SH |
| PHTH 6440 | Advanced Methods in Biostatistics | 3 SH |
| PPUA 6509 | Techniques of Program Evaluation | 3 SH |

## PROGRAM CREDIT/GPA REQUIREMENTS

42 total semester hours required
Minimum 3.000 GPA required

# PhD in Population Health

***Director: Helen H. Suh, ScD***

This program trains students to become public health 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, epidemiolFogy, 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 learn to conduct research that addresses five key health determinants:

1. Social and community context
2. Environment and neighborhoods
3. Health and healthcare delivery
4. Education
5. Economic stability

Complete all courses and requirements listed below unless otherwise indicated.

## MILESTONES

Qualifying exam
Annual review
Dissertation committee
Dissertation proposal
Dissertation defense

## PROGRAM REQUIREMENTS

***Health Services***

| | | |
|---|---|---|
| PHTH 5232 | Evaluating Healthcare Quality | 3 SH |
| or PHTH 5234 | Economic Perspectives on Health Policy | 3 SH |

***Population Health***

| | | |
|---|---|---|
| PHTH 6400 | Principles of Population Health 1 | 3 SH |
| PHTH 6410 | Principles of Population Health 2 | 3 SH |

***Epidemiology***

Requires 6 semester hours:

| | | |
|---|---|---|
| PHTH 5202 | Epidemiology | 3 or 4 SH |
| PHTH 6202 | Intermediate Epidemiology | 3 SH |

***Research Ethics***

| | | |
|---|---|---|
| BIOL 6381 | Ethics in Biological Research | 2 SH |
| or PHSC 6212 | Research Skills and Ethics | 1 SH |

***Research and Analysis***

| | | |
|---|---|---|
| PHTH 5210 | Biostatistics in Public Health | 3 SH |
| PHTH 6210 | Applied Regression Analysis | 3 SH |

## OPTIONS

Complete one of the following options:

***Social and Environmental Determinants-of-Health Option***

REQUIRED COURSES

| | | |
|---|---|---|
| PHTH 5224 | Social Epidemiology | 3 SH |
| PHTH 6440 | Advanced Methods in Biostatistics | 3 SH |

ELECTIVES

Complete 5 semester hours from the list of electives below.

***Health Services and Policy Option***

REQUIRED COURSES

| | | |
|---|---|---|
| ECON 5110 | Microeconomic Theory | 4 SH |
| PHTH 5234 | Economic Perspectives on Health Policy | 3 SH |

ELECTIVES

Complete 4 semester hours from the list of electives below.

## LIST OF ELECTIVES

| | | |
|---|---|---|
| CIVE 7388 | Special Topics in Civil Engineering | 2 or 4 SH |
| ECON 5110 | Microeconomic Theory | 4 SH |
| ECON 5140 | Applied Econometrics | 4 SH |
| ECON 7200 | Topics in Applied Economics | 4 SH |
| EXSC 5200 | Cardiopulmonary Physiology | 3 SH |
| EXSC 5220 | Advanced Exercise Physiology | 3 SH |
| EXSC 5230 | Physical Activity and Exercise: Effects on Musculoskeletal Health and Disease | 3 SH |
| HINF 5200 | Theoretical Foundations in Personal Health Informatics | 4 SH |
| HINF5XX1 (Pending Approval) | | |
| HINF5XX2 (Pending Approval) | | |
| HRMG 6220 | Health Organization Management | 3 SH |
| PHSC 6216 | Human Physiology and Pathophysiology | 2 SH |
| PHTH 5212 | Public Health Administration and Policy | 3 SH |
| PHTH 5214 | Environmental Health | 3 SH |
| PHTH 5226 | Strategic Management and Leadership in Healthcare | 3 SH |
| PHTH 5228 | Advances in Measuring Behavior | 3 SH |
| PHTH 5230 | Global Health | 3 SH |
| PHTH 5440 | Community-Based Participatory Research: Environmental Health | 3 SH |
| PHTH 5540 | Health Education and Program Planning | 3 or 4 SH |
| PHTH 6200 | Principles and History of Urban Health | 3 SH |
| PHTH 6204 | Society, Behavior, and Health | 3 SH |
| PHTH 6208 | Urban Community Health Assessment | 3 SH |
| PHTH 6232 | Neighborhood and Public Health | 3 SH |
| PHTH 6320 | Qualitative Methods in Health and Illness | 3 SH |
| SOCL 7257 | Contemporary Issues in Sociology | 3 SH |
| SOCL 7287 | Social Movements in Health | 3 SH |
| STRT 6220 | Strategic Management for Healthcare Organizations | 3 SH |

## DISSERTATION COURSES

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| PHTH 9990 | Dissertation | 0 SH |

## PROGRAM CREDIT/GPA REQUIREMENTS

33 total semester hours required

Minimum 3.000 GPA required

## SCHOOL OF NURSING

**www.northeastern.edu/bouve/nursing**

NANCY P. HANRAHAN, RN, PHD, FAAN
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This is an exciting time in healthcare and nursing in particular. According to a recent Gallup Poll, the public ranks nursing as the "most ethical" profession. In the newly enacted healthcare legislation passed by Congress, nurses are considered the critical backbone and life force of the delivery system. What does that mean for those considering nursing as a profession? It means that as a nurse you will carry an awesome responsibility—to improve the health outcomes of patients and their families. It also means that you must be among the best prepared of health professionals. Excellent preparation is just what we seek to offer.

If you are coming to the School of Nursing to earn a master's, PhD, or DNP, your learning will be guided by our senior faculty, nursing leaders who are expert advance practice nurses in their respective specialty areas. Our affiliation with over 100 institutions means that you and the faculty can select the best place for your clinical rotations. *U.S. News & World Report* ranked our nurse anesthesia graduate program in the top 10 in the United States.

You want to change career pathways? We have the Certificate of Advanced Graduate Study (CAGS) that facilitates attainment of a specialty track if you already have an advanced nursing degree. You want research? We have excellent nurse researchers who are working to improve patient care and advance nursing knowledge. Come join nursing at its finest. Northeastern University is a school on the move.

### Admission Requirement

Admissions requirements are specific to the program. Refer to www.northeastern.edu/bouve/grad/chart.html.

### Acute-Care—Adult-Gerontology Nurse Practitioner

The adult-gerontology acute-care program seeks to prepare nurses for advanced practice roles as clinical experts, managers, educators, and consultants. The program provides advanced study with a major focus on clinical experience and culminates with the Master of Science in Nursing. Students may pursue either full-time or part-time study, and a BSN/MS in Nursing is available for qualified nurses. Nurses who possess an MS in Nursing are eligible for the Certificate of Advanced Graduate Study (CAGS) in this specialization.

### Certificate of Advanced Graduate Study (CAGS)—Adult-Gerontology Nurse Practitioner, Acute Care

Complete all courses and requirements listed below unless otherwise indicated.

#### REQUIRED COURSES

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

***Acute Care Theory***

| | | |
|---|---|---|
| NRSG 6220 | Nursing Management: Acute Episodic Illness | 3 SH |
| NRSG 6221 | Nursing Management: Critical and Chronic Illness | 3 SH |
| NRSG 6241 | Acute-Care Concepts in Nursing Practice | 3 SH |

***Acute Care Practicum***

| | | |
|---|---|---|
| NRSG 6420 | Adult-Gerontology Acute-Care Nursing Practicum 1 | 2 SH |
| NRSG 6421 | Adult-Gerontology Acute-Care Nursing Practicum 2 | 4 SH |
| NRSG 6422 | Adult-Gerontology Acute-Care Nursing Practicum 3 | 4 SH |

#### ELECTIVES

Complete 5 semester hours of NRSG course work with a grade of B or higher.

#### PROGRAM CREDIT/GPA REQUIREMENTS

24 total semester hours required
Minimum 3.000 GPA required

### MS in Nursing—Adult-Gerontology Nurse Practitioner, Acute Care

Complete all courses and requirements listed below unless otherwise indicated.

#### REQUIRED COURSES

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

***Professional Core***

| | | |
|---|---|---|
| NRSG 5118 | Healthcare System and Professional Role Development | 3 SH |
| NRSG 5121 | Epidemiology and Population Health | 3 SH |

***Clinical Core***

| | | |
|---|---|---|
| NRSG 5117 | Advanced Pharmacology | 2 SH |
| NRSG 5126 | Pathophysiology for Advanced Practice | 3 SH |
| NRSG 6115 | Health Assessment | 3 SH |
| NRSG 6325 | Pharmacotherapeutics in Anesthesia and Critical Care Nursing | 2 SH |
| or NRSG 6222 | Pharmacology of Adults and Older Adults | 2 SH |

***Acute Care Theory***

| | | |
|---|---|---|
| NRSG 6220 | Nursing Management: Acute Episodic Illness | 3 SH |
| NRSG 6221 | Nursing Management: Critical and Chronic Illness | 3 SH |
| NRSG 6241 | Acute-Care Concepts in Nursing Practice | 3 SH |

***Acute Care Practicum***

| | | |
|---|---|---|
| NRSG 6420 | Adult-Gerontology Acute-Care Nursing Practicum 1 | 2 SH |
| NRSG 6421 | Adult-Gerontology Acute-Care Nursing Practicum 2 | 4 SH |
| NRSG 6422 | Adult-Gerontology Acute-Care Nursing Practicum 3 | 4 SH |

***Research Core***

| | | |
|---|---|---|
| NRSG 7105 | Translating Research Evidence into Practice | 3 SH |
| NRSG 7110 | Evidence-Based Practice Research Application | 2 SH |

**ELECTIVE**

Complete one NRSG course (3 semester hours) with a grade of B or higher.

**PROGRAM CREDIT/GPA REQUIREMENTS**

43 total semester hours required
Minimum 3.000 GPA required

## Psychiatric Mental Health

We offer 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 nurses with a diploma or associate degree from a nursing program, there is a 67-semester-hour BSN/MSN option.
- 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.

Incoming students should be aware that the American Nursing Credentialing Center (ANCC) plans to retire specific certification exams related to psychiatric mental health, with the family psychiatric and mental health nurse practitioner as the sole new certification exam offered in 2015. The life span focus of our curriculum prepares students for this exam.

## Certificate of Advanced Graduate Study (CAGS)—Family Psychiatric Nurse Practitioner

Complete all courses and requirements listed below unless otherwise indicated.

**REQUIRED COURSE WORK**

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

***Family Psychiatric Core***

| | | |
|---|---|---|
| NRSG 6281 | Dimensions of Clinical Practice | 3 SH |
| NRSG 6282 | Clinical Psychopharmacology | 3 SH |
| NRSG 6283 | Psychobiological Bases of Mental Disorders | 3 SH |
| NRSG 6286 | Contemporary Psychotherapies—Theory and Practice | 3 SH |

***Family Psychiatric Practicum***

| | | |
|---|---|---|
| NRSG 6480 | Psychiatric Practicum across the Life Span 1 | 5 SH |
| NRSG 6481 | Psychiatric Practicum across the Life Span 2 | 5 SH |

**ELECTIVE**

Complete 2 semester hours of NRSG course work with a grade of B or higher.

**PROGRAM CREDIT/GPA REQUIREMENTS**

24 total semester hours required
Minimum 3.000 GPA required

## MS in Nursing—Family Psychiatric Nurse Practitioner

Complete all courses and requirements listed below unless otherwise indicated.

**REQUIRED COURSE WORK**

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

***Professional Core***

| | | |
|---|---|---|
| NRSG 5118 | Healthcare System and Professional Role Development | 3 SH |
| NRSG 5121 | Epidemiology and Population Health | 3 SH |

***Family Psychiatric Core***

| | | |
|---|---|---|
| NRSG 6281 | Dimensions of Clinical Practice | 3 SH |
| NRSG 6282 | Clinical Psychopharmacology | 3 SH |
| NRSG 6283 | Psychobiological Bases of Mental Disorders | 3 SH |
| NRSG 6286 | Contemporary Psychotherapies—Theory and Practice | 3 SH |

***Clinical Core***

| | | |
|---|---|---|
| NRSG 5117 | Advanced Pharmacology | 2 SH |
| NRSG 5126 | Pathophysiology for Advanced Practice | 3 SH |
| NRSG 6115 | Health Assessment | 3 SH |

***Family Psychiatric Practicum***

| | | |
|---|---|---|
| NRSG 6480 | Psychiatric Practicum across the Life Span 1 | 5 SH |
| NRSG 6481 | Psychiatric Practicum across the Life Span 2 | 5 SH |

***Research Core***

| | | |
|---|---|---|
| NRSG 7105 | Translating Research Evidence into Practice | 3 SH |
| NRSG 7110 | Evidence-Based Practice Research Application | 2 SH |

**ELECTIVE**

Complete 2 semester hours of NRSG course work with a grade of B or higher.

**PROGRAM CREDIT/GPA REQUIREMENTS**

43 total semester hours required
Minimum 3.000 GPA required

## MS in Nursing—Family Psychiatric Nurse Practitioner—Direct Entry

Complete all courses and requirements listed below unless otherwise indicated.

**REQUIRED COURSE WORK**

A grade of B or higher is required in all course work.

***Professional Core***

| | | |
|---|---|---|
| NRSG 5118 | Healthcare System and Professional Role Development | 3 SH |
| NRSG 5121 | Epidemiology and Population Health | 3 SH |

***Family Psychiatric Core***

| | | |
|---|---|---|
| NRSG 6281 | Dimensions of Clinical Practice | 3 SH |
| NRSG 6282 | Clinical Psychopharmacology | 3 SH |
| NRSG 6283 | Psychobiological Bases of Mental Disorders | 3 SH |
| NRSG 6286 | Contemporary Psychotherapies—Theory and Practice | 3 SH |

***Clinical Core***

| | | |
|---|---|---|
| NRSG 5117 | Advanced Pharmacology | 2 SH |
| NRSG 5126 | Pathophysiology for Advanced Practice | 3 SH |
| NRSG 6115 | Health Assessment | 3 SH |

***Family Psychiatric Practicum***

| | | |
|---|---|---|
| NRSG 6480 | Psychiatric Practicum across the Life Span 1 | 5 SH |
| NRSG 6481 | Psychiatric Practicum across the Life Span 2 | 5 SH |

***Research Core***

| | | |
|---|---|---|
| NRSG 7105 | Translating Research Evidence into Practice | 3 SH |
| NRSG 7110 | Evidence-Based Practice Research Application | 2 SH |

**ELECTIVE**

A grade of B or higher is required in all course work.
Complete 2 semester hours from the following courses:

| | | |
|---|---|---|
| NRSG 6287 | Child and Adolescent Psychopharmacology | 2 SH |
| NRSG 6288 | Geriatric and Aging Adult Psychopharmacology | 2 SH |
| NRSG 5117 | Advanced Pharmacology | 2 SH |
| NRSG 6210 | Holistic Healing and Integrative Health | 3 SH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

43 total semester hours required
Minimum 3.000 GPA required

## Neonatal Nurse Practitioner

We require applicants to have at least two years of neonatal intensive care unit (NICU) experience before entering our program, and most have more than that. As a registered nurse, you already have a significant base of nursing knowledge. The neonatal nurse practitioner (NNP) program focuses on advanced nursing knowledge and clinical practice. You will have an opportunity to:

- 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.

We also offer a certificate of advanced study for experienced nurses who have a master's degree in nursing and want to specialize in neonatal critical care. One year of full-time study will offer you an opportunity to increase your skills and experience and enable you to sit for the neonatal nurse practitioner certification exam offered by the National Certification Corporation for the obstetric, gynecologic, and neonatal nursing specialties.

## Certificate of Advanced Graduate Study (CAGS)—Neonatal Nurse Practitioner

Complete all courses and requirements listed below unless otherwise indicated.

**REQUIRED COURSES**

A grade of B or higher is required in all course work.

***Prerequisites***

| | | |
|---|---|---|
| NRSG 5117 | Advanced Pharmacology | 2 SH |
| NRSG 5126 | Pathophysiology for Advanced Practice | 3 SH |

***Clinical Core***

| | | |
|---|---|---|
| NRSG 6116 | Advanced Health Assessment of the Neonate and Infant | 3 SH |
| NRSG 6230 | Nursing Management: Critically Ill Neonatal 1 | 3 SH |
| NRSG 6231 | Nursing Management: Critically Ill Neonatal 2 | 3 SH |
| NRSG 6232 | Neonatal Pharmacology | 2 SH |

***Neonatal Practicum***

| | | |
|---|---|---|
| NRSG 6430 | Neonatal Clinical Practicum 1 | 4 SH |
| NRSG 6431 | Neonatal Clinical Practicum 2 | 4 SH |
| NRSG 6432 | Neonatal Clinical Practicum 3 | 2 SH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

24 total semester hours required
Minimum 3.000 GPA required

## MS in Nursing—Neonatal Nurse Practitioner

Complete all courses and requirements listed below unless otherwise indicated.

**REQUIRED COURSES**

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

***Professional Core***

| | | |
|---|---|---|
| NRSG 5118 | Healthcare System and Professional Role Development | 3 SH |
| NRSG 5121 | Epidemiology and Population Health | 3 SH |
| NRSG 5126 | Pathophysiology for Advanced Practice | 3 SH |
| NRSG 5117 | Advanced Pharmacology | 2 SH |

***Clinical Core***

| | | |
|---|---|---|
| NRSG 6116 | Advanced Health Assessment of the Neonate and Infant | 3 SH |
| NRSG 6230 | Nursing Management: Critically Ill Neonatal 1 | 3 SH |
| NRSG 6231 | Nursing Management: Critically Ill Neonatal 2 | 3 SH |
| NRSG 6232 | Neonatal Pharmacology | 2 SH |

***Neonatal Practicum***

| | | |
|---|---|---|
| NRSG 6430 | Neonatal Clinical Practicum 1 | 4 SH |
| NRSG 6431 | Neonatal Clinical Practicum 2 | 4 SH |
| NRSG 6432 | Neonatal Clinical Practicum 3 | 2 SH |

***Research Core***

| | | |
|---|---|---|
| NRSG 7105 | Translating Research Evidence into Practice | 3 SH |
| NRSG 7110 | Evidence-Based Practice Research Application | 2 SH |

***Elective***

Complete 4 semester hours of NRSG course work.

**PROGRAM CREDIT/GPA REQUIREMENTS**

41 total semester hours required
Minimum 3.000 GPA required

## Nurse Anesthesia Program

The nurse anesthesia program is housed in the Bouvé College of Health Sciences, which encourages interdisciplinary collaboration with other healthcare disciplines. This high level of integration is part of what has made us one of the highest nationally ranked programs in the Northeast in the *U.S. News and World Report* ranking.

Northeastern offers a traditional master's degree, an accelerated master's for certified registered nurse anesthetists (CRNAs), a certificate of advanced graduate study, and participation in the U.S. Army Graduate Program in Nurse Anesthesia.

Students graduate in May each year and are eligible to sit for the national certification examination for nurse anesthetists, administered by the Council on Certification of Nurse Anesthetists.

The Bouvé program received funding from the Department of Health and Human Services to increase its size and diversity. As a result, many of our students receive stipends, grants, and tuition assistance.

Northeastern University is accredited by the New England Association of Schools and Colleges, Inc. The School of Nursing is accredited by the Commission on Collegiate Nursing Education (CCNE). The nurse anesthesia program is accredited by the Council on Accreditation of Nurse Anesthesia Educational Programs (COA) for the maximum allowable ten years, through May 2024 (Council on Accreditation of Nurse Anesthesia Educational Programs, 222 South Prospect Avenue, Park Ridge, IL 60068-4001).

- Pass rate for first-time test takers on the National Certification Exam (NCE) offered through the National Board of Certification and Recertification for Nurse Anesthetists (NBCRNA) for the graduating class in 2014 was 95 percent.
- Graduates in 2014 obtained employment within three months of graduation.
- The attrition rate for the graduating class in 2014 was 10 percent.

## Certificate of Advanced Graduate Study (CAGS) in Nurse Anesthesia

Complete all courses and requirements listed below unless otherwise indicated.

**PREREQUISITES**

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

| | | |
|---|---|---|
| NRSG 5117 | Advanced Pharmacology | 2 SH |
| NRSG 5126 | Pathophysiology for Advanced Practice | 3 SH |
| NRSG 6115 | Health Assessment | 3 SH |

**REQUIRED COURSES**

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

***Anesthesia Didactic Courses***

| | | |
|---|---|---|
| NRSG 6320 | Role/Practice Issues in Nurse Anesthesia | 3 SH |
| NRSG 6321 | Conceptual Basis of Nurse Anesthesia Practice 1 | 3 SH |
| NRSG 6322 | Conceptual Basis of Nurse Anesthesia Practice 2 | 3 SH |
| NRSG 6324 | Chemistry and Physics in Anesthesia | 3 SH |

| | | |
|---|---|---|
| NRSG 6325 | Pharmacotherapeutics in Anesthesia and Critical Care Nursing | 2 SH |
| NRSG 6333 | Conceptual Basis of Nurse Anesthesia Practice 3 | 3 SH |
| NRSG 6336 | Advanced Concepts in Nurse Anesthesia Practice | 3 SH |

***Nurse Anesthesia Clinical Courses***

| | | |
|---|---|---|
| NRSG 6530 | Nurse Anesthesia Practicum 1 | 2 SH |
| NRSG 6534 | Nurse Anesthesia Practicum 2 | 4 SH |
| NRSG 6535 | Nurse Anesthesia Practicum 3 | 4 SH |
| NRSG 6540 | Advanced Clinical Experiences in Nurse Anesthesia 1 | 1 SH |
| NRSG 6541 | Advanced Clinical Experiences in Nurse Anesthesia 2 | 1 SH |
| NRSG 6542 | Advanced Clinical Experiences in Nurse Anesthesia 3 | 1 SH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

33 total semester hours required
Minimum 3.000 GPA required

## MS in Nursing Anesthesia

Complete all courses and requirements listed below unless otherwise indicated.

**REQUIRED COURSES**

A grade of B or higher is required in all course work.

***Core Courses***

| | | |
|---|---|---|
| NRSG 5118 | Healthcare System and Professional Role Development | 3 SH |
| NRSG 5121 | Epidemiology and Population Health | 3 SH |

***Anesthesia Didactic Courses***

| | | |
|---|---|---|
| NRSG 6320 | Role/Practice Issues in Nurse Anesthesia | 3 SH |
| NRSG 6321 | Conceptual Basis of Nurse Anesthesia Practice 1 | 3 SH |
| NRSG 6322 | Conceptual Basis of Nurse Anesthesia Practice 2 | 3 SH |
| NRSG 6324 | Chemistry and Physics in Anesthesia | 3 SH |
| NRSG 6325 | Pharmacotherapeutics in Anesthesia and Critical Care Nursing | 2 SH |
| NRSG 6333 | Conceptual Basis of Nurse Anesthesia Practice 3 | 3 SH |
| NRSG 6336 | Advanced Concepts in Nurse Anesthesia Practice | 3 SH |

***Clinical Core***

COURSE WORK

| | | |
|---|---|---|
| NRSG 5117 | Advanced Pharmacology | 2 SH |
| NRSG 5126 | Pathophysiology for Advanced Practice | 3 SH |
| NRSG 6115 | Health Assessment | 3 SH |

ELECTIVE

Complete a minimum of 2 semester hours of elective course work.

***Nurse Anesthesia Clinical Courses***

| | | |
|---|---|---|
| NRSG 6530 | Nurse Anesthesia Practicum 1 | 2 SH |
| NRSG 6534 | Nurse Anesthesia Practicum 2 | 4 SH |
| NRSG 6535 | Nurse Anesthesia Practicum 3 | 4 SH |
| NRSG 6540 | Advanced Clinical Experiences in Nurse Anesthesia 1 | 1 SH |
| NRSG 6541 | Advanced Clinical Experiences in Nurse Anesthesia 2 | 1 SH |
| NRSG 6542 | Advanced Clinical Experiences in Nurse Anesthesia 3 | 1 SH |

***Research Core***

| | | |
|---|---|---|
| NRSG 7105 | Translating Research Evidence into Practice | 3 SH |
| NRSG 7110 | Evidence-Based Practice Research Application | 2 SH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

54 total semester hours required
Minimum 3.000 GPA required

## DNP with Concentration in Nurse Anesthesia

*Note:* Restricted to students in the United States Army Graduate Program in Anesthesia Nursing (USAGPAN).

Complete all courses and requirements listed below unless otherwise indicated.

**REQUIRED COURSES**

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

***Core Courses***

| | | |
|---|---|---|
| NRSG 5127 | Scientific Inquiry and Epidemiological Concepts | 3 SH |
| NRSG 5170 | Statistics in Nursing | 2 SH |
| NRSG 5182 | Physical Examination and Differential Diagnosis | 4 SH |
| NRSG 5184 | Biochemistry for Nurse Anesthesia | 4 SH |
| NRSG 6372 | Professional Aspects of Nurse Anesthesia Practice | 3 SH |
| NRSG 7100 | Leadership in Advanced Practice Nursing | 3 SH |
| NRSG 7105 | Translating Research Evidence into Practice | 3 SH |

***Pharmacology for Nurse Anesthesia***

| | | |
|---|---|---|
| NRSG 6369 | Pharmacology for Nurse Anesthesia 1 | 5 SH |
| NRSG 6371 | Pharmacology for Nurse Anesthesia 2 | 4 SH |

***Anatomy and Physiology***

| | | |
|---|---|---|
| NRSG 5172 | Clinical Anatomy and Physiology 1 for Nurse Anesthesia | 6 SH |
| NRSG 5174 | Clinical Anatomy and Physiology 2 for Nurse Anesthesia | 5 SH |

***Healthcare***

| | | |
|---|---|---|
| NRSG 6302 | Health Policy and Law | 3 SH |
| NRSG 6306 | Health Informatics | 3 SH |
| NRSG 6308 | Healthcare Management | 3 SH |

### PRACTICE, CLINICAL, PRACTICUM, AND CAPSTONE

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

***Fundamentals of Nurse Anesthesia Practice***

| | | |
|---|---|---|
| NRSG 6375 | Fundamentals of Nurse Anesthesia Practice 1 | 9 SH |
| NRSG 6379 | Fundamentals of Nurse Anesthesia Practice 2 | 9 SH |

***Clinical Practicum***

| | | |
|---|---|---|
| NRSG 7400 | Nurse Anesthesia Clinical Practicum 1 | 5 SH |
| NRSG 7403 | Nurse Anesthesia Clinical Practicum 2 | 5 SH |
| NRSG 7406 | Nurse Anesthesia Clinical Practicum 3 | 5 SH |
| NRSG 7409 | Nurse Anesthesia Clinical Practicum 4 | 5 SH |

***Role Development***

| | | |
|---|---|---|
| NRSG 7412 | Nurse Anesthesia Role Development 1 | 6 SH |
| NRSG 7415 | Nurse Anesthesia Role Development 2 | 6 SH |
| NRSG 7418 | Nurse Anesthesia Role Development 3 | 6 SH |
| NRSG 7421 | Nurse Anesthesia Role Development 4 | 6 SH |

***Capstone***

| | | |
|---|---|---|
| NRSG 7921 | Capstone 1: Design and Ethical Consideration of Practice Application | 3 SH |
| NRSG 7922 | Capstone 2: Applying Practice Knowledge—Implementation/Outcomes | 3 SH |
| NRSG 7923 | Capstone 3: Dissemination of Practice Inquiry | 3 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

122 total semester hours required
Minimum 3.000 GPA required

## Pediatric Nurse Practitioner

This specialization is designed to prepare nurses with the specialized skills needed to care for children living in urban settings who are at risk across the continuum of care. For nearly two decades, our pediatric nurse practitioner (PNP) program has prepared primary care PNPs to provide community-based, culturally sensitive care. More recently, building on our foundation in evidence-based, interdisciplinary, urban healthcare, we expanded the PNP program into acute care. We are the only graduate nursing program in New England to prepare acute-care PNPs. Students may study either full-time or part-time.

## Certificate of Advanced Graduate Study (CAGS)—Pediatric Nurse Practitioner, Acute Care

Complete all courses and requirements listed below unless otherwise indicated.

### REQUIRED COURSES

A grade of B or higher is required in all course work.

***Acute Care Core***

| | | |
|---|---|---|
| CAEP 5151 | Early Intervention: Infant and Toddler Development, Risk, and Disability | 3 SH |
| NRSG 6262 | Pediatric Pharmacology | 2 SH |
| NRSG 6267 | Care of the Critically Ill Child | 4 SH |
| NRSG 6265 | Care of Child/Adolescent Health Problems | 4 SH |

***Acute Care Practicum***

| | | |
|---|---|---|
| NRSG 6461 | Child/Adolescent Health Problems Practicum | 4 SH |
| NRSG 6463 | Care of the Critically Ill Child Practicum | 4 SH |

### ELECTIVE

A grade of B or higher is required in all course work.
Complete 3 semester hours of NRSG courses.

### PROGRAM CREDIT/GPA REQUIREMENTS

24 total semester hours required
Minimum 3.000 GPA required

## Certificate of Advanced Graduate Study (CAGS)—Pediatric Nurse Practitioner, Acute and Primary Care

Complete all courses and requirements listed below unless otherwise indicated.

### REQUIRED COURSES

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

***Acute and Primary Care Core***

| | | |
|---|---|---|
| CAEP 5151 | Early Intervention: Infant and Toddler Development, Risk, and Disability | 3 SH |
| NRSG 5117 | Advanced Pharmacology | 2 SH |
| NRSG 6262 | Pediatric Pharmacology | 2 SH |
| NRSG 6267 | Care of the Critically Ill Child | 4 SH |
| NRSG 6265 | Care of Child/Adolescent Health Problems | 4 SH |

***Acute and Primary Care Practicum***

| | | |
|---|---|---|
| NRSG 6460 | Care of Well Child/Adolescent Health Promotion Practicum | 4 SH |
| NRSG 6461 | Child/Adolescent Health Problems Practicum | 4 SH |
| NRSG 6463 | Care of the Critically Ill Child Practicum | 4 SH |

***Primary Care***

| | | |
|---|---|---|
| NRSG 5126 | Pathophysiology for Advanced Practice | 3 SH |
| NRSG 6115 | Health Assessment | 3 SH |

| | | |
|---|---|---|
| NRSG 6264 | Care of Well Child/Adolescent Health Promotion | 4 SH |
| NRSG 6275 | Urban Families at Risk: A Primary Care Approach | 4 SH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

41 total semester hours required
Minimum 3.000 GPA required

## MS in Nursing—Pediatric Nurse Practitioner, Acute and Primary Care

Complete all courses and requirements listed below unless otherwise indicated.

**REQUIRED COURSES**

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

***Professional Core***

| | | |
|---|---|---|
| NRSG 5118 | Healthcare System and Professional Role Development | 3 SH |
| NRSG 5121 | Epidemiology and Population Health | 3 SH |

***Acute and Primary Care Core***

| | | |
|---|---|---|
| CAEP 5151 | Early Intervention: Infant and Toddler Development, Risk, and Disability | 3 SH |
| NRSG 6275 | Urban Families at Risk: A Primary Care Approach | 4 SH |
| NRSG 6264 | Care of Well Child/Adolescent Health Promotion | 4 SH |
| NRSG 6267 | Care of the Critically Ill Child | 4 SH |
| NRSG 6265 | Care of Child/Adolescent Health Problems | 4 SH |

***Clinical Core***

| | | |
|---|---|---|
| NRSG 5117 | Advanced Pharmacology | 2 SH |
| NRSG 5126 | Pathophysiology for Advanced Practice | 3 SH |
| NRSG 6115 | Health Assessment | 3 SH |
| NRSG 6262 | Pediatric Pharmacology | 2 SH |

***Acute Care Practicum***

| | | |
|---|---|---|
| NRSG 6460 | Care of Well Child/Adolescent Health Promotion Practicum | 4 SH |
| NRSG 6461 | Child/Adolescent Health Problems Practicum | 4 SH |
| NRSG 6463 | Care of the Critically Ill Child Practicum | 4 SH |

***Research Core***

| | | |
|---|---|---|
| NRSG 7105 | Translating Research Evidence into Practice | 3 SH |
| NRSG 7110 | Evidence-Based Practice Research Application | 2 SH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

52 total semester hours required
Minimum 3.000 GPA required

## Certificate of Advanced Graduate Study (CAGS)—Pediatric Nurse Practitioner, Primary Care

Complete all courses and requirements listed below unless otherwise indicated.

**REQUIRED COURSES**

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

***Pediatric Primary Care Core***

| | | |
|---|---|---|
| NRSG 6275 | Urban Families at Risk: A Primary Care Approach | 4 SH |
| NRSG 6264 | Care of Well Child/Adolescent Health Promotion | 4 SH |
| NRSG 6265 | Care of Child/Adolescent Health Problems | 4 SH |

***Clinical Core***

| | | |
|---|---|---|
| NRSG 5117 | Advanced Pharmacology | 2 SH |
| NRSG 5126 | Pathophysiology for Advanced Practice | 3 SH |
| NRSG 6115 | Health Assessment | 3 SH |
| NRSG 6262 | Pediatric Pharmacology | 2 SH |

***Pediatric Care Practicum***

| | | |
|---|---|---|
| NRSG 6460 | Care of Well Child/Adolescent Health Promotion Practicum | 4 SH |
| NRSG 6461 | Child/Adolescent Health Problems Practicum | 4 SH |

**ELECTIVE**

Complete 2 semester hours of NRSG course work with a grade of B or higher.

**PROGRAM CREDIT/GPA REQUIREMENTS**

32 total semester hours required
Minimum 3.000 GPA required

## MS in Nursing—Pediatric Nurse Practitioner, Primary Care

Complete all courses and requirements listed below unless otherwise indicated.

**REQUIRED COURSES**

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

***Professional Core***

| | | |
|---|---|---|
| NRSG 5118 | Healthcare System and Professional Role Development | 3 SH |
| NRSG 5121 | Epidemiology and Population Health | 3 SH |

***Pediatric Primary Care Core***

| | | |
|---|---|---|
| NRSG 6275 | Urban Families at Risk: A Primary Care Approach | 4 SH |
| NRSG 6264 | Care of Well Child/Adolescent Health Promotion | 4 SH |
| NRSG 6265 | Care of Child/Adolescent Health Problems | 4 SH |

***Clinical Core***

| | | |
|---|---|---|
| NRSG 5117 | Advanced Pharmacology | 2 SH |
| NRSG 5126 | Pathophysiology for Advanced Practice | 3 SH |
| NRSG 6115 | Health Assessment | 3 SH |
| NRSG 6262 | Pediatric Pharmacology | 2 SH |

***Pediatric Care Practicum***

| | | |
|---|---|---|
| NRSG 6460 | Care of Well Child/Adolescent Health Promotion Practicum | 4 SH |
| NRSG 6461 | Child/Adolescent Health Problems Practicum | 4 SH |

***Research Core***

| | | |
|---|---|---|
| NRSG 7105 | Translating Research Evidence into Practice | 3 SH |
| NRSG 7110 | Evidence-Based Practice Research Application | 2 SH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

41 total semester hours required
Minimum 3.000 GPA required

## Primary Care—Adult-Gerontology Nurse Practitioner

This specialization offers adult/older adult and family nurse practitioners an opportunity to learn how to provide quality primary care.

Upon completion of the primary care program, graduates are eligible to sit for all national certification exams in their area of practice.

## Certificate of Advanced Graduate Study (CAGS)—Adult-Gerontology Nurse Practitioner, Primary Care

**REQUIRED COURSE WORK**

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

***Adult/Gerontology Core***

| | | |
|---|---|---|
| NRSG 6249 | Health Promotion of Adult/Older Adult | 3 SH |
| NRSG 6253 | Primary Care of Adult/Older Adult Health Problems | 4 SH |
| NRSG 6254 | Primary Care of Adult/Older Adult Complex Patients | 4 SH |

***Clinical Core***

| | | |
|---|---|---|
| NRSG 5117 | Advanced Pharmacology | 2 SH |
| NRSG 5126 | Pathophysiology for Advanced Practice | 3 SH |
| NRSG 6115 | Health Assessment | 3 SH |
| NRSG 6222 | Pharmacology of Adults and Older Adults | 2 SH |

***Adult/Gerontology Nurse Practicum***

| | | |
|---|---|---|
| NRSG 6449 | Health Promotion of Adult/Older Adult Practicum | 1 SH |
| NRSG 6450 | Adult/Older Adult Practicum 1 | 4 SH |
| NRSG 6451 | Adult/Older Adult Practicum 2 | 4 SH |

**ELECTIVE**

Complete 2 semester hours of NRSG course work with a grade of B or higher.

**PROGRAM CREDIT/GPA REQUIREMENTS**

32 total semester hours required
Minimum 3.000 GPA required

## MS in Nursing—Adult-Gerontology Nurse Practitioner, Primary Care

Complete all courses and requirements listed below unless otherwise indicated.

**REQUIRED COURSE WORK**

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

***Professional Core***

| | | |
|---|---|---|
| NRSG 5118 | Healthcare System and Professional Role Development | 3 SH |
| NRSG 5121 | Epidemiology and Population Health | 3 SH |

***Primary Adult/Gerontology Nurse Core***

| | | |
|---|---|---|
| NRSG 6249 | Health Promotion of Adult/Older Adult | 3 SH |
| NRSG 6253 | Primary Care of Adult/Older Adult Health Problems | 4 SH |
| NRSG 6254 | Primary Care of Adult/Older Adult Complex Patients | 4 SH |

***Clinical Core***

| | | |
|---|---|---|
| NRSG 6115 | Health Assessment | 3 SH |
| NRSG 5117 | Advanced Pharmacology | 2 SH |
| NRSG 5126 | Pathophysiology for Advanced Practice | 3 SH |
| NRSG 6222 | Pharmacology of Adults and Older Adults | 2 SH |

***Adult/Gerontology Nurse Practicum***

| | | |
|---|---|---|
| NRSG 6449 | Health Promotion of Adult/Older Adult Practicum | 1 SH |
| NRSG 6450 | Adult/Older Adult Practicum 1 | 4 SH |
| NRSG 6451 | Adult/Older Adult Practicum 2 | 4 SH |

***Research Core***

| | | |
|---|---|---|
| NRSG 7105 | Translating Research Evidence into Practice | 3 SH |
| NRSG 7110 | Evidence-Based Practice Research Application | 2 SH |

**ELECTIVE**

Complete 2 semester hours of NRSG course work with a grade of B or higher.

**PROGRAM CREDIT/GPA REQUIREMENTS**

43 total semester hours required
Minimum 3.000 GPA required

## MS in Nursing—Family Nurse Practitioner, Primary Care

Complete all courses and requirements listed below unless otherwise indicated.

### REQUIRED COURSE WORK

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

***Professional Core***

| | | |
|---|---|---|
| NRSG 5118 | Healthcare System and Professional Role Development | 3 SH |
| NRSG 5121 | Epidemiology and Population Health | 3 SH |

***Family Nurse Core***

| | | |
|---|---|---|
| NRSG 6249 | Health Promotion of Adult/Older Adult | 3 SH |
| NRSG 6253 | Primary Care of Adult/Older Adult Health Problems | 4 SH |
| NRSG 6264 | Care of Well Child/Adolescent Health Promotion | 4 SH |
| NRSG 6265 | Care of Child/Adolescent Health Problems | 4 SH |
| NRSG 6266 | Family Theory and Primary Care in the Childbearing Years | 4 SH |

***Clinical Core***

| | | |
|---|---|---|
| NRSG 5117 | Advanced Pharmacology | 2 SH |
| NRSG 5126 | Pathophysiology for Advanced Practice | 3 SH |
| NRSG 6115 | Health Assessment | 3 SH |
| NRSG 6222 | Pharmacology of Adults and Older Adults | 2 SH |
| NRSG 6262 | Pediatric Pharmacology | 2 SH |

***Family Nurse Practicum***

| | | |
|---|---|---|
| NRSG 6449 | Health Promotion of Adult/Older Adult Practicum | 1 SH |
| NRSG 6255 | Family Nurse Practitioner Practicum 1 | 3 SH |
| NRSG 6256 | Family Nurse Practitioner Practicum 2 | 3 SH |
| NRSG 6257 | Family Nurse Practitioner Practicum 3 | 3 SH |
| NRSG 6450 | Adult/Older Adult Practicum 1 | 4 SH |

***Research Core***

| | | |
|---|---|---|
| NRSG 7105 | Translating Research Evidence into Practice | 3 SH |
| NRSG 7110 | Evidence-Based Practice Research Application | 2 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

56 total semester hours required
Minimum 3.000 GPA required

## MS in Nursing—Direct Entry

Complete all courses and requirements listed below unless otherwise indicated.

### REQUIRED COURSES

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

***Core Courses***

| | | |
|---|---|---|
| NRSG 2210 | Influences on Health and Illness: A Nursing Perspective | 3 SH |
| NRSG 2220 | Nursing Interventions, Assessment, and Community Care | 3 SH |
| with NRSG 2221 | Lab for NRSG 2220 | 2 SH |
| NRSG 3302 | Nursing with Women and Families | 3 SH |
| with NRSG 3303 | Clinical for NRSG 3302 | 2 SH |
| NRSG 3320 | Nursing Care of Adults 1 | 4 SH |
| with NRSG 3321 | Clinical for NRSG 3320 | 2 SH |
| NRSG 3323 | Intermediate Interventions and Assessment | 1 SH |
| with NRSG 3324 | Lab for NRSG 3323 | 1 SH |
| NRSG 3400 | Nursing and the Promotion of Mental Health | 3 SH |
| with NRSG 3401 | Clinical for NRSG 3400 | 2 SH |
| NRSG 3420 | Nursing Care of Adults 2 | 4 SH |
| with NRSG 3421 | Clinical for NRSG 3420 | 2 SH |
| NRSG 4502 | Nursing Care of the Child | 4 SH |
| with NRSG 4503 | Clinical for NRSG 4502 | 2 SH |
| NRSG 4604 | Public Health Community Nursing | 3 SH |
| with NRSG 4605 | Clinical for NRSG 4604 | 2 SH |
| NRSG 4610 | Managing and Leading in Healthcare | 3 SH |
| NRSG 5117 | Advanced Pharmacology | 2 SH |
| NRSG 5126 | Pathophysiology for Advanced Practice | 3 SH |
| NRSG 6306 | Health Informatics | 3 SH |

***Research and Practicum***

| | | |
|---|---|---|
| HLTH 5450 | Healthcare Research | 4 SH |
| NRSG 4995 | Comprehensive Nursing Practicum | 6 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

64 total semester hours required
Minimum 3.000 GPA required

## MS in Nursing Administration

Complete all courses and requirements listed below unless otherwise indicated.

### PROGRAM REQUIREMENTS

| | | |
|---|---|---|
| NRSG 5118 | Healthcare System and Professional Role Development | 3 SH |
| NRSG 5121 | Epidemiology and Population Health | 3 SH |
| NRSG 6300 | Healthcare Finance and Marketing | 3 SH |
| NRSG 6301 | Human Resources and Operations | 3 SH |
| NRSG 6302 | Health Policy and Law | 3 SH |
| NRSG 6305 | Case Management | 3 SH |
| NRSG 6306 | Health Informatics | 3 SH |
| NRSG 6307 | Operational Informatics in Healthcare Organizations | 3 SH |
| NRSG 6311 | Program Development and Evaluation | 3 SH |
| NRSG 6500 | Nursing Administration Practicum 1 | 4 SH |
| NRSG 6501 | Nursing Administration Practicum 2 | 4 SH |

| | | |
|---|---|---|
| NRSG 7105 | Translating Research Evidence into Practice | 3 SH |
| NRSG 7110 | Evidence-Based Practice Research Application | 2 SH |

Also complete one graduate elective (3 semester hours).

**PROGRAM CREDIT/GPA REQUIREMENTS**

43 total semester hours required
Minimum 3.000 GPA required

## MS in Nursing/MBA

Complete all courses and requirements listed below unless otherwise indicated.

**BUSINESS REQUIREMENTS**

| | | |
|---|---|---|
| ACCT 6272 | Financial Statement Preparation and Analysis | 2.25 SH |
| ACCT 6273 | Identifying Strategic Implications in Accounting Data | 2.25 SH |
| ENTR 6200 | Enterprise Growth and Innovation | 3 SH |
| FINA 6200 | Value Creation through Financial Decision Making | 3 SH |
| INTB 6200 | Managing the Global Enterprise | 3 SH |
| MECN 6200 | Global Competition and Market Dominance | 3 SH |
| MGSC 6200 | Information Analysis | 3 SH |
| MGSC 6206 | Management of Service and Manufacturing Operations | 3 SH |
| MKTG 6200 | Creating and Sustaining Customer Markets | 3 SH |
| STRT 6200 | Strategic Decision Making in a Changing Environment | 3 SH |

Complete one business specialization course (3 semester hours).
Complete one business specialization course (1 semester hour).

**NURSING REQUIREMENTS**

| | | |
|---|---|---|
| NRSG 5118 | Healthcare System and Professional Role Development | 3 SH |
| NRSG 5121 | Epidemiology and Population Health | 3 SH |
| NRSG 6301 | Human Resources and Operations | 3 SH |
| NRSG 6302 | Health Policy and Law | 3 SH |
| NRSG 6305 | Case Management | 3 SH |
| NRSG 6306 | Health Informatics | 3 SH |
| NRSG 6307 | Operational Informatics in Healthcare Organizations | 3 SH |
| NRSG 6500 | Nursing Administration Practicum 1 | 4 SH |
| NRSG 6501 | Nursing Administration Practicum 2 | 4 SH |
| NRSG 7105 | Translating Research Evidence into Practice | 3 SH |
| NRSG 7110 | Evidence-Based Practice Research Application | 2 SH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

66.5 total semester hours required
Minimum 3.000 GPA required

## The Doctor of Nursing Practice (DNP)

The DNP is a practice-oriented doctoral degree designed to prepare advanced nurses at the highest level. This change was driven by evolving nursing roles in an increasingly complex healthcare system, new scientific knowledge, and ongoing concerns about the quality and outcomes of patient care. Keeping pace with the demands of today's changing healthcare environment requires clinical experts who have the knowledge and skills to be effective and practical change agents. Graduates of DNP programs across the country are assuming clinical and leadership positions as advanced nurses in a variety of roles, including faculty, nurse executives, and community leaders.

The Northeastern University DNP program includes advance course work in leadership, research translation, 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 a hybrid format.

If you are a registered nurse with at least two years of 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. Applicants who do not hold national certification in one other of the four advanced practice registered nurse (APRN) roles must provide evidence of the equivalent of 500 practicum hours in a previous master's program.

## DNP—Doctor of Nursing Practice

Complete all courses and requirements listed below unless otherwise indicated.

**REQUIRED COURSES**

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

***Core Courses***

| | | |
|---|---|---|
| NRSG 5121 | Epidemiology and Population Health | 3 SH |
| NRSG 6300 | Healthcare Finance and Marketing | 3 SH |
| NRSG 6302 | Health Policy and Law | 3 SH |
| NRSG 6306 | Health Informatics | 3 SH |
| NRSG 7100 | Leadership in Advanced Practice Nursing | 3 SH |

***Capstone Courses***

| | | |
|---|---|---|
| NRSG 7920 | The Steps to Practice Inquiry: Analyze, Evaluate, Synthesize, and Apply the Evidence | 3 SH |
| NRSG 7921 | Capstone 1: Design and Ethical Consideration of Practice Application | 3 SH |
| NRSG 7922 | Capstone 2: Applying Practice Knowledge—Implementation/Outcomes | 3 SH |
| NRSG 7923 | Capstone 3: Dissemination of Practice Inquiry | 3 SH |

### ELECTIVE

Complete one NRSG course (3 semester hours) with a grade of B or higher.

### PROGRAM CREDIT/GPA REQUIREMENTS

30 total semester hours required
Minimum 3.000 GPA required

## Doctor of Philosophy

As a student in the PhD in Nursing program you will have an opportunity to gain the knowledge and skills needed to identify and examine health problems that impact urban and underserved populations. Successful graduates will be able to assume the role of researcher, educator, and scholar in a school of nursing, clinical agency, research center, or other setting. You may find yourself providing leadership for the profession and developing new knowledge that will influence nursing practice and improve health outcomes for all individuals. If you are a registered nurse, you may enter the PhD program after completing a baccalaureate or a master's degree in nursing.

You will have an opportunity to study with nursing faculty whose research programs address a broad spectrum of clinical nursing questions and urban healthcare problems. Collectively, the faculty has expertise in a variety of research methods and a range of research interests, including health issues of women, children, and families; depression; cardiovascular disease; substance abuse; and perinatal injury.

In addition, you will have an opportunity to study with faculty from other Northeastern departments and research centers and with others in Boston's nursing community whose work addresses clinical problems with urban and underserved populations. Our close ties with the university's Institute on Urban Health Research and School of Social Science; Urban Affairs and Public Policy; as well as with the Center for Community Health Education, Research and Service and other organizations provide opportunities to work across disciplines and access populations and sites for your dissertation. Visit the Northeastern University faculty research website: www.northeastern.edu/research/faculty-research.

## PhD in Nursing—Advanced Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

### MILESTONES

Comprehensive exam
Annual review
Dissertation proposal
Dissertation defense

### REQUIRED COURSES

A grade of B or higher is required in all course work.

***Core Courses***

Requires 34 semester hours:

| | | |
|---|---|---|
| NRSG 7700 | The Science of Nursing | 3 SH |
| NRSG 7750 | Healthcare of Urban Populations | 3 SH |
| NRSG 7705 | Theoretical and Conceptual Foundations in Nursing Science | 3 SH |
| NRSG 7709 | Qualitative Research Methods | 3 SH |
| NRSG 7712 | Quantitative Research Methods | 3 SH |
| NRSG 7715 | Measurement in Clinical Research | 3 SH |
| NRSG 7770 | Research Colloquium *(repeatable course, to be taken four times)* | 1 SH |
| NRSG 9984 | Research *(repeatable course, to be taken twice)* | 1 to 4 SH |
| PHTH 5210 | Biostatistics in Public Health | 3 SH |
| PHTH 6210 | Applied Regression Analysis | 3 SH |

***Cognate Courses***

Complete two NRSG courses (6 semester hours) in consultation with your faculty advisor.

### DISSERTATION COURSES

| | | |
|---|---|---|
| NRSG 9845 | Dissertation Seminar 1 | 3 SH |
| NRSG 9846 | Dissertation Seminar 2 | 3 SH |
| NRSG 9990 | Dissertation *(repeatable course, to be taken twice)* | 1 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

48 total semester hours required
Minimum 3.000 GPA required

## PhD in Nursing—Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

### MILESTONES

Comprehensive exam
Annual review
Dissertation proposal
Dissertation defense

### REQUIRED COURSES

A grade of B or higher is required in all course work.

***Core Courses***

Requires 40 semester hours:

| | | |
|---|---|---|
| NRSG 5121 | Epidemiology and Population Health | 3 SH |
| NRSG 7700 | The Science of Nursing | 3 SH |
| NRSG 7750 | Healthcare of Urban Populations | 3 SH |
| NRSG 7705 | Theoretical and Conceptual Foundations in Nursing Science | 3 SH |
| NRSG 7709 | Qualitative Research Methods | 3 SH |

| | | |
|---|---|---|
| NRSG 7712 | Quantitative Research Methods | 3 SH |
| NRSG 7715 | Measurement in Clinical Research | 3 SH |
| NRSG 7770 | Research Colloquium<br>*(repeatable course, to be taken four times)* | 1 SH |
| NRSG 7100 | Leadership in Advanced Practice Nursing | 3 SH |
| NRSG 9984 | Research<br>*(repeatable course, to be taken twice)* | 1 to 4 SH |
| PHTH 5210 | Biostatistics in Public Health | 3 SH |
| PHTH 6210 | Applied Regression Analysis | 3 SH |

***Cognate Courses***

Complete two NRSG courses (6 semester hours) in consultation with your faculty advisor.

***Electives***

Complete two NRSG courses (6 semester hours) in consultation with your faculty advisor.

## DISSERTATION

| | | |
|---|---|---|
| NRSG 9845 | Dissertation Seminar 1 | 3 SH |
| NRSG 9846 | Dissertation Seminar 2 | 3 SH |
| NRSG 9990 | Dissertation<br>*(repeatable course, to be taken twice)* | 1 SH |

## PROGRAM CREDIT/GPA REQUIREMENTS

60 total semester hours required
Minimum 3.000 GPA required

# SCHOOL OF PHARMACY

**www.northeastern.edu/bouve/pharmacy**

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The School of Pharmacy is dedicated to excellence in pharmacy-related education, research, and service, including the provision of patient care. We 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.

## Pharmaceutical Science

Pharmaceutical science is a problem-solving discipline concerned with the discovery, design, and use of drugs. Pharmaceutical scientists find new targets for drug development; research how drugs work at a molecular level; and determine how drugs' properties, dosages, and delivery systems affect their performance. Northeastern has a well-deserved reputation among students, researchers, and other universities. Our department has five interlinked Centers of Research Excellence that pursue specific areas of pharmaceutical and chemical research: the Center for

Drug Discovery, the New England Inflammation and Tissue Protection Institute, the Center for Pharmaceutical Biotechnology and Nanomedicine, the Center for Translational Imaging, and the Environmental Cancer Research Program. Northeastern offers many of its classes in the evening to accommodate the needs of the working community. Many students in the pharmaceutical science MS program complete their degree on a part-time basis. For those interested in discovery, problem solving, and cutting-edge research in one of the world's foremost scientific and medical environments, Northeastern University's School of Pharmacy in the Bouvé College of Health Sciences is the place to study pharmaceutical science.

Pharmaceutical science is inherently interdisciplinary, and this is reflected in the availability of several options at both the MS and PhD levels. The main options are pharmaceutics and drug delivery, pharmacology, and medicinal chemistry. The curriculum for each of these options allows a degree of flexibility in terms of specific courses taken, and the examples below are not absolute but reflect students' most common choices made with the advice of faculty members. Even more flexibility is possible with the MS in Pharmaceutical Sciences (interdisciplinary concentration).

## MS in Biomedical Nanotechnology

This MS program in biomedical nanotechnology incorporates aspects of the pharmaceutical sciences curriculum with courses in nanotechnology, entrepreneurship, and law. The combination of these fields results in a unique curriculum that offers students an opportunity to obtain skills not only in the relevant science but also in leadership, business, and intellectual property law. Furthermore, the program directly addresses a core mission of the university: the provision of practice-oriented educational programs in major scientific disciplines.

Prerequisites: calculus, organic chemistry, biochemistry, and physiology.

Complete all courses and requirements listed below unless otherwise indicated.

### REQUIREMENTS

***Pharmaceutical***

| | | |
|---|---|---|
| EECE 5698 | Special Topics in Electrical and Computer Engineering | 4 SH |
| PHSC 5100 | Concepts in Pharmaceutical Science | 2 SH |
| PHSC 5300 | Pharmaceutical Biochemistry | 2 SH |
| PHSC 5305 | Professional Development for Pharmaceutical Sciences | 1 SH |
| PHSC 6212 | Research Skills and Ethics | 1 SH |
| PHSC 6300 | Pharmaceutical Science Seminar | 1 SH |
| PHSC 7010 | Pharmaceutical Sciences Laboratory | 4 SH |
| PMST 6254 | Advanced Drug Delivery System | 3 SH |

***Nanomedicine***

Requires 6 semester hours:

| | | |
|---|---|---|
| NNMD 5270 | Introduction to Nanomedicine Science and Technology | 3 SH |
| NNMD 4570 | (pending approval) | |

***Business and Enterprise***

| | | |
|---|---|---|
| ENTR 6200 | Enterprise Growth and Innovation | 3 SH |
| ENTR 6212 | Business Planning for New Ventures | 3 SH |
| LW 7369 | Intellectual Property | 2 SH |

***Research and Internship***

Requires 2 semester hours (all courses are repeatable):

| | | |
|---|---|---|
| PHSC 6401 | Pharmaceutical Science Internship | 1 SH |
| or PHSC 5976 | Directed Study | 1 to 4 SH |
| or PHSC 6984 | Pharmaceutical Science Research | 2 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

34 total semester hours required
Minimum 3.000 GPA required

## MS in Biomedical Sciences

Complete all courses and requirements listed below unless otherwise indicated.

### REQUIRED COURSE WORK

***Required Core***

Requires 13–18 semester hours:

| | | |
|---|---|---|
| PHSC 5100 | Concepts in Pharmaceutical Science | 2 SH |
| PHSC 6210 | Drug Design, Evaluation, and Development | 2 SH |
| PHSC 6214 | Experimental Design and Biostatistics | 2 SH |
| PHSC 6216 | Human Physiology and Pathophysiology | 2 SH |
| PHSC 6212 | Research Skills and Ethics | 1 SH |
| or BIOL 6381 | Ethics in Biological Research | 2 SH |
| BIOL 6300 | Biochemistry | 4 SH |
| or PHSC 5300 | Pharmaceutical Biochemistry | 2 SH |
| or PHSC 7010 | Pharmaceutical Sciences Laboratory | 4 SH |
| BIOL 6301 | Molecular Cell Biology | 4 SH |
| or PHSC 5310 | Cellular Physiology | 2 SH |

***Pharmaceutics Core***

| | | |
|---|---|---|
| PMST 6252 | Pharmacokinetics and Drug Metabolism | 3 SH |
| PMST 6250 | Advanced Physical Pharmacy | 2 SH |
| PMST 6254 | Advanced Drug Delivery System | 3 SH |

***Electives***

Complete 7–12 semester hours in the following subject areas:
PHSC, PMCL, PMST, BIOL, CHEM, NNMD, BIOT

### PROGRAM CREDIT/GPA REQUIREMENTS

33 total semester hours required
Minimum 3.000 GPA required

## PhD in Biomedical Sciences

Complete all courses and requirements listed below unless otherwise indicated.

### MILESTONES

Qualifying exam
Annual review
Dissertation committee
Dissertation proposal
Dissertation defense

### REQUIRED COURSE WORK

***Required Core***

Requires 13–18 semester hours:

| | | |
|---|---|---|
| PHSC 5100 | Concepts in Pharmaceutical Science | 2 SH |
| PHSC 6210 | Drug Design, Evaluation, and Development | 2 SH |
| PHSC 6214 | Experimental Design and Biostatistics | 2 SH |
| PHSC 6216 | Human Physiology and Pathophysiology | 2 SH |
| PHSC 6212 | Research Skills and Ethics | 1 SH |
| or BIOL 6381 | Ethics in Biological Research | 2 SH |
| BIOL 6300 | Biochemistry | 4 SH |
| or PHSC 5300 | Pharmaceutical Biochemistry | 2 SH |
| or PHSC 7010 | Pharmaceutical Sciences Laboratory | 4 SH |
| BIOL 6301 | Molecular Cell Biology | 4 SH |
| or PHSC 5310 | Cellular Physiology | 2 SH |

***Pharmaceutics Core***

| | | |
|---|---|---|
| PMST 6252 | Pharmacokinetics and Drug Metabolism | 3 SH |
| PMST 6250 | Advanced Physical Pharmacy | 2 SH |
| PMST 6254 | Advanced Drug Delivery System | 3 SH |

***Electives***

Complete 7–12 semester hours in the following subject areas:
PHSC, PMCL, PMST, BIOL, CHEM, NNMD, BIOT

### SEMINAR AND COLLOQUIUM

***Seminar***

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| PHSC 6300 | Pharmaceutical Science Seminar | 1 SH |

***Colloquium***

| | | |
|---|---|---|
| PHSC 6810 | Pharmaceutical Science Colloquium | 1 SH |

### RESEARCH AND DISSERTATION

***Qualifying Exam***

| | | |
|---|---|---|
| PHSC 8940 | Doctoral Training and Research | 1 SH |

***Proposal Preparation***

| | | |
|---|---|---|
| PHSC 9681 | Doctoral Proposal | 2 SH |

***Dissertation***

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| PHSC 9990 | Dissertation | 3 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

45 total semester hours required
Minimum 3.000 GPA required

## MS in Medicinal Chemistry

This MS program integrates aspects of contemporary medicinal chemistry and pharmacology, emphasizing topics most relevant to therapeutics design, discovery, and action. The core curriculum is an interdisciplinary combination of synthetic organic chemistry, bioorganic chemistry, analytical chemistry, and pharmaceutical sciences courses. In-depth electives are available in these areas. The program offers students the opportunity to develop knowledge of medicinal chemistry that can be applied to a practice-oriented career in the pharmaceutical industry.

Undergraduate prerequisites are general chemistry, organic chemistry, biochemistry, or cell/molecular biology.

Complete all courses and requirements listed below unless otherwise indicated.

### REQUIREMENTS

***Core Courses***

| | | |
|---|---|---|
| PHSC 5100 | Concepts in Pharmaceutical Science | 2 SH |
| PHSC 6210 | Drug Design, Evaluation, and Development | 2 SH |
| BIOL 6381 | Ethics in Biological Research | 2 SH |
| or PHSC 6212 | Research Skills and Ethics | 1 SH |

***Chemistry***

| | | |
|---|---|---|
| CHEM 5612 | Principles of Mass Spectrometry | 3 SH |
| CHEM 5626 | Organic Synthesis 1 | 3 SH |
| CHEM 5628 | Principles of Spectroscopy of Organic Compounds | 3 SH |
| CHEM 5672 | Organic Synthesis 2 | 3 SH |
| CHEM 5676 | Bioorganic Chemistry | 3 SH |
| PHSC 6222 | The Chemistry and Biology of Drugs of Abuse | 2 SH |
| PHSC 6224 | Behavioral Pharmacology and Drug Discovery | 2 SH |
| PHSC 6226 | Imaging in Medicine and Drug Discovery | 2 SH |

***Electives***

Requires 6–7 semester hours in the following subject areas:
BIOL, BIOT, CHEM, NNMD, PHSC, PMCL, PMST

### PROGRAM CREDIT/GPA REQUIREMENTS

33 total semester hours required
Minimum 3.000 GPA required

## PhD in Medicinal Chemistry

This specialization offered by the Center for Drug Discovery (CDD) trains students in the design and synthesis of novel biologically active compounds and in the study of their mechanisms of action using biochemical, biophysical, and pharmacological approaches. Concentrations are available in synthetic, biochemical/pharmacological, and biophysical medicinal chemistry. The CDD's excellence in teaching has been recognized by the award of a training grant from the National Institute on Drug Abuse for predoctoral and postdoctoral training in development of medications. These will be targeted to treat

drug abuse; addiction; and other indications such as neuropathic pain, obesity, neuropsychiatric disorders (psychoses, ADHD, depression, anxiety, eating disorders); and neurodegenerative disorders.

Complete all courses and requirements listed below unless otherwise indicated.

### MILESTONES

Qualifying exam
Annual review
Dissertation committee
Dissertation proposal
Dissertation defense

### REQUIREMENTS

***Core Courses***

| | | |
|---|---|---|
| PHSC 5100 | Concepts in Pharmaceutical Science | 2 SH |
| PHSC 6210 | Drug Design, Evaluation, and Development | 2 SH |
| BIOL 6381 | Ethics in Biological Research | 2 SH |
| or PHSC 6212 | Research Skills and Ethics | 1 SH |

***Chemistry***

| | | |
|---|---|---|
| CHEM 5612 | Principles of Mass Spectrometry | 3 SH |
| CHEM 5626 | Organic Synthesis 1 | 3 SH |
| CHEM 5628 | Principles of Spectroscopy of Organic Compounds | 3 SH |
| CHEM 5672 | Organic Synthesis 2 | 3 SH |
| CHEM 5676 | Bioorganic Chemistry | 3 SH |
| PHSC 6222 | The Chemistry and Biology of Drugs of Abuse | 2 SH |
| PHSC 6224 | Behavioral Pharmacology and Drug Discovery | 2 SH |
| PHSC 6226 | Imaging in Medicine and Drug Discovery | 2 SH |

***Electives***

Complete 6–7 semester hours from the following subject areas: BIOL, BIOT, CHEM, NNMD, PHSC, PMCL, and PMST

### SEMINAR AND COLLOQUIUM

***Seminar***

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| PHSC 6300 | Pharmaceutical Science Seminar | 1 SH |

***Colloquium***

| | | |
|---|---|---|
| PHSC 6810 | Pharmaceutical Science Colloquium | 1 SH |

### RESEARCH AND DISSERTATION

***Research***

| | | |
|---|---|---|
| PHSC 8940 | Doctoral Training and Research | 1 SH |

***Proposal Preparation***

| | | |
|---|---|---|
| PHSC 9681 | Doctoral Proposal | 2 SH |

***Dissertation***

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| PHSC 9990 | Dissertation | 3 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

45 total semester hours required
Minimum 3.000 GPA required

## MS in Pharmaceutical Sciences

Just as cars are useless without roads, drugs are useless without an effective delivery system. This is especially important in contemporary pharmaceutical research as new chemical entities are either too hydrophobic (e.g., many anticancer drugs) or hydrophilic and highly labile (e.g., nucleic acids). The Bouvé College of Health Sciences' pharmaceutics faculty and students are developing the pathways that bring small-molecule drugs and biological therapies directly to the target cells.

Our comprehensive program in pharmaceutics has specialists in drug development and delivery who use and deliver treatments. Their goal is to better understand how the chemical and physical properties of drugs and their dosage forms affect many approaches to create drug performance in healthy and diseased systems. Graduate students may elect a program 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 needs, this concentration also gives you the opportunity to study with some of the world's top researchers. Pharmaceutics students have the option of performing industrial internships during the summer in some of the most prestigious pharmaceutical and biotechnology companies in the area.

Complete all courses and requirements listed below unless otherwise indicated.

### REQUIRED COURSE WORK

***Required Core***

Requires 13–18 semester hours:

| | | |
|---|---|---|
| PHSC 5100 | Concepts in Pharmaceutical Science | 2 SH |
| PHSC 6210 | Drug Design, Evaluation, and Development | 2 SH |
| PHSC 6214 | Experimental Design and Biostatistics | 2 SH |
| PHSC 6216 | Human Physiology and Pathophysiology | 2 SH |
| PHSC 6212 | Research Skills and Ethics | 1 SH |
| or BIOL 6381 | Ethics in Biological Research | 2 SH |
| BIOL 6300 | Biochemistry | 4 SH |
| or PHSC 5300 | Pharmaceutical Biochemistry | 2 SH |
| or PHSC 7010 | Pharmaceutical Sciences Laboratory | 4 SH |
| BIOL 6301 | Molecular Cell Biology | 4 SH |
| or PHSC 5310 | Cellular Physiology | 2 SH |

***Pharmaceutics Core***

| | | |
|---|---|---|
| PMST 6252 | Pharmacokinetics and Drug Metabolism | 3 SH |
| PMST 6250 | Advanced Physical Pharmacy | 2 SH |
| PMST 6254 | Advanced Drug Delivery System | 3 SH |

***Electives***

Complete 7–12 semester hours in the following subject areas:
PHSC, PMCL, PMST, BIOL, CHEM, NNMD, BIOT

### PROGRAM CREDIT/GPA REQUIREMENTS

33 total semester hours required
Minimum 3.000 GPA required

## PhD in Pharmaceutical Sciences

### PHARMACEUTICS AND DRUG DELIVERY SYSTEMS

Students studying pharmaceutics and drug delivery will be thoroughly exposed to the fundamentals of physical pharmacy and pharmaceutics in addition to being trained in several more specialized areas such as:

- Novel drug delivery systems
- Nanomedical technologies
- Physical pharmacy
- Biopharmaceutics and pharmacokinetics

With exposure to these various facets of pharmaceutics, successful graduates are poised to understand and assimilate the field of modern pharmaceutics. A PhD in pharmaceutics is a research degree. While course work plays an important role, students become a real participant in the science of pharmaceutics in the laboratory. Faculty research covers a broad range of scientific interests, including pharmacokinetic toxicodynamics of anticancer agents, use of biomaterials and synthetic polymeric systems in design of drug delivery systems, passive and active targeting of therapeutic agents, cardiovascular targeting of drugs, novel delivery systems for proteins and peptides, and mathematical modeling of endogenous compounds.

### INTERDISCIPLINARY OPTION

The interdisciplinary option is intended to meet the needs of students interested in combining courses and skills from two areas of specialization. At least one of the specialization areas must come from within the college. The second area may come from a department in another college at Northeastern University, such as biology, chemistry, or engineering. Students electing the interdisciplinary option must fulfill the same requirements as all other PhD candidates.

### DEGREE REQUIREMENTS

Complete all courses and requirements listed below unless otherwise indicated.

### MILESTONES

Qualifying exam
Annual review
Dissertation committee
Dissertation proposal
Dissertation defense

### REQUIRED COURSE WORK

***Required Core***

Requires 13–18 semester hours:

| | | |
|---|---|---|
| PHSC 5100 | Concepts in Pharmaceutical Science | 2 SH |
| PHSC 6210 | Drug Design, Evaluation, and Development | 2 SH |
| PHSC 6214 | Experimental Design and Biostatistics | 2 SH |
| PHSC 6216 | Human Physiology and Pathophysiology | 2 SH |
| PHSC 6212 | Research Skills and Ethics | 1 SH |
| or BIOL 6381 | Ethics in Biological Research | 2 SH |
| BIOL 6300 | Biochemistry | 4 SH |
| or PHSC 5300 | Pharmaceutical Biochemistry | 2 SH |
| or PHSC 7010 | Pharmaceutical Sciences Laboratory | 4 SH |
| BIOL 6301 | Molecular Cell Biology | 4 SH |
| or PHSC 5310 | Cellular Physiology | 2 SH |

***Pharmaceutics Core***

| | | |
|---|---|---|
| PMST 6252 | Pharmacokinetics and Drug Metabolism | 3 SH |
| PMST 6250 | Advanced Physical Pharmacy | 2 SH |
| PMST 6254 | Advanced Drug Delivery System | 3 SH |

***Electives***

Complete 7–12 semester hours in the following subject areas:
PHSC, PMCL, PMST, BIOL, CHEM, NNMD, BIOT

### SEMINAR AND COLLOQUIUM

***Seminar***

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| PHSC 6300 | Pharmaceutical Science Seminar | 1 SH |

***Colloquium***

| | | |
|---|---|---|
| PHSC 6810 | Pharmaceutical Science Colloquium | 1 SH |

### RESEARCH AND DISSERTATION

***Qualifying Exam***

| | | |
|---|---|---|
| PHSC 8940 | Doctoral Training and Research | 1 SH |

***Proposal Preparation***

| | | |
|---|---|---|
| PHSC 9681 | Doctoral Proposal | 2 SH |

***Dissertation***

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| PHSC 9990 | Dissertation | 3 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

45 total semester hours required
Minimum 3.000 GPA required

## MS in Pharmacology

Graduate education in pharmacology embodies the principles and mechanisms of drug action on biological systems. Through course work, seminars, and conferences, students gain exposure to both classical and recent approaches that have led to the development of current theories of drug action. Pharmacology should not be confused with pharmacy, which is a professional degree allowing a licensed individual to dispense drugs.

Complete all courses and requirements listed below unless otherwise indicated.

## PHARMACOLOGY REQUIREMENTS

***Required Core***

Requires 13–18 semester hours:

| | | |
|---|---|---|
| PHSC 5100 | Concepts in Pharmaceutical Science | 2 SH |
| PHSC 6210 | Drug Design, Evaluation, and Development | 2 SH |
| PHSC 6214 | Experimental Design and Biostatistics | 2 SH |
| PHSC 6216 | Human Physiology and Pathophysiology | 2 SH |
| PHSC 5300 | Pharmaceutical Biochemistry | 2 SH |
| or BIOL 6300 | Biochemistry | 4 SH |
| or PHSC 7010 | Pharmaceutical Sciences Laboratory | 4 SH |
| PHSC 5310 | Cellular Physiology | 2 SH |
| or BIOL 6301 | Molecular Cell Biology | 4 SH |
| PHSC 6212 | Research Skills and Ethics | 1 SH |
| or BIOL 6381 | Ethics in Biological Research | 2 SH |

***Pharmacology***

| | | |
|---|---|---|
| PMCL 6260 | Pharmacology 1 | 2 SH |
| PMCL 6261 | Pharmacology 2 | 2 SH |
| PMCL 6262 | Receptor Pharmacology | 2 SH |

***Electives***

Complete 9–14 semester hours in the following subject areas:
BIOL, BIOT, CHEM, NNMD, PHSC, PMCL, PMST

## PROGRAM CREDIT/GPA REQUIREMENTS

33 total semester hours required
Minimum 3.000 GPA required

# PhD in Pharmacology

The PhD in Pharmacology specialization allows a student to specialize in the study of the actions of drugs. In addition to developing a sound knowledge base through course work and seminars, the program is designed to strengthen the student's ability to comprehend and to evaluate critically the current literature, allowing the conduct of significant independent research. Recent graduates with a PhD in Pharmacology have found employment in academic or industrial research positions.

Complete all courses and requirements listed below unless otherwise indicated.

## MILESTONES

Qualifying exam
Annual review
Dissertation committee
Dissertation proposal
Dissertation defense

## PHARMACOLOGY REQUIREMENTS

***Required Core***

Requires 13–18 semester hours:

| | | |
|---|---|---|
| PHSC 5100 | Concepts in Pharmaceutical Science | 2 SH |
| PHSC 6210 | Drug Design, Evaluation, and Development | 2 SH |
| PHSC 6214 | Experimental Design and Biostatistics | 2 SH |
| PHSC 6216 | Human Physiology and Pathophysiology | 2 SH |
| PHSC 5300 | Pharmaceutical Biochemistry | 2 SH |
| or BIOL 6300 | Biochemistry | 4 SH |
| or PHSC 7010 | Pharmaceutical Sciences Laboratory | 4 SH |
| PHSC 5310 | Cellular Physiology | 2 SH |
| or BIOL 6301 | Molecular Cell Biology | 4 SH |
| PHSC 6212 | Research Skills and Ethics | 1 SH |
| or BIOL 6381 | Ethics in Biological Research | 2 SH |

***Pharmacology***

| | | |
|---|---|---|
| PMCL 6260 | Pharmacology 1 | 2 SH |
| PMCL 6261 | Pharmacology 2 | 2 SH |
| PMCL 6262 | Receptor Pharmacology | 2 SH |

***Electives***

Complete 9–14 semester hours in the following subject areas:
BIOL, BIOT, CHEM, NNMD, PHSC, PMCL, PMST

## SEMINAR AND COLLOQUIUM

***Seminar***

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| PHSC 6300 | Pharmaceutical Science Seminar | 1 SH |

***Colloquium***

| | | |
|---|---|---|
| PHSC 6810 | Pharmaceutical Science Colloquium | 1 SH |

## RESEARCH AND DISSERTATION

***Research***

| | | |
|---|---|---|
| PHSC 8940 | Doctoral Training and Research | 1 SH |

***Proposal Preparation***

| | | |
|---|---|---|
| PHSC 9681 | Doctoral Proposal | 2 SH |

***Dissertation***

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| PHSC 9990 | Dissertation | 3 SH |

## PROGRAM CREDIT/GPA REQUIREMENTS

45 total semester hours required
Minimum 3.000 GPA required

# Doctor of Pharmacy (PharmD) Program

The School of Pharmacy offers the professional 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 and achieve a minimum prerequisite GPA of 3.000. The following prerequisite courses and credits are required:

| | |
|---|---|
| Chemistry 1 with lab | 4 |
| Chemistry 2 with lab | 4 |
| General biology 1 with lab | 4 |
| General biology 2 with lab | 4 |
| Calculus | 4 |
| Organic chemistry 1 with lab | 4 |
| Organic chemistry 2 with lab | 4 |
| Biochemistry | 4 |
| General psychology | 4 |
| English—writing-intensive | 4 |
| Human physiology 1 with lab | 4 |
| Human physiology 2 with lab | 4 |
| Physics with lab | 4 |
| Arts or humanities elective | 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 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 agencies such as the Federal Drug Enforcement Administration. 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 (SOP) Academic Affairs Committee.

The pharmacy curriculum includes introductory (cooperative education) and advanced pharmacy practice experiences. 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.

Introductory pharmacy practice experiences (IPPEs) are competitive placements that are based on job availability in a geographic region. The placements are facilitated by SOP cooperative education coordinators. Students are required to complete one IPPE in a community setting and one IPPE in an institutional/hospital practice setting.

Advanced pharmacy practice experience (APPE) placements are provided based on site/preceptor availability and the final approval of the SOP 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 Doctor of Pharmacy degree (PharmD), a student must successfully complete all courses in the curriculum including the introductory (co-op) and advanced pharmacy practice experiences; meet the academic progression standards of the program; meet the technical standards of the program; and satisfy all other requirements as stated in the *Bouvé College of Health Sciences Graduate Policies and Regulations.* The pharmacy program, which is fully accredited by the Accreditation Council for Pharmacy Education (info@acpe-accredit.org), subscribes to the standards established by ACPE and the American Association of Colleges of Pharmacy.

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 1,740 internship hours, all of which are satisfied through the introductory (co-op) and APPEs.

## REQUIREMENTS FOR ADVANCED PHARMACY PRACTICE EXPERIENCES

1. Successful completion all required and elective didactic course work in the pharmacy curriculum.
2. Successful completion of the APPE preparatory courses (PHMD 6438 and PHMD 6439).
3. Evidence of health clearance from University Health and Counseling Services before placements at any APPE site.
4. Satisfactory completion of any additional site-specific requirements including, but not limited to, criminal record information (CORI) and verification of immunization status. All fees associated with these requirements are the responsibility of the student.

5. Adherence to the university's code of conduct policies while off-campus.
6. Successful completion of six, six-week APPEs: four required APPEs (i.e., ambulatory care, community, internal/general medicine, and one health system experience); and two electives that may be patient-care or non-patient-care focused.
7. Maintenance of sufficient knowledge of site-specific requirements (via site descriptions) and completion of site requests within specified deadlines. Failure to complete these requirements as directed will likely result in delay of graduation.
8. Maintenance of an APPE portfolio throughout the APPE year and completion of all portfolio submission requirements within specified deadlines.
9. Attendance at scheduled on-campus APPE meetings during the APPE year: (1) fall semester: midpoint APPE meeting; and (2) spring semester: exit meeting.

## TECHNICAL STANDARDS

The Doctor of Pharmacy 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 Doctor of Pharmacy 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 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 and ethical 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.

## COLLEGE ACADEMIC STANDARDS—PROFESSIONAL COURSES

PharmD students must receive a grade of C or better in professional courses.

- Professional courses are those required courses taught within the major/college as identified by course subject code: PHMD, PHSC.
- Courses in the above-listed subjects that are taken as electives are exempt from the C or better rule, and the university's minimum satisfactory grade will be accepted.
- For PharmD students, failure to earn a satisfactory grade (S) in a co-op will be counted as a professional course failure.

### *Progression within Bouvé*

The requirements for any graduate degree or certificate of advanced study must yield a cumulative grade-point average of 3.000 or higher as stated in the university's *Graduate Catalog.*

- To progress into the subsequent year of professional courses, students must have completed all professional prerequisites with the required minimum passing grade.
- To progress into the subsequent semester of professional courses, students must have completed all professional courses with a grade of C or better.
- Students who incur an incomplete grade in a prerequisite course must obtain approval from their academic advisor, upon consultation with the department faculty, prior to progression into the subsequent course(s).

### *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. Lecture and clinical/lab components for the same class are considered as *one* professional course failure. 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.
- For PharmD students, the expected graduation date may not be changed 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 Graduate Student Policies and RegulationsManual*, which details the Bouvé College of Health Sciences Appeals Process, and the *Northeastern University Student Handbook*, which details the University Graduate Student Academic Appeals Procedures.

## PharmD—Doctor of Pharmacy—Direct-Entry

Complete all courses and requirements listed below unless otherwise indicated.

### YEAR 1

***Fall Term***

| | | |
|---|---|---|
| ENGW 3306 | Advanced Writing in the Health Professions | 4 SH |
| PHMD 1201 | Introduction to Pharmacy Practice | 2.5 SH |
| with PHMD 1202 | Lab for PHMD 1201 | 0.5 SH |
| PHSC 3411 | Pharmaceutics 1 | 4 SH |
| PHSC 4501 | Pharmacology/Medicinal Chemistry 1 | 5 SH |

***Spring Term***

| | | |
|---|---|---|
| PHMD XXXX | (pending approval) | |

***Summer Term***

| | | |
|---|---|---|
| PHMD 2310 | Educational and Behavioral Interventions in Pharmacy Practice | 2 SH |
| with PHMD 2311 | Lab for PHMD 2310 | 0.5 SH |
| PHMD 2350 | Healthcare Systems | 3 SH |
| PHSC 3412 | Pharmaceutics 2 | 4 SH |
| PHSC 3419 | Pharmaceutics Laboratory | 1 SH |
| PHSC 4502 | Pharmacology/Medicinal Chemistry 2 | 5 SH |

### YEAR 2

***Fall Term***

| | | |
|---|---|---|
| PHMD XXXX | (pending approval) | |

***Spring Term***

| | | |
|---|---|---|
| PHMD 3450 | Research Methodology and Biostatistics | 3 SH |
| PHMD 4611 | Comprehensive Disease Management 1 | 6 SH |
| with PHMD 4612 | Comprehensive Disease Management 1 Seminar | 1 SH |
| PHSC 2330 | Immunology | 3 SH |
| PHSC 3430 | Pharmacokinetics and Biopharmaceutics | 3 SH |

Also complete one elective course.

***Summer Term***

| | | |
|---|---|---|
| PHMD 4621 | Comprehensive Disease Management 2 | 6 SH |
| with PHMD 4622 | Comprehensive Disease Management 2 Seminar | 1 SH |
| with PHMD 4623 | Comprehensive Disease Management 2 Skills Lab | 0.5 SH |
| PHMD 6223 | Drug Information and Evaluation | 3 SH |
| PHMD 6330 | Jurisprudence | 3 SH |
| PHSC 5360 | Anti-Infectives | 4 SH |

Also complete one elective course.

### YEAR 3

***Fall Term***

| | | |
|---|---|---|
| PHMD 4631 | Comprehensive Disease Management 3 | 6 SH |
| with PHMD 4632 | Comprehensive Disease Management 3 Seminar | 1 SH |
| with PHMD 4633 | Comprehensive Disease Management 3 Skills Lab | 0.5 SH |
| PHMD 6250 | Pharmacy Care Management | 3 SH |
| PHMD 6438 | Advanced Pharmacy Practice Experience Preparatory Seminar 1 | 0.5 SH |
| PHSC 4501 | Pharmacology/Medicinal Chemistry 1 | 5 SH |

Also complete one elective course.

***Spring Term***

| | | |
|---|---|---|
| PHMD 4641 | Comprehensive Disease Management 4 | 6 SH |
| with PHMD 4642 | Comprehensive Disease Management 4 Seminar | 1 SH |
| with PHMD 4643 | Comprehensive Disease Management 4 Skills Lab | 0.5 SH |
| PHMD 6270 | Economic Evaluation of Pharmaceuticals and Pharmacy Practice | 4 SH |
| PHMD 6439 | Advanced Pharmacy Practice Experience Preparatory Seminar 2 | 0.5 SH |

Also complete two elective courses.

***Summer Term***

Complete two courses in the following range:
PHMD 6440 to PHMD 6474

### YEAR 4

***Fall Term***

Complete two courses in the following range:
PHMD 6440 to PHMD 6474

***Spring Term***

Complete two courses in the following range:
PHMD 6440 to PHMD 6474

### PROGRAM CREDIT/GPA REQUIREMENTS

133 total semester hours required
Minimum 3.000 GPA required

## PHYSICAL THERAPY, MOVEMENT, AND REHABILITATION SCIENCES

**www.northeastern.edu/bouve/pt**

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Northeastern University physical therapy (PT) graduates are innovative, global leaders who excel in clinical practice, research, and community service. As one of the longest-accredited physical therapy programs in the United States, and the only program with cooperative education, we seek to graduate our students with exceptional clinical decision-making skills and experience in the field of physical therapy.

We offer three entry points in the Doctor of Physical Therapy:

- The postbaccalaureate direct-entry DPT is for applicants who hold a baccalaureate or master's degree in a field other than physical therapy.
- The transitional Doctor of Physical Therapy (DPT) is for applicants who hold a baccalaureate or master's degree in physical therapy and a U.S. license in physical therapy.
- The entry-level DPT is for applicants applying as freshmen students.

Our Doctor of Physical Therapy program builds on the university's core values of interdisciplinary education, urban engagement, international knowledge, and cutting-edge research. Our exceptional faculty are dedicated to promoting excellence in practice, education, scholarship, and community service. Faculty are active in the American Physical Therapy Association and engaged in active clinical research and practice. A hallmark of our program is the integration of experiential learning and didactic education whether through use of standardized patients, communication and interaction with community consultants, participation in service-learning projects, or engagement in research with our faculty.

## Unique Program Features

### INTERPROFESSIONAL OPPORTUNITIES

The Bouvé van provides community access to healthcare offered in conjunction with the nursing, pharmacy, speech-language pathology, and public health programs.

### GLOBAL

Beyond the traditional semester abroad, we offer multiple global academic and service-oriented experiences such as Global Dialogues (30 days in-country), PT academic exchange programs, and global service PT programs to Mexico and Ecuador.

### CONCENTRATIONS

- **Early intervention—**seeks to prepare students to work with very young children with known disabilities or at risk for developmental delays. This program is offered in conjunction with the Department of Applied Psychology. Completion of this concentration provides physical therapy students with the requirements for provisional certification with advanced standing as an early intervention specialist.
- **Sports conditioning and management of the athlete—** enhances a graduate's ability to work with athletes in various venues from gyms to the athletic field to improve collaboration with multiple medical disciplines. This concentration prepares physical therapy students to sit for the sports and conditioning certification.
- **Psychology, business, foreign language.**

### RESEARCH OPPORTUNITIES

- Biomotion Lab
- Cadaver Lab
- Cancer Survivorship Center
- Ergonomics Lab
- Neurocognitive Rehabilitation Research Lab
- Neurorehabilitation Laboratory
- Neuroscience Wet Lab
- Rehabilitation and Epidemiology Trainee Program
- Robotics Lab
- Teaching and Learning Innovation

### CLINICAL EDUCATION

- Throughout the United States, including Division I athletic programs
- Thirty-six weeks of internship plus six months of paid clinical experience through our unique cooperative education program

## Graduate Certificate in Disability Studies

Complete all courses and requirements listed below unless otherwise indicated.

### REQUIREMENTS

Requires 16 semester hours:

| | | |
|---|---|---|
| PT 5710 | Advanced Psychosocial Aspects of Healthcare | 4 SH |
| PT 5720 | Legal and Policy Issues Surrounding Disability | 4 SH |
| PT 5730 | Global Perspectives in Disability and Health | 4 SH |
| HLTH 5280 | The (in)Visibility of (dis)Ability in Society | 3 or 4 SH |
| or PT 5740 | Disabilities Practicum | 4 SH |

## PROGRAM CREDIT/GPA REQUIREMENTS

16 total semester hours required
Minimum 3.000 GPA required

## MS in Occupational Ergonomics and Health

Complete all courses and requirements listed below unless otherwise indicated.

## CORE REQUIREMENTS

***Research***

Requires 6 semester hours:

| | | |
|---|---|---|
| PHTH 5202 | Epidemiology | 3 or 4 SH |
| PHTH 5210 | Biostatistics in Public Health | 3 SH |

***Occupational Health***

Requires 15 semester hours:

| | | |
|---|---|---|
| HINF 6201 | Organizational Behavior, Work Flow Design, and Change Management | 3 SH |
| PHTH 5214 | Environmental Health | 3 SH |
| PT 6400 | (pending approval) | |
| PT 6410 | (pending approval) | |
| PT 6978 | Independent Study | 1 to 4 SH |

***Electives***

Complete four of the following courses (11 semester hours):

| | | |
|---|---|---|
| CAEP 6203 | Understanding Culture and Diversity | 3 SH |
| CAEP 6220 | Development Across the Life Span | 3 SH |
| IE 7315 | Human Factors Engineering | 4 SH |
| PHTH 5224 | Social Epidemiology | 3 SH |
| PHTH 5228 | Advances in Measuring Behavior | 3 SH |
| PHTH 5240 | Evaluating Scientific Evidence | 3 SH |
| PHTH 6320 | Qualitative Methods in Health and Illness | 3 SH |
| PT 6243 | Health Assessment and Wellness | 3 SH |
| SOCL 7270 | Sociology of Work and Employment | 3 SH |

## PROGRAM CREDIT/GPA REQUIREMENTS

32 total semester hours required
Minimum 3.000 GPA required

## DPT—Doctor of Physical Therapy

Complete all courses and requirements listed below unless otherwise indicated.

## YEAR 1

***Spring Term***

| | | |
|---|---|---|
| HLTH 5450 | Healthcare Research | 4 SH |
| PT 5101 | Foundations of Physical Therapy | 3 SH |
| PT 5102 | Lab for PT 5101 | 1 SH |
| PT 5131 | Gross Anatomy | 4 SH |
| PT 5132 | Lab for PT 5131 | 1 SH |
| PT 5160 | Psychosocial Aspects of Healthcare | 3 SH |
| PT 5161 | Psychosocial Aspects of Healthcare Seminar | 1 SH |

***Summer Term***

| | | |
|---|---|---|
| PT 5133 | Kinesiology | 3 SH |
| PT 5134 | Lab for PT 5133 | 1 SH |
| PT 5138 | Neuroscience | 4 SH |
| PT 5139 | Lab for PT 5138 | 1 SH |
| PT 5140 | Pathology | 4 SH |
| PT 5145 | Introduction to the Healthcare System | 2 SH |

## YEAR 2

***Fall Term***

| | | |
|---|---|---|
| PHSC 4340 | Pharmacology for the Health Professions | 4 SH |
| PT 5111 | Professional Development for Bouvé Graduate Co-op | 1 SH |
| PT 5150 | Motor Control, Development, and Learning | 4 SH |
| PT 5151 | Lab for PT 5150 | 1 SH |
| PT 5503 | Cardiovascular and Pulmonary Management | 4 SH |
| PT 5504 | Lab for PT 5503 | 1 SH |

***Spring Term***

| | | |
|---|---|---|
| PT 6964 | Co-op Work Experience | 0 SH |

***Summer Term 1***

| | | |
|---|---|---|
| PT 6964 | Co-op Work Experience | 0 SH |

***Summer Term 2***

| | | |
|---|---|---|
| PT 5515 | Integumentary Systems and Advanced Modalities | 2 SH |
| PT 5516 | Lab for PT 5515 | 1 SH |
| PT 5540 | Clinical Integration 1: Evidence and Practice | 2 SH |
| PT 6243 | Health Assessment and Wellness | 3 SH |
| PT 6244 | Recitation for PT 6243 | 0 SH |

## YEAR 3

***Fall Term***

| | | |
|---|---|---|
| PT 5209 | Neurological Rehabilitation 1 | 4 SH |
| PT 5210 | Lab for PT 5209 | 1 SH |
| PT 5227 | Physical Therapy Project 1 | 3 SH |
| PT 5505 | Musculoskeletal Management 1 | 4 SH |
| PT 5506 | Lab for PT 5505 | 1 SH |
| PT 6000 | Leadership, Administration, and Management | 2 SH |
| PT 6241 | Screening for Medical Conditions in Physical Therapy Practice | 4 SH |

***Spring Term***

| | | |
|---|---|---|
| PT 5226 | Physical Therapy Professional Seminar 2 | 2 SH |
| PT 5229 | Physical Therapy Project 2 | 2 SH |
| PT 5230 | Pediatric and Geriatric Aspects of Life Span Management | 3 SH |
| PT 6221 | Neurological Rehabilitation 2 | 4 SH |
| PT 6222 | Lab for PT 6221 | 1 SH |
| PT 6223 | Musculoskeletal Management 2 | 4 SH |
| PT 6224 | Lab for PT 6223 | 1 SH |

***Summer Term 1***

| | | |
|---|---|---|
| PT 6441 | Clinical Education 1 | 6 SH |

***Summer Term 2***

| | | |
|---|---|---|
| PT 6215 | Assistive Technology | 3 SH |
| PT 6216 | Lab for PT 6215 | 1 SH |
| PT 6250 | Clinical Integration 2: Evidence and Practice | 2 SH |

Also complete one course in the following range:
PT 6231 to PT 6237

### YEAR 4

***Fall Term***

| | | |
|---|---|---|
| PT 6251 | Diagnostic Imaging | 3 SH |
| PT 6442 | Clinical Education 2 | 6 SH |

***Spring Term***

| | | |
|---|---|---|
| PT 6448 | Clinical Education 3 | 9 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

123 total semester hours required
Minimum 3.000 GPA required

## PHYSICIAN ASSISTANT

**www.northeastern.edu/bouve/pa**

ROBIN REED, MD
*Clinical Professor and Program Director*

202 Robinson Hall
617.373.3195
617.373.3338 (fax)
paprogram@neu.edu

Established in 1971, the physician assistant (PA) 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 prepares 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 is designed to provide students with experience in diverse healthcare settings in our well-established network of clinical rotation sites.

Northeastern'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.

### MS in Physician Assistant Studies

Complete all courses and requirements listed below unless otherwise indicated.

### PHYSICIAN ASSISTANT CORE

***Core Course Work***

| | | |
|---|---|---|
| PA 6200 | Anatomy and Physiology 1 | 3 SH |
| PA 6201 | Anatomy and Physiology 2 | 3 SH |
| PA 6208 | Professional Issues for Physician Assistants | 2 SH |
| PA 6330 | Research Design | 2 SH |
| PA 6329 | Healthcare Delivery | 2 SH |

***Diagnosis and Evaluation***

| | | |
|---|---|---|
| PA 6203 | Physical Diagnosis and Patient Evaluation 1 | 3 SH |
| PA 6204 | Physical Diagnosis and Patient Evaluation 2 | 3 SH |
| PA 6207 | Clinical Laboratory and Diagnostic Methods | 4 SH |
| PA 6323 | Clinical Neurology | 2 SH |

| | | |
|---|---|---|
| ***Pharmacology*** | | |
| PA 6205 | Pharmacology 1 | 2 SH |
| PA 6206 | Pharmacology 2 | 2 SH |
| ***Principles*** | | |
| PA 6311 | Principles of Medicine 1 | 4 SH |
| PA 6312 | Principles of Medicine 2 | 4 SH |
| PA 6313 | Principles of Medicine 3 | 4 SH |
| PA 6320 | Principles of Obstetrics and Gynecology | 2 SH |
| PA 6321 | Principles of Surgery | 2 SH |
| PA 6322 | Principles of Orthopedics | 2 SH |
| PA 6324 | Principles of Pediatrics | 2 SH |
| PA 6325 | Principles of Psychiatry | 2 SH |
| ***Primary and Critical Care*** | | |
| PA 6326 | Aspects of Primary Care | 4 SH |
| PA 6327 | Emergency Medicine and Critical Care | 2 SH |
| PA 6328 | Aging and Rehabilitation Medicine | 2 SH |

## CLINICALS

Complete nine courses (45 semester hours) in the following range: PA 6400 to PA 6408

## PROGRAM CREDIT/GPA REQUIREMENTS

103 total semester hours required

Minimum 3.000 GPA required

# SPEECH-LANGUAGE PATHOLOGY AND AUDIOLOGY

See “Communication Sciences and Disorders” on page 177.

INTERDISCIPLINARY

**www.northeastern.edu/bouve/id**

STEVE COHEN, PHD
*Academic Director, Biotechnology Program*
DANIEL A. FEINBERG, MBA
*Assistant Clinical Instructor and Program Director, Health Informatics Program*
STEPHEN INTILLE, PHD
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Students in Northeastern University's graduate biotechnology program attain a common core knowledge of biotechnology with particular emphasis on the ability to integrate knowledge across disciplinary boundaries. Track objectives are to provide students with didactic and practical knowledge in protein analytical approaches and methodologies for activities and functions of biopharmaceuticals (biopharmaceutical analytical sciences); in formulation development and drug product manufacturing of biopharmaceuticals (pharmaceutical technologies); and in development and optimization of drug substance manufacturing of biopharmaceuticals (process sciences).

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 a growing field. We seek to educate the leaders who use technology to improve healthcare for the future.

## Graduate Certificate in Biopharmaceutical Analytical Sciences

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 structures with focus on the characterization and quantification of proteins and variant derivatives. The certificate will provide an opportunity for individuals, particularly those who are working in the various sectors of biotechnology—including basic research of biological systems, discovery, development, and manufacturing of biopharmaceuticals—to enhance their competency and practical skills, enabling them to increase productivity and further contribute to their professions.

Complete all courses and requirements listed below unless otherwise indicated.

### COURSE WORK

| | | |
|---|---|---|
| CHEM 5550 | Introduction to Glycobiology and Glycoprotein Analysis | 3 SH |
| CHEM 5660 | Analytical Biochemistry | 3 SH |
| CHEM 5616 | Protein Mass Spectrometry | 3 SH |
| CHEM 5617 | Protein Mass Spectrometry Laboratory | 3 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

12 total semester hours required
Minimum 3.000 GPA required

## MS in Biotechnology

The MS in Biotechnology is a Professional Master of Science (PSM) degree, an innovative graduate degree designed to allow students to pursue advanced training and excel in science while simultaneously developing highly valued business skills without acquiring a PhD or MBA. PSM programs are characterized by instruction in advanced science or mathematics, business courses, and a graduate co-op providing a real-world work experience. Graduates are referred to as "T-shaped" professionals with both deep knowledge of a specific discipline and broad knowledge of the communications and relational skills necessary to excel in any business and adapt to a changing workplace. The PSM is a nonthesis degree.

### 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 discover 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 are exposed to 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 spectroscopy and molecular separations.

### PHARMACEUTICAL TECHNOLOGIES CONCENTRATION

The pharmaceutical technology 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 study 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 SCIENCES CONCENTRATION

The process development concentration focuses on the production of drug substance of biopharmaceuticals from cell culture process to purification of the biologic molecules. The students study 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. Both lecture courses and project-driven laboratory experience offer hands-on study of cell culture and protein separation.

### DEGREE REQUIREMENTS

Complete all courses and requirements listed below unless otherwise indicated.

### CORE REQUIREMENTS

***Biotechnology and Chemistry***

| | | |
|---|---|---|
| BIOT 5120 | Introduction to Biotechnology | 3 SH |
| BIOT 5145 | Basic Biotechnology Lab Skills | 1 SH |
| BIOT 5631 | Cell Culture Processes for Biopharmaceutical Production | 3 SH |
| BIOT 7245 | Biotechnology Applications Laboratory | 3 SH |
| CHEM 5620 | Protein Chemistry | 3 SH |
| CHEM 5660 | Analytical Biochemistry | 3 SH |
| PHSC 6214 | Experimental Design and Biostatistics | 2 SH |
| BIOL 6299 | Molecular Cell Biology for Biotechnology | 3 SH |

***Biotechnology Business***

| | | |
|---|---|---|
| BIOT 5219 | The Biotechnology Enterprise | 2 SH |
| BIOT 5130 | Team Skills in Biotechnology | 2 SH |

***Elective***

Complete one course (3 semester hours) in the following subject areas, or complete any other graduate course approved by your faculty advisor:

BIOL, BIOT, CHEM, PHSC, PMST, CHME, BUSN, TECE, or ENTR

***Co-op***

| | | |
|---|---|---|
| BIOT 6500 | Professional Development for Co-op | 0 SH |
| BIOT 6964 | Co-op Work Experience | 0 SH |

### CONCENTRATION

Complete one of the following three concentrations:

***Biopharmaceutical Analytical Sciences Concentration***

| | | |
|---|---|---|
| CHEM 5550 | Introduction to Glycobiology and Glycoprotein Analysis | 3 SH |
| CHEM 5616 | Protein Mass Spectrometry | 3 SH |

***Pharmaceutical Technologies Concentration***

| | | |
|---|---|---|
| BIOT 5640 | Drug Product Processes for Biopharmaceuticals | 3 SH |
| BIOT 5700 | Molecular Interactions of Proteins in Biopharmaceutical Formulations | 3 SH |

***Process Sciences Concentration***

| | | |
|---|---|---|
| BIOT 5560 | Bioprocess Fundamentals | 3 SH |
| BIOT 5635 | Downstream Processes for Biopharmaceutical Production | 3 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

34 total semester hours required
Minimum 3.000 GPA required

## MS in Biotechnology—ALIGN Program

Complete all courses and requirements listed below unless otherwise indicated.

### BIOTECHNOLOGY ALIGN COURSE WORK

*Note:* One or both of the following courses may be required. Consult your faculty advisor for information:

***Chemistry***

| | | |
|---|---|---|
| BIOT 5040 | Fundamentals of Biochemistry for Biotechnology | 4 SH |
| BIOT 5050 | Organic Chemistry for Biotechnology | 4 SH |

### CORE REQUIREMENTS

***Biotechnology and Chemistry***

| | | |
|---|---|---|
| BIOT 5120 | Introduction to Biotechnology | 3 SH |
| BIOT 5145 | Basic Biotechnology Lab Skills | 1 SH |
| BIOT 5631 | Cell Culture Processes for Biopharmaceutical Production | 3 SH |
| BIOT 7245 | Biotechnology Applications Laboratory | 3 SH |
| CHEM 5620 | Protein Chemistry | 3 SH |
| CHEM 5660 | Analytical Biochemistry | 3 SH |
| PHSC 6214 | Experimental Design and Biostatistics | 2 SH |
| BIOL 6299 | Molecular Cell Biology for Biotechnology | 3 SH |

***Biotechnology Business***

| | | |
|---|---|---|
| BIOT 5219 | The Biotechnology Enterprise | 2 SH |
| BIOT 5130 | Team Skills in Biotechnology | 2 SH |

***Elective***

Complete one elective course (3 semester hours) in the following subject areas or any other graduate course approved by your faculty advisor:

BIOL, BIOT, CHEM, PHSC, PMST, CHME, BUSN, TECE, ENTR

***Co-op***

| | | |
|---|---|---|
| BIOT 6500 | Professional Development for Co-op | 0 SH |
| BIOT 6964 | Co-op Work Experience | 0 SH |

**CONCENTRATIONS**

Complete one of the following concentrations:

***Biopharmaceutical Analytical Concentration***

| | | |
|---|---|---|
| CHEM 5550 | Introduction to Glycobiology and Glycoprotein Analysis | 3 SH |
| CHEM 5616 | Protein Mass Spectrometry | 3 SH |

***Pharmaceutical Technologies Concentration***

| | | |
|---|---|---|
| BIOT 5640 | Drug Product Processes for Biopharmaceuticals | 3 SH |
| BIOT 5700 | Molecular Interactions of Proteins in Biopharmaceutical Formulations | 3 SH |

***Process Sciences Concentration***

Complete two of the following courses:

| | | |
|---|---|---|
| BIOT 5560 | Bioprocess Fundamentals | 3 SH |
| BIOT 5631 | Cell Culture Processes for Biopharmaceutical Production | 3 SH |
| BIOT 5635 | Downstream Processes for Biopharmaceutical Production | 3 SH |
| BIOT 5640 | Drug Product Processes for Biopharmaceuticals | 3 SH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

34 total semester hours required
Minimum 3.000 GPA required

## Certificates in Health Informatics

Northeastern's graduate certificate programs provide high-quality, specialized training in health informatics and the opportunity to acquire and apply your knowledge quickly. In eight months, you can prepare for a key role in areas of the field offering ample career opportunities.

Three certificate programs enable you to choose the one that addresses your specific goals:

- 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.

## Graduate Certificate in Health Informatics Management and Exchange

- Eight-month program
- Five courses, 15 semester hours

The certificate program in health informatics management and exchange offers you 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.

Complete all courses and requirements listed below unless otherwise indicated.

**HEALTH INFORMATICS MANAGEMENT AND EXCHANGE REQUIREMENTS**

A grade of B– or higher is required in all course work.

***Health Informatics Core***

| | | |
|---|---|---|
| HINF 5101 | Introduction to Health Informatics and Health Information Systems | 3 SH |
| HINF 5102 | Data Management in Healthcare | 3 SH |

***Management and Exchange***

| | | |
|---|---|---|
| HINF 6205 | Creation and Application of Medical Knowledge | 3 SH |
| HINF 6220 | Database Design, Access, Modeling, and Security | 3 SH |
| HINF 6355 | Key Standards in Health Informatics Systems | 3 SH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

15 total semester hours required
Minimum 3.000 GPA required

## Graduate Certificate in Health Informatics Privacy and Security

- Eight-month program
- Five courses, 15 semester hours

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.

Complete all courses and requirements listed below unless otherwise indicated.

**HEALTH INFORMATICS PRIVACY AND SECURITY REQUIREMENTS**

A grade of B– or higher is required in all course work.

***Health Informatics Core***

| | | |
|---|---|---|
| HINF 5101 | Introduction to Health Informatics and Health Information Systems | 3 SH |
| HINF 5102 | Data Management in Healthcare | 3 SH |

***Privacy and Security***

| | | |
|---|---|---|
| IA 5130 | Computer System Security | 4 SH |
| IA 5150 | Network Security Practices | 4 SH |
| IA 5200 | Security Risk Management and Assessment | 4 SH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

18 total semester hours required
Minimum 3.000 GPA required

## Graduate Certificate in Health Informatics Software Engineering

- Eight-month program
- Five courses, 15 semester hours

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.

Complete all courses and requirements listed below unless otherwise indicated.

**HEALTH INFORMATICS SOFTWARE ENGINEERING REQUIREMENTS**

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

***Health Informatics Core***

| | | |
|---|---|---|
| HINF 5101 | Introduction to Health Informatics and Health Information Systems | 3 SH |
| HINF 5102 | Data Management in Healthcare | 3 SH |

***Management and Exchange***

| | | |
|---|---|---|
| HINF 6205 | Creation and Application of Medical Knowledge | 3 SH |
| HINF 6355 | Key Standards in Health Informatics Systems | 3 SH |
| HINF 6345 | Design for Usability in Healthcare | 3 SH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

15 total semester hours required
Minimum 3.000 GPA required

## MS in Health Informatics

Northeastern's interdisciplinary MS in Health Informatics Program 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.

Complete all courses and requirements listed below unless otherwise indicated.

**REQUIREMENTS**

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

***Core Requirements***

| | | |
|---|---|---|
| HINF 5101 | Introduction to Health Informatics and Health Information Systems | 3 SH |
| HINF 5105 | The American Healthcare System | 3 SH |
| HINF 7701 | Health Informatics Capstone Project | 3 SH |

***Business Management Core***

Complete two of the following courses:

| | | |
|---|---|---|
| HINF 6201 | Organizational Behavior, Work Flow Design, and Change Management | 3 SH |
| HINF 6215 | Project Management | 3 SH |
| HINF 6335 | Management Issues in Healthcare Information Technology | 3 SH |
| PHTH 5226 | Strategic Management and Leadership in Healthcare | 3 SH |

***Health Informatics Core***

Complete two of the following courses:

| | | |
|---|---|---|
| HINF 6202 | Business of Healthcare Informatics | 3 SH |
| HINF 6205 | Creation and Application of Medical Knowledge | 3 SH |
| HINF 6225 | Health Systems Lab | 3 SH |
| PHTH 5232 | Evaluating Healthcare Quality | 3 SH |

***Technical Core***

Complete two of the following courses:

| | | |
|---|---|---|
| HINF 5102 | Data Management in Healthcare | 3 SH |
| HINF 6220 | Database Design, Access, Modeling, and Security | 3 SH |
| HINF 6230 | Strategic Topics in Programming For Health Professionals | 3 SH |
| HINF 6355 | Key Standards in Health Informatics Systems | 3 SH |

***Elective Core***

Complete two of the following courses (6 semester hours):

| | | |
|---|---|---|
| HINF 6325 | Legal and Social Issues in Health Informatics | 3 SH |
| HINF 6330 | Emerging Technologies in Healthcare | 3 SH |
| HINF 6345 | Design for Usability in Healthcare | 3 SH |
| HINF 6350 | Public Health Surveillance and Informatics | 3 SH |
| PHTH 5210 | Biostatistics in Public Health | 3 SH |
| PHTH 5202 | Epidemiology | 3 or 4 SH |

Also any HINF course(s)

**PROGRAM CREDIT/GPA REQUIREMENTS**

33 total semester hours required
Minimum 3.000 GPA required

## MS in Health Informatics—ALIGN Program

Our MS in Health Informatics ALIGN Program seeks to prepare students from diverse backgrounds to excel in the health informatics field. ALIGN's custom master's degree curricula are tailored to each student's professional and educational background, allowing successful students to transition into careers in high-demand industries. Learn more at www.northeastern.edu/align.

Complete all courses and requirements listed below unless otherwise indicated.

### REQUIREMENTS

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

***Core Requirements***

| | | |
|---|---|---|
| HINF 0200 | Health and Medicine for Nonclinicians | 3 SH |
| HINF 5101 | Introduction to Health Informatics and Health Information Systems | 3 SH |
| HINF 5105 | The American Healthcare System | 3 SH |
| HINF 7701 | Health Informatics Capstone Project | 3 SH |
| IA 5001 | Cyberspace Technology and Applications | 3 SH |

***Business Management Core***

Complete two of the following courses:

| | | |
|---|---|---|
| HINF 6201 | Organizational Behavior, Work Flow Design, and Change Management | 3 SH |
| HINF 6215 | Project Management | 3 SH |
| HINF 6335 | Management Issues in Healthcare Information Technology | 3 SH |
| PHTH 5226 | Strategic Management and Leadership in Healthcare | 3 SH |

***Health Informatics Core***

Complete two of the following courses:

| | | |
|---|---|---|
| HINF 6202 | Business of Healthcare Informatics | 3 SH |
| HINF 6205 | Creation and Application of Medical Knowledge | 3 SH |
| HINF 6225 | Health Systems Lab | 3 SH |
| PHTH 5232 | Evaluating Healthcare Quality | 3 SH |

***Technical Core***

Complete two of the following courses:

| | | |
|---|---|---|
| HINF 5102 | Data Management in Healthcare | 3 SH |
| HINF 6220 | Database Design, Access, Modeling, and Security | 3 SH |
| HINF 6230 | Strategic Topics in Programming For Health Professionals | 3 SH |
| HINF 6355 | Key Standards in Health Informatics Systems | 3 SH |

***Elective Core***

Complete two of the following courses (6 semester hours):

| | | |
|---|---|---|
| HINF 6325 | Legal and Social Issues in Health Informatics | 3 SH |
| HINF 6330 | Emerging Technologies in Healthcare | 3 SH |
| HINF 6345 | Design for Usability in Healthcare | 3 SH |
| HINF 6350 | Public Health Surveillance and Informatics | 3 SH |
| PHTH 5210 | Biostatistics in Public Health | 3 SH |
| PHTH 5202 | Epidemiology | 3 or 4 SH |

Also any HINF course(s)

### PROGRAM CREDIT/GPA REQUIREMENTS

39 total semester hours required
Minimum 3.000 GPA required

## PhD in Personal Health Informatics

Northeastern University's interdisciplinary Doctoral Program in Personal Health Informatics seeks to prepare researchers to design and evaluate technologies that improve health and wellness with the potential to transform healthcare. The joint degree program combines a strong curriculum in human-computer interface technology and experimental design in health sciences. See additional information on page 87.

For degree requirements, visit the myNEU Web Portal (www.myneu.neu.edu), click on the "Self-Service" tab, then on "My Degree Audit."

## Graduate Certificate in Early Intervention

The interdisciplinary Graduate Certificate Program in Early Intervention was developed in response to state and national needs to prepare personnel to serve infants and toddlers with disabilities, or who are at risk for developmental delays, and their families. The program is approved by the Massachusetts Department of Public Health (DPH), the lead agency for Part C services of the Individuals with Disabilities Education Act (IDEA), as meeting the requirements for provisional certification with advanced standing as an Early Intervention Specialist.

Complete all courses and requirements listed below unless otherwise indicated.

### REQUIRED COURSE WORK

A grade of B– or higher is required in all courses.

***Early Intervention***

| | | |
|---|---|---|
| CAEP 5150 | Early Intervention: Family Systems | 3 SH |
| CAEP 5151 | Early Intervention: Infant and Toddler Development, Risk, and Disability | 3 SH |
| CAEP 5152 | Early Intervention: Planning and Evaluating Services | 3 SH |
| SLPA 6335 | Early Intervention: Assessment and Intervention | 3 SH |

***Practicum***

| | | |
|---|---|---|
| CAEP 8425 | Early Intervention Practicum 1 | 2 SH |
| CAEP 8426 | Early Intervention Practicum 2 | 2 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

16 total semester hours required
Minimum 3.000 GPA required

## Graduate Certificate in Aging

The purpose of this program is to provide interprofessional education to meet the specific healthcare needs of older adults. The interprofessional aging certificate program will consist of four graduate courses. As an interactive online program, the interprofessional certificate program in healthy aging is designed for the twenty-first-century professional requiring the flexibility that online education allows.

Complete all courses and requirements listed below unless otherwise indicated.

### REQUIRED COURSE WORK

A grade of B– or higher is required in each course:

| | | |
|---|---|---|
| HLTH 5005 | Introduction to Health and Aging | 3 SH |
| HLTH 5010 | Health and Aging: Special Considerations | 3 SH |
| HLTH 5015 | Health Assessment in Older Adults | 3 SH |
| HLTH 5020 | Seminar and Capstone Project: Contemporary Issues in Aging | 3 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

12 total semester hours required
Minimum 3.000 GPA required

## JD/MPH in Law and Urban Public Health

Northeastern University's School of Law and Bouvé College of Health Sciences offer a dual-degree JD/MPH in urban health. Given the worldwide trend toward urbanization, the Master of Public Health Program in Urban Public Health 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, College of Computer and Information Science, 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 urban public health problems.

# School of Law

www.northeastern.edu/mls

**JEREMY R. PAUL, JD,** *Dean*

**Dan Danielsen, JD,** *Associate Dean for Academic Affairs*
**James R. Hackney, JD,** *Associate Dean for Entrepreneurial Programs and Research Support*
**Gregory Tilley, MBA,** *Associate Dean for Finance and Administration*

Northeastern University School of Law
400 Huntington Avenue, Boston, MA 02115
617.373.5149
lawweb@neu.edu

## MASTER OF LEGAL STUDIES DEGREE—ONLINE

### Overview

This degree is designed for the professional who wants general exposure to 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 a human resource professional, a claims representative at an insurance company, professionals in large healthcare organizations, a loan officer at a bank, a real estate broker managing a local office, a risk manager, a management consultant advising organizations, a development officer working on planned giving, or a software entrepreneur. They desire to know more about the law and deal more effectively with the lawyers with whom they interact during their professional lives. The degree will include concentrations in human resource management, business, healthcare, and intellectual property.

### Program Plan

Students will take one 3-semester-hour course per term. A term will be approximately seven weeks, and there will be two terms in each of three semesters (fall, spring, and summer). The semesters will be broken into two parts: A/B. The course work will be spread over ten terms or five semesters. Every student in their first semester will take two introduction to legal studies foundation courses. (These two courses are the only prerequisites.) Students then take five core courses and three specialization courses in one of the four concentrations. Students pursuing the general track can take any three specialization courses of their choosing.

### Program Features

#### TOTAL DEGREE CREDIT REQUIRED

The program requires 30 semester hours.

#### COURSE ORGANIZATION

The program comprises ten courses:

- Each course is seven weeks.
- Two courses are taken per semester.
- Each course is 3 semester hours.
- Course types:
  - Two foundation courses
  - Five core courses
  - Three elective courses

#### CONCENTRATIONS

The program includes four concentrations plus a general track. The concentrations are:

- Business
- Intellectual Property
- Healthcare
- Human Resource Management

#### ACADEMIC STRUCTURE

- Six seven-week sessions per calendar year:
  - Spring A
  - Spring B
  - Summer A
  - Summer B
  - Fall A
  - Fall B
- Two seven-week courses (3 semester hours each) back-to-back in each fourteen-week semester
- Total of ten courses needed to graduate

#### TIME TO DEGREE COMPLETION

Normal completion time is twenty months (five semesters) of part-time study.

#### ADMISSION CYCLES

- Fall 1 session
- Spring 1 session
- Summer 1 session

#### ADMISSION REQUIREMENTS

- Bachelor's degree from regionally accredited institution
- Online application
- Application fee—none
- Personal statement with designated questions to be answered
- Two letters of recommendation
- TOEFL for international students

## Master of Legal Studies

Complete all courses and requirements listed below unless otherwise indicated.

### FOUNDATION COURSES

| | | |
|---|---|---|
| LS 6101 | Introduction to Legal Studies 1 | 3 SH |
| LS 6102 | Introduction to Legal Studies 2 | 3 SH |

### CORE COURSES

| | | |
|---|---|---|
| LS 6110 | Law of Information and Records | 3 SH |
| LS 6120 | Law and Strategy | 3 SH |
| LS 6130 | Negotiation and Advocacy | 3 SH |
| LS 6140 | Regulation and Compliance | 3 SH |
| LS 6150 | Law and Organizational Management | 3 SH |

### SPECIALIZATION ELECTIVE COURSES

Complete three of the following courses (9 semester hours):

| | |
|---|---|
| LS 6210 | (pending approval) |
| LS 6220 | (pending approval) |
| LS 6230 | (pending approval) |
| LS 6310 | (pending approval) |
| LS 6320 | (pending approval) |
| LS 6330 | (pending approval) |
| LS 6410 | (pending approval) |
| LS 6420 | (pending approval) |
| LS 6510 | (pending approval) |
| LS 6520 | (pending approval) |

### PROGRAM CREDIT/GPA REQUIREMENTS

30 total semester hours required

Minimum 3.000 GPA required

# College of Professional Studies

www.cps.neu.edu/degree-programs/graduate

**JOHN LABRIE, EDD,** *Dean of the College of Professional Studies and Vice President of Professional Education*

**John Caron, EdD,** *Senior Associate Dean of Faculty and Academic Affairs*
**David Fields, PhD,** *Assistant Dean of Faculty and Academic Affairs*
**Mya Mangawang, PhD,** *Associate Dean of Academic and Faculty Affairs; Director of Graduate School of Education*

50 Nightingale Hall
877.668.7727, 617.373.2400

## 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.

## 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 8 quarter hours or two 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.

### GRADUATE CERTIFICATE TRANSFER CREDIT POLICIES

- A maximum of 4 quarter hours (one course) of transfer credit

### MASTER DEGREE TRANSFER CREDIT POLICIES

- A maximum of 8 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

## Special Student Status

Graduate applicants to the College of Professional Studies may be eligible to take up to two graduate (nondoctoral) courses toward their program while completing the formal application process by seeking special student status (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.

### Personal Professional Enrichment (PPE)

Students interested in taking graduate-level (nondoctoral) courses for personal or professional enrichment (PPE) need to complete an online application as a PPE student (www.cps.neu.edu/admissions/graduate). Once approved, students will be able to register through their myNEU 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. 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.

## NEW STUDENT ORIENTATION (ON-GROUND AND ONLINE)

All newly accepted College of Professional Studies students are expected to attend the on-ground orientation or participate in online 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.

Students are encouraged to use the online orientation, accessed via NU Online, as a resource throughout their career at the College of Professional Studies.

For additional information, visit www.cps.neu.edu/student-resources/orientation.php.

## ACADEMIC RESOURCES

### Interactive Academic Integrity Checklist (IAIC)

The Interactive Academic Integrity Checklist (IAIC) is a Flash-based 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.

- Version for desktop Internet browsers: nuonline.adobeconnect.com/academicintegritychecklist/
- Version for mobile devices: nuonline.adobeconnect.com/academicintegritychecklist_mobile/

### Global Student Success

10 Belvedere
617.373.2455
globalss@neu.edu
www.cps.neu.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
globalss@neu.edu
www.cps.neu.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.

### Smarthinking

Smarthinking is a free online tutoring service accessed through the student's NU Online account for College of Professional Studies students.

Online tutoring sessions can be synchronous or asynchronous. Many different subjects such as writing, reading, basic math through multivariate calculus, business, biology, chemistry, and physics are available.

## ATTENDANCE REQUIREMENTS

Class participation is essential to success no matter the course format or its delivery.

Attendance requirements vary. It is the student's responsibility to ascertain what each instructor requires. If a student will be absent for any reason (e.g., illness, religious beliefs, or jury duty), it is his or her responsibility to inform the instructor and to abide by the attendance requirements as explained in the course syllabus. Unexplained absence from class or failure to meet a course deadline may seriously affect the student's academic progress and may result in a final grade of F.

### "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 myNEU account during the first week of each class start. This verification process is called "I Am Here." 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 "I Am Here" 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.

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 contact CPSiamhere@neu.edu.

### Nonattendance

Nonattendance does not constitute official course dropping or withdrawal which means the student is fully responsible for the academic and financial consequences.

A student who registers for a course and completes the "I Am Here" process but does not officially drop the course by 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.

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; a federal financial aid recipient's aid eligibility and award.

## 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 year 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 course work 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 and Student Support Services for assistance and to complete the appropriate form.

## 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 re-admission. 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 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.

## 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 twelve-week term, with no more than 8 credits per six-week session.

To be eligible for a course overload (greater than 16 credits per twelve-week term or greater than 8 credits per six-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 of 3.500
- Provide a rationale to support the request

Students need to complete the appropriate form and return it to their student success specialist. 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

In order to maintain lawful student status in the United States, international students must be mindful of the rules and regulations that govern their nonimmigrant visa classification. Numerous U.S. federal regulations make it especially important for students in the "F" (student) and "J" (exchange visitor) categories to consult regularly with an international student advisor at the International Student and Scholar Institute (ISSI) before taking any action that might impact their immigration status and educational endeavors in the United States.

All international students in F or J status must register before each quarter starts. It is strongly recommended that international students register for an appropriate full-time course load at least two weeks before the quarter starts. Any exceptions from full-time registration requirements must be preapproved by the ISSI in accordance with specified regulations.

In the College of Professional Studies, there are four quarters that make up each academic year. Each twelve-week quarter (term) in fall, winter, and spring is made up of Parts of Term (courses that are scheduled for less than twelve weeks). Some courses are scheduled for the entire twelve weeks of a quarter, while others are scheduled for either the first six weeks or the last six weeks. A full summer term is eight weeks with Parts of Term as well. Students in F-1 and J-1 status must remain registered at all times during a quarter to remain in compliance. International students are not allowed to take courses during only one-half of an academic quarter. Restrictions on course formats apply to international student enrollment requirements.

To achieve full-time status, graduate and doctoral international students must be enrolled in 9 credits each quarter. For graduate degree programs which require only 4-credit courses in the curriculum, like the Master of Science in Regulatory Affairs for Drugs, Biologics, and Medical Devices, 8 credits is considered full-time enrollment. International students should consult with their student success specialist to develop a course plan to maintain their international student status.

For a 9-credit course load, international students must take at least 6 credits of courses that are held on-campus, in the blended, or hybrid format. Students may not take classes on campus for just the first or second six weeks of an eight or twelve-week quarter and then take only online courses during the other half of the term.

Full-time status must be maintained for F-1 visa students throughout the academic year with the following exceptions:

- A student whose first term is *not* summer does not need to be enrolled in the summer term.
  - If a student's first term of enrollment is summer, he or she must be enrolled full-time that summer. For the second and subsequent summer terms, he or she does not need to be enrolled.
- In the final academic term of a student's program of study, enrollment may be for less than 9 credits, but it must either be on-campus or a combination of on-campus and online throughout the entire term.
- Contact the ISSI if you would like or need one-on-one guidance and assistance on the vast array of federal requirements and procedures related to immigration and maintaining your legal status throughout your studies: www.northeastern.edu/issi/contactus.html.

### 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 (found at www.cps.neu.edu/student-resources/academic-forms.php), signed by both the student and the faculty member, must be submitted to the academic program for review and approval.

## 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.

## REGISTRATION AND TAKING COURSES

### Course Registration

For course registration information, visit www.cps.neu.edu/class-registration/registration-instructions.php.

Course registration procedures are as follows:

- Newly accepted and returning students add or drop courses through their myNEU 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 and Student Support Services 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 does 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 twelve-week courses. For four-, six-, and eight-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 may access their degree audits through their myNEU account or request an audit from their student success specialist. Degree audits are unofficial records of academic progress. Students are encouraged to consult with their student success specialist 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 myNEU account, students, regardless of matriculation status, should read the course description 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 myNEU 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 GPA by repeating a course, he or she may do so . A student may take the same course up to three times to earn a better grade. 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

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.

## Course Formats and Credits

For information on College of Professional Studies course formats, visit www.cps.neu.edu/class-registration/course-formats.php.

The College of Professional Studies operates on a quarter credit system and offers courses in a variety of formats.

One quarter credit is equivalent to 0.75 semester credits.

## Duration of Courses

Each full fall, winter, and spring terms runs for twelve weeks. Each full summer term runs for eight weeks.

Course durations are as follows:

- During the fall, winter, and spring terms, courses are scheduled for either six or twelve weeks.
- During the summer term, courses are scheduled for four, six, or eight weeks.

## Course Add/Drop Policy

Refer to the academic calendar for specific dates: www.northeastern.edu/registrar/calendars.html.

Students may add a four-week or six-week course within the first week of the course. For eight-and twelve-week courses, students may add a course within the first two weeks of the course.

Students who drop a course before the 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 myNEU 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 the Office of the University Registrar (registrar@neu.edu). If it is determined that there is an issue with the student's myNEU account or access, he or she needs to contact the Service Desk at 617.373.4357 (HELP); help@neu.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 for specific dates: www.northeastern.edu/registrar/calendars.html.

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 myNEU 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@neu.edu.

Students who fail to withdraw from a course by 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.

## 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 myNEU Web Portal (www.myneu.neu.edu). Courses with a response rate of less than 20 percent of enrolled students will be excluded from the results.

## ACADEMIC PROGRESSION STANDARDS

### Academic Progress/Standing

A graduate or doctoral student must maintain a minimum cumulative GPA of 3.000 on a 4.000 scale to be in good academic standing. 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 myNEU account. If there are any discrepancies, students should immediately contact the instructor(s) directly. Students who want to appeal a grade have twenty working 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.

### Graduate (Nondoctoral) Students

With exception as specified by the program, a graduate (nondoctoral) student is placed on academic warning for low academic performance if his or her cumulative GPA is below 3.000 after he or she attempts 6 to 11 credits. At this point, the student is strongly encouraged to consult with his or her student success specialist or academic program designee to develop an action plan to improve his or her academic standing. Attempted credits include all credits/courses for which the student registered and did not drop.

A student is placed on academic probation if his or her cumulative GPA is below 3.000 after he or she attempts 12 to 17 credits. The student is required to consult with his or her student success specialist or academic program designee to develop an individualized education plan 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 after attempting 18 or more credits will be academically dismissed. A student who has been academically dismissed from the college is automatically dismissed from his or her program of study.

A student must make consistent satisfactory academic progress toward his or her program. A student who attempts but does not complete credits and earns one or more I, IP, NE, or W grades for two or more consecutive terms may be placed on academic probation, which may then result in academic dismissal.

### Doctoral Students

A doctoral student whose cumulative GPA is below 3.000 is placed on academic warning after attempting 3 credits; academic probation for the second time after attempting 4 to 6 credits; and academic dismissal after attempting 12 or more credits.

A doctoral student must make consistent satisfactory academic progress toward his or her program. A student who attempts but does not complete credits and earns one or more I, IP, NE, or W grades for two or more consecutive terms may be placed on academic probation, which may then result in academic dismissal.

### Dismissal Notification

A student will be notified about his or her dismissal 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 will include the appeal deadline.

Students are responsible for checking their academic progress via their myNEU account at the end of each course and term.

## 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 year 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-plus year absence). The application must be made in writing by submitting the appropriate form and providing supporting documentation to the Office of Academic and Student Support Services.

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.

## 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 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 (tDPT) 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.

## 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 his or her student success specialist, must apply to the intended program by submitting the following:

1. New personal statement
2. Updated resumé, if applicable
3. At least one letter of reference (for degree applicants only)

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.

### Declare a Concentration

Graduate and doctoral students matriculated in a degree program that offers concentrations must declare one concentration. This can be done at the time of application to the program as part of the admissions process. Students also may complete the appropriate form in consultation with their student success specialist or academic program designee. Students who wish to pursue a customized specialization must seek prior approval from the academic program director.

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 must declare a concentration by the beginning of their last term of enrollment for degree completion.

### Academic Internship and Cooperative Education

An academic internship or cooperative education placement is an opportunity for students to engage in a short-term workplace experience that is relevant to their academic course of study. The College of Professional Studies' Cooperative Education Department makes every effort to work with students to identify experiential learning opportunities of three to six months to facilitate career exploration and transition. This program is an optional component of most degree programs. Students must qualify to participate. Review the website (www.cps.neu.edu/degree-programs/internships-co-ops) for guidelines, academic requirements, and opportunities.

## 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.
   - 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 waiver to be permitted to take another course instead of repeating the course. See Course Waiver section.
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.
   - 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 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 two courses (no more than 8 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

A doctoral student can be enrolled in only one program at a time and may not seek an additional certificate or degree.

## GRADUATION REQUIREMENTS

### Graduation Procedures

The following information is for degree-seeking students only. Certificate students should refer to the "Certificate" section.

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.

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 a student's myNEU account, the "Expected Graduation Date" (EGD) is the same as the "Degree conferral date." Northeastern University confers degrees three times each academic year: winter, spring, and fall. The graduation ceremony date is the date that the College hosts the annual graduation ceremony.

To qualify for winter degree conferral, a student must satisfy all degree requirements by the end of the previous fall quarter. To qualify for spring degree conferral, a student must satisfy all degree requirements by the end of the previous winter quarter. To qualify for fall degree conferral, a student must satisfy all degree requirements by the end of the previous summer quarter.

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. Eligibility is based on the number of earned credits at the beginning of the fall term. This email notification informs and instructs students to complete the "Apply to Graduate" process, accessed via their myNEU account. 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 student success specialist.

For more information, visit www.cps.neu.edu/student-resources/graduation/index.php.

### 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.

### Certificate

The College of Professional Studies confers graduate certificates the same time degrees are conferred each year: winter, spring, and fall. Students must submit the appropriate form to their student success specialist in order to have their academic record audited to receive their certificate. Deadlines apply. All certificates will be mailed to the address provided on the form.

## 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.

## ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES

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. 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. For additional information on the DRC, visit their website at www.northeastern.edu/drc or contact staff at 617.373.2675.

## PERSONAL INFORMATION

### Change of Name

Report all name changes to the Office of the Registrar immediately. This is especially important when students marry and wish to use a new name on university records.

### Change of Address

Report all address changes via the myNEU Web Portal (www.myneu.neu.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 also report any changes of address to the International Student and Scholar Institute within ten days in order to ensure compliance with SEVIS requirements.

## 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.

## ACCOUNTING

### Graduate Certificate in Forensic Accounting

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.

Complete all courses and requirements listed below unless otherwise indicated.

#### REQUIRED COURSES

Courses should be taken in the following sequence:

| | | |
|---|---|---|
| ACC 6210 | Forensic Accounting Principles | 4 QH |
| ACC 6220 | Dissecting Financial Statements | 4 QH |
| ACC 6230 | Investigative Accounting and Fraud Examination | 4 QH |
| ACC 6240 | Litigation Support | 4 QH |

#### PROGRAM CREDIT/GPA REQUIREMENTS

16 total quarter hours required
Minimum 3.000 GPA required

# APPLIED NUTRITION

## Master of Science in Applied Nutrition

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 four 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 four degree concentrations: business and entrepreneurship in nutrition; 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.

## MS in Applied Nutrition

Complete all courses and requirements listed below unless otherwise indicated.

### REQUIRED COURSES

| | | |
|---|---|---|
| NTR 6100 | Advanced Nutrition and Metabolism | 4 QH |
| NTR 6110 | Medical Nutrition Therapy | 4 QH |
| NTR 6112 | Research Methods in Nutrition | 4 QH |
| NTR 6115 | Health Promotion/Disease Prevention | 4 QH |
| NTR 6118 | Clinical Health Behavior Change | 4 QH |
| NTR 6866 | Applied Research in Nutrition | 1 to 4 QH |
| NTR 6165 | Food and Society | 4 QH |

### CONCENTRATION

Complete one of the following four concentrations:

***Concentration in Business and Entrepreneurship in Nutrition***

| | | |
|---|---|---|
| NTR 6155 | Nutrition Entrepreneurship | 3 QH |
| NTR 6130 | Healthcare and Nutrition Communication | 4 QH |
| PJM 5900 | Foundations of Project Management | 4 QH |
| NTR 6202 | The Financing of Nutrition and Wellness | 3 QH |
| NTR 7880 | Nutrition in Practice | 1 to 4 QH |

***Concentration in Nutrition Education***

REQUIRED COURSES

| | | |
|---|---|---|
| NTR 6200 | Nutrition Education | 4 QH |
| NTR 6130 | Healthcare and Nutrition Communication | 4 QH |
| NTR 6201 | Commercialization of Nutrition and Nutritional Information | 3 QH |
| NTR 7880 | Nutrition in Practice | 1 to 4 QH |

NUTRITION EDUCATION ELECTIVE

Complete one of the following courses:

| | | |
|---|---|---|
| NTR 6119 | Pediatric Nutrition | 4 QH |
| NTR 6120 | Healthy Aging: Nutrition Strategies for Optimal Longevity | 4 QH |
| NTR 6101 | Nutrition Program Planning | 4 QH |

***Concentration in Nutrition and Fitness***

REQUIRED COURSES

| | | |
|---|---|---|
| NTR 7147 | Sports and Fitness Nutrition | 3 QH |
| NTR 6148 | Exercise Physiology | 3 QH |
| NTR 6150 | Sports Psychology | 3 QH |
| NTR 7880 | Nutrition in Practice | 1 to 4 QH |

NUTRITION AND FITNESS ELECTIVE

Complete one of the following courses:

| | | |
|---|---|---|
| NTR 6120 | Healthy Aging: Nutrition Strategies for Optimal Longevity | 4 QH |
| NTR 6101 | Nutrition Program Planning | 4 QH |

***Concentration in Obesity and Nutritional Health***

REQUIRED COURSES

| | | |
|---|---|---|
| NTR 7130 | Overweight and Obesity 1 | 4 QH |
| NTR 7132 | Overweight and Obesity 2 | 4 QH |
| NTR 6201 | Commercialization of Nutrition and Nutritional Information | 3 QH |
| NTR 7880 | Nutrition in Practice | 1 to 4 QH |

OBESITY AND NUTRITIONAL HEALTH ELECTIVE

Complete one of the following courses:

| | | |
|---|---|---|
| NTR 7140 | Wellness and Nutrition | 4 QH |
| NTR 7135 | Eating Disorders in Children and Adults | 4 QH |

### PROGRAM CREDIT/GPA REQUIREMENTS

45 total quarter hours required

Minimum 3.000 GPA required

## COMMERCE AND ECONOMIC DEVELOPMENT

### Master of Science in Commerce and Economic Development

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.

### MS in Commerce and Economic Development

Complete all courses and requirements listed below unless otherwise indicated.

**REQUIRED COURSES**

| | | |
|---|---|---|
| CED 6010 | Applied Microeconomic Theory | 4 QH |
| CED 6020 | Applied Macroeconomic Theory | 4 QH |
| CED 6030 | Applied Mathematics and Statistics for Economics | 4 QH |
| CED 6040 | Applied Econometrics | 4 QH |
| CED 6050 | Commerce and Economic Development | 4 QH |
| CED 6910 | Capstone: Master's Project | 5 QH |

**ELECTIVE COURSES**

Complete five of the following courses:

| | | |
|---|---|---|
| CED 6070 | Economics of Human Capital | 4 QH |
| CED 6080 | Commerce, Institutions, and Innovation | 4 QH |
| CED 6090 | Cultural Economic Development | 4 QH |
| CED 6110 | Law and Economics | 4 QH |
| CED 6120 | Environmental Economics | 4 QH |
| CED 6130 | Sustainable Economic Development | 4 QH |
| CED 6140 | Economics of E-Commerce | 4 QH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

45 total quarter hours required
Minimum 3.000 GPA required

## CONSTRUCTION MANAGEMENT

### Graduate Certificate in Construction Management

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 Construction Management Graduate Certificate 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.

Complete all courses and requirements listed below unless otherwise indicated.

**REQUIRED COURSES**

| | | |
|---|---|---|
| CMG 6400 | Introduction to Construction Management | 4 QH |
| CMG 6402 | Alternative Project Delivery Methods and Project Controls | 4 QH |
| CMG 6403 | Safety, Project Risk, and Quality Management | 4 QH |
| CMG 6405 | Construction Law | 4 QH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

16 total quarter hours required
Minimum 3.000 GPA required

## CRIMINAL JUSTICE

### Master of Science in Criminal Justice

Criminal justice and security agencies are under increased scrutiny—challenged to provide efficient and effective services; be transparent in their interactions with the public; and respond to changing local, national, and world conditions. To be successful, justice system leaders need to think strategically, communicate locally, and act ethically while developing comprehensive (and often multijurisdictional) solutions to crime and terrorism problems.

In response, Northeastern University's College of Professional Studies—in collaboration with the School of Criminology and Criminal Justice—offers the Master of Science in Criminal Justice**.** This innovative online master's degree provides a path to excellence for leaders in law enforcement, courts, private security, and corrections organizations. Academically distinctive, graduate courses in this program emphasize leadership, communication, and ethics—themes that are designed to enhance your leadership capacity and improve your career prospects.

### MS in Criminal Justice

Complete all courses and requirements listed below unless otherwise indicated.

#### FOUNDATION COURSES

| | | |
|---|---|---|
| CJS 6020 | Contemporary Issues in Criminal Justice Policy | 3 QH |
| CJS 6400 | Administration of Justice | 3 QH |
| CJS 6405 | Criminological Theory for Criminal Justice Leaders | 3 QH |
| CJS 6415 | Legal Decision Making and Leadership | 3 QH |

It is recommended that the following course be taken last:

| | | |
|---|---|---|
| CJS 6470 | Criminal Justice Capstone | 3 QH |

#### OPERATIONS COURSES

| | | |
|---|---|---|
| CJS 6425 | Research Methods | 3 QH |
| CJS 6435 | Program Evaluations | 3 QH |
| CJS 6440 | GIS, Evidence-Based Learning, and Policy | 3 QH |
| CMN 6050 | Crisis Communication | 3 QH |

#### CONCENTRATION

Complete one of the following six concentrations:

***Concentration in Community and Family Justice***

COMMUNITY AND FAMILY JUSTICE COURSES

| | | |
|---|---|---|
| CJS 6300 | Communities and Crime | 3 QH |
| CJS 6330 | Youth Justice and Crime | 3 QH |
| CJS 6340 | Substance Abuse and Addictions | 3 QH |
| CJS 6305 | Criminal Behavior and the Family | 3 QH |
| CJS 6135 | Intimate Partner Violence | 3 QH |

ELECTIVE

Complete 3 quarter hours from the following courses:

| | | |
|---|---|---|
| CJS 6005 | Legal and Regulatory Issues for Security Management | 3 QH |
| CJS 6010 | Advanced Principles of Security Management and Threat Assessment | 3 QH |
| CJS 6025 | Genocide and War Crimes | 3 QH |
| CJS 6030 | Organized Crime | 3 QH |
| CJS 6035 | Corruption, Integrity, and Accountability | 3 QH |
| CJS 6040 | Human Trafficking and Exploitation | 3 QH |
| CJS 6045 | Policing Issues around the Globe | 3 QH |
| CJS 6050 | Models of Intelligence-Led Policing | 3 QH |
| CJS 6105 | Domestic and International Terrorism | 3 QH |
| CJS 6110 | Management of Service Industries Security Department | 3 QH |
| CJS 6120 | Preventing Service Industries Losses | 3 QH |
| CJS 6125 | Issues in National Security | 3 QH |
| CJS 6135 | Intimate Partner Violence | 3 QH |
| CJS 6140 | Security Role: Safety and Environment Protection | 3 QH |
| CJS 6145 | Correctional Rehabilitation | 3 QH |
| CJS 6205 | Law Enforcement Management and Planning | 3 QH |
| CJS 6300 | Communities and Crime | 3 QH |
| CJS 6305 | Criminal Behavior and the Family | 3 QH |
| CJS 6315 | Administration of the Adult and Juvenile Correction Systems | 3 QH |
| CJS 6320 | Community Corrections | 3 QH |
| CJS 6325 | Probation and Parole | 3 QH |
| CJS 6330 | Youth Justice and Crime | 3 QH |
| CJS 6340 | Substance Abuse and Addictions | 3 QH |
| CJS 6420 | U.S. Policing in the Twenty-First Century | 3 QH |
| GST 6300 | Security and Terrorism | 4 QH |
| LDR 6110 | Leading Teams | 3 to 6 QH |
| LDR 6120 | Organizational Leadership | 3 to 6 QH |
| LDR 6125 | Managing Organizational Culture | 3 QH |
| LDR 6140 | Strategic Leadership | 3 to 6 QH |
| LDR 6360 | Dynamics of Change at the Community and Social Level | 3 QH |
| INT 6943 | Integrative Experiential Learning | 3 QH |

***Concentration in Corrections***

CORRECTIONS COURSES

Complete five of the following courses:

| | | |
|---|---|---|
| CJS 6145 | Correctional Rehabilitation | 3 QH |
| CJS 6300 | Communities and Crime | 3 QH |
| CJS 6315 | Administration of the Adult and Juvenile Correction Systems | 3 QH |
| CJS 6325 | Probation and Parole | 3 QH |
| CJS 6320 | Community Corrections | 3 QH |
| CJS 6340 | Substance Abuse and Addictions | 3 QH |

ELECTIVE

Complete 3 quarter hours from the following courses:

| | | |
|---|---|---|
| CJS 6005 | Legal and Regulatory Issues for Security Management | 3 QH |
| CJS 6010 | Advanced Principles of Security Management and Threat Assessment | 3 QH |
| CJS 6025 | Genocide and War Crimes | 3 QH |
| CJS 6030 | Organized Crime | 3 QH |
| CJS 6035 | Corruption, Integrity, and Accountability | 3 QH |
| CJS 6040 | Human Trafficking and Exploitation | 3 QH |
| CJS 6045 | Policing Issues around the Globe | 3 QH |
| CJS 6050 | Models of Intelligence-Led Policing | 3 QH |
| CJS 6105 | Domestic and International Terrorism | 3 QH |
| CJS 6110 | Management of Service Industries Security Department | 3 QH |
| CJS 6120 | Preventing Service Industries Losses | 3 QH |
| CJS 6125 | Issues in National Security | 3 QH |
| CJS 6135 | Intimate Partner Violence | 3 QH |
| CJS 6140 | Security Role: Safety and Environment Protection | 3 QH |
| CJS 6145 | Correctional Rehabilitation | 3 QH |
| CJS 6205 | Law Enforcement Management and Planning | 3 QH |
| CJS 6300 | Communities and Crime | 3 QH |
| CJS 6305 | Criminal Behavior and the Family | 3 QH |
| CJS 6315 | Administration of the Adult and Juvenile Correction Systems | 3 QH |
| CJS 6320 | Community Corrections | 3 QH |
| CJS 6325 | Probation and Parole | 3 QH |
| CJS 6330 | Youth Justice and Crime | 3 QH |
| CJS 6340 | Substance Abuse and Addictions | 3 QH |
| CJS 6420 | U.S. Policing in the Twenty-First Century | 3 QH |
| GST 6300 | Security and Terrorism | 4 QH |
| LDR 6110 | Leading Teams | 3 to 6 QH |
| LDR 6120 | Organizational Leadership | 3 to 6 QH |
| LDR 6125 | Managing Organizational Culture | 3 QH |
| LDR 6140 | Strategic Leadership | 3 to 6 QH |
| LDR 6360 | Dynamics of Change at the Community and Social Level | 3 QH |
| INT 6943 | Integrative Experiential Learning | 3 QH |

***Concentration in Global Criminal Justice***

GLOBAL CRIMINAL JUSTICE COURSES

Complete five of the following courses:

| | | |
|---|---|---|
| CJS 6025 | Genocide and War Crimes | 3 QH |
| CJS 6030 | Organized Crime | 3 QH |
| CJS 6035 | Corruption, Integrity, and Accountability | 3 QH |
| CJS 6040 | Human Trafficking and Exploitation | 3 QH |
| CJS 6045 | Policing Issues around the Globe | 3 QH |
| CJS 6105 | Domestic and International Terrorism | 3 QH |
| CJS 6125 | Issues in National Security | 3 QH |
| GST 6300 | Security and Terrorism | 4 QH |

ELECTIVE

Complete 3 quarter hours from the following courses:

| | | |
|---|---|---|
| CJS 6005 | Legal and Regulatory Issues for Security Management | 3 QH |
| CJS 6010 | Advanced Principles of Security Management and Threat Assessment | 3 QH |
| CJS 6025 | Genocide and War Crimes | 3 QH |
| CJS 6030 | Organized Crime | 3 QH |
| CJS 6035 | Corruption, Integrity, and Accountability | 3 QH |
| CJS 6040 | Human Trafficking and Exploitation | 3 QH |
| CJS 6045 | Policing Issues around the Globe | 3 QH |
| CJS 6050 | Models of Intelligence-Led Policing | 3 QH |
| CJS 6105 | Domestic and International Terrorism | 3 QH |
| CJS 6110 | Management of Service Industries Security Department | 3 QH |
| CJS 6120 | Preventing Service Industries Losses | 3 QH |
| CJS 6125 | Issues in National Security | 3 QH |
| CJS 6135 | Intimate Partner Violence | 3 QH |
| CJS 6140 | Security Role: Safety and Environment Protection | 3 QH |
| CJS 6145 | Correctional Rehabilitation | 3 QH |
| CJS 6205 | Law Enforcement Management and Planning | 3 QH |
| CJS 6300 | Communities and Crime | 3 QH |
| CJS 6305 | Criminal Behavior and the Family | 3 QH |
| CJS 6315 | Administration of the Adult and Juvenile Correction Systems | 3 QH |
| CJS 6320 | Community Corrections | 3 QH |
| CJS 6325 | Probation and Parole | 3 QH |
| CJS 6330 | Youth Justice and Crime | 3 QH |
| CJS 6340 | Substance Abuse and Addictions | 3 QH |
| CJS 6420 | U.S. Policing in the Twenty-First Century | 3 QH |
| GST 6300 | Security and Terrorism | 4 QH |
| LDR 6110 | Leading Teams | 3 to 6 QH |
| LDR 6120 | Organizational Leadership | 3 to 6 QH |
| LDR 6125 | Managing Organizational Culture | 3 QH |
| LDR 6140 | Strategic Leadership | 3 to 6 QH |
| LDR 6360 | Dynamics of Change at the Community and Social Level | 3 QH |
| INT 6943 | Integrative Experiential Learning | 3 QH |

***Concentration in Leadership***

LEADERSHIP COURSES

| | | |
|---|---|---|
| LDR 6110 | Leading Teams | 3 to 6 QH |
| LDR 6120 | Organizational Leadership | 3 to 6 QH |
| LDR 6125 | Managing Organizational Culture | 3 QH |
| LDR 6140 | Strategic Leadership | 3 to 6 QH |
| LDR 6360 | Dynamics of Change at the Community and Social Level | 3 QH |

ELECTIVE

Complete 3 quarter hours from the following courses:

| | | |
|---|---|---|
| CJS 6005 | Legal and Regulatory Issues for Security Management | 3 QH |
| CJS 6010 | Advanced Principles of Security Management and Threat Assessment | 3 QH |
| CJS 6025 | Genocide and War Crimes | 3 QH |
| CJS 6030 | Organized Crime | 3 QH |
| CJS 6035 | Corruption, Integrity, and Accountability | 3 QH |
| CJS 6040 | Human Trafficking and Exploitation | 3 QH |
| CJS 6045 | Policing Issues around the Globe | 3 QH |
| CJS 6050 | Models of Intelligence-Led Policing | 3 QH |
| CJS 6105 | Domestic and International Terrorism | 3 QH |
| CJS 6110 | Management of Service Industries Security Department | 3 QH |
| CJS 6120 | Preventing Service Industries Losses | 3 QH |
| CJS 6125 | Issues in National Security | 3 QH |
| CJS 6135 | Intimate Partner Violence | 3 QH |
| CJS 6140 | Security Role: Safety and Environment Protection | 3 QH |
| CJS 6145 | Correctional Rehabilitation | 3 QH |
| CJS 6205 | Law Enforcement Management and Planning | 3 QH |
| CJS 6300 | Communities and Crime | 3 QH |
| CJS 6305 | Criminal Behavior and the Family | 3 QH |
| CJS 6315 | Administration of the Adult and Juvenile Correction Systems | 3 QH |
| CJS 6320 | Community Corrections | 3 QH |
| CJS 6325 | Probation and Parole | 3 QH |
| CJS 6330 | Youth Justice and Crime | 3 QH |
| CJS 6340 | Substance Abuse and Addictions | 3 QH |
| CJS 6420 | U.S. Policing in the Twenty-First Century | 3 QH |
| GST 6300 | Security and Terrorism | 4 QH |
| LDR 6110 | Leading Teams | 3 to 6 QH |
| LDR 6120 | Organizational Leadership | 3 to 6 QH |
| LDR 6125 | Managing Organizational Culture | 3 QH |
| LDR 6140 | Strategic Leadership | 3 to 6 QH |
| LDR 6360 | Dynamics of Change at the Community and Social Level | 3 QH |
| INT 6943 | Integrative Experiential Learning | 3 QH |

***Concentration in Policing***

POLICING COURSES

Complete five of the following courses:

| | | |
|---|---|---|
| CJS 6035 | Corruption, Integrity, and Accountability | 3 QH |
| CJS 6045 | Policing Issues around the Globe | 3 QH |
| CJS 6050 | Models of Intelligence-Led Policing | 3 QH |
| CJS 6205 | Law Enforcement Management and Planning | 3 QH |
| CJS 6300 | Communities and Crime | 3 QH |
| CJS 6420 | U.S. Policing in the Twenty-First Century | 3 QH |

ELECTIVE

Complete 3 quarter hours from the following courses:

| | | |
|---|---|---|
| CJS 6005 | Legal and Regulatory Issues for Security Management | 3 QH |
| CJS 6010 | Advanced Principles of Security Management and Threat Assessment | 3 QH |
| CJS 6025 | Genocide and War Crimes | 3 QH |
| CJS 6030 | Organized Crime | 3 QH |
| CJS 6035 | Corruption, Integrity, and Accountability | 3 QH |
| CJS 6040 | Human Trafficking and Exploitation | 3 QH |
| CJS 6045 | Policing Issues around the Globe | 3 QH |
| CJS 6050 | Models of Intelligence-Led Policing | 3 QH |
| CJS 6105 | Domestic and International Terrorism | 3 QH |
| CJS 6110 | Management of Service Industries Security Department | 3 QH |
| CJS 6120 | Preventing Service Industries Losses | 3 QH |
| CJS 6125 | Issues in National Security | 3 QH |
| CJS 6135 | Intimate Partner Violence | 3 QH |
| CJS 6140 | Security Role: Safety and Environment Protection | 3 QH |
| CJS 6145 | Correctional Rehabilitation | 3 QH |
| CJS 6205 | Law Enforcement Management and Planning | 3 QH |
| CJS 6300 | Communities and Crime | 3 QH |
| CJS 6305 | Criminal Behavior and the Family | 3 QH |
| CJS 6315 | Administration of the Adult and Juvenile Correction Systems | 3 QH |
| CJS 6320 | Community Corrections | 3 QH |
| CJS 6325 | Probation and Parole | 3 QH |
| CJS 6330 | Youth Justice and Crime | 3 QH |
| CJS 6340 | Substance Abuse and Addictions | 3 QH |
| CJS 6420 | U.S. Policing in the Twenty-First Century | 3 QH |
| GST 6300 | Security and Terrorism | 4 QH |
| LDR 6110 | Leading Teams | 3 to 6 QH |
| LDR 6120 | Organizational Leadership | 3 to 6 QH |
| LDR 6125 | Managing Organizational Culture | 3 QH |
| LDR 6140 | Strategic Leadership | 3 to 6 QH |
| LDR 6360 | Dynamics of Change at the Community and Social Level | 3 QH |
| INT 6943 | Integrative Experiential Learning | 3 QH |

***Concentration in Security***

SECURITY COURSES

Complete five of the following courses:

| | | |
|---|---|---|
| CJS 6010 | Advanced Principles of Security Management and Threat Assessment | 3 QH |
| CJS 6005 | Legal and Regulatory Issues for Security Management | 3 QH |
| CJS 6035 | Corruption, Integrity, and Accountability | 3 QH |
| CJS 6045 | Policing Issues around the Globe | 3 QH |

| | | |
|---|---|---|
| CJS 6105 | Domestic and International Terrorism | 3 QH |
| CJS 6125 | Issues in National Security | 3 QH |
| GST 6300 | Security and Terrorism | 4 QH |

ELECTIVE

Complete 3 quarter hours from the following courses:

| | | |
|---|---|---|
| CJS 6005 | Legal and Regulatory Issues for Security Management | 3 QH |
| CJS 6010 | Advanced Principles of Security Management and Threat Assessment | 3 QH |
| CJS 6025 | Genocide and War Crimes | 3 QH |
| CJS 6030 | Organized Crime | 3 QH |
| CJS 6035 | Corruption, Integrity, and Accountability | 3 QH |
| CJS 6040 | Human Trafficking and Exploitation | 3 QH |
| CJS 6045 | Policing Issues around the Globe | 3 QH |
| CJS 6050 | Models of Intelligence-Led Policing | 3 QH |
| CJS 6105 | Domestic and International Terrorism | 3 QH |
| CJS 6110 | Management of Service Industries Security Department | 3 QH |
| CJS 6120 | Preventing Service Industries Losses | 3 QH |
| CJS 6125 | Issues in National Security | 3 QH |
| CJS 6135 | Intimate Partner Violence | 3 QH |
| CJS 6140 | Security Role: Safety and Environment Protection | 3 QH |
| CJS 6145 | Correctional Rehabilitation | 3 QH |
| CJS 6205 | Law Enforcement Management and Planning | 3 QH |
| CJS 6300 | Communities and Crime | 3 QH |
| CJS 6305 | Criminal Behavior and the Family | 3 QH |
| CJS 6315 | Administration of the Adult and Juvenile Correction Systems | 3 QH |
| CJS 6320 | Community Corrections | 3 QH |
| CJS 6325 | Probation and Parole | 3 QH |
| CJS 6330 | Youth Justice and Crime | 3 QH |
| CJS 6340 | Substance Abuse and Addictions | 3 QH |
| CJS 6420 | U.S. Policing in the Twenty-First Century | 3 QH |
| GST 6300 | Security and Terrorism | 4 QH |
| LDR 6110 | Leading Teams | 3 to 6 QH |
| LDR 6120 | Organizational Leadership | 3 to 6 QH |
| LDR 6125 | Managing Organizational Culture | 3 QH |
| LDR 6140 | Strategic Leadership | 3 to 6 QH |
| LDR 6360 | Dynamics of Change at the Community and Social Level | 3 QH |
| INT 6943 | Integrative Experiential Learning | 3 QH |

### PROGRAM CREDIT/GPA REQUIREMENTS

45 total quarter hours required
Minimum 3.000 GPA required

## DIGITAL MEDIA

## Graduate Certificate in 3-D Animation

Three-D 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 3-D Animation offers a practice-oriented approach to the art and science of animation, with a particular emphasis on the special requirements of 3-D 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.

Complete all courses and requirements listed below unless otherwise indicated.

### CORE COURSE

Complete one of the following courses. *Note:* For students with a portfolio waiver, DGM 6450 is the core course:

| | | |
|---|---|---|
| DGM 6105 | Visual Communications Foundation | 4 QH |
| DGM 6450 | Animation Basics | 4 QH |

### REQUIRED COURSES

| | | |
|---|---|---|
| DGM 6122 | Foundations of Digital Storytelling | 4 QH |
| DGM 6510 | 3-D Modeling | 4 QH |
| DGM 6530 | Character Animation | 4 QH |
| DGM 6540 | Compositing | 4 QH |
| DGM 6882 | Animation Reel | 1 to 4 QH |

### PROGRAM CREDIT/GPA REQUIREMENTS

22 total quarter hours required
Minimum 3.000 GPA required

## Graduate Certificate in Digital Video

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.

The courses in this program also serve as a concentration in the Master of Professional Studies in Digital Media.

Complete all courses and requirements listed below unless otherwise indicated.

**REQUIRED COURSES**

| | | |
|---|---|---|
| DGM 6105 | Visual Communications Foundation | 4 QH |
| DGM 6122 | Foundations of Digital Storytelling | 4 QH |
| DGM 6880 | Portfolio | 2 QH |

**DIGITAL VIDEO ELECTIVES**

Complete two of the following courses:

| | | |
|---|---|---|
| DGM 6435 | Digital Video Production | 4 QH |
| DGM 6440 | Editing in the Digital Studio | 4 QH |
| DGM 6520 | Lighting for the Camera | 4 QH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

18 total quarter hours required
Minimum 3.000 GPA required

## Graduate Certificate in Game Design

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.

Courses in this program also serve as a concentration in the Master of Professional Studies in Digital Media.

Complete all courses and requirements listed below unless otherwise indicated.

**REQUIRED COURSES**

| | | |
|---|---|---|
| DGM 6308 | Intermediate Programming for Digital Media | 4 QH |
| DGM 6122 | Foundations of Digital Storytelling | 4 QH |
| DGM 6400 | Game Design Fundamentals | 4 QH |
| DGM 6405 | Game Development | 4 QH |

**GAME DESIGN ELECTIVE**

Complete one of the following courses:

| | | |
|---|---|---|
| DGM 6408 | Game Design Algorithms and Data Structures | 4 QH |
| DGM 6410 | Game Design Technology Lab | 4 QH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

20 total quarter hours required
Minimum 3.000 GPA required

## Graduate Certificate in Interactive Design

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.

The courses in this program also serve as a concentration in the Master of Professional Studies in Digital Media.

Complete all courses and requirements listed below unless otherwise indicated.

**REQUIRED COURSES**

| | | |
|---|---|---|
| DGM 6105 | Visual Communications Foundation | 4 QH |
| DGM 6108 | Programming Foundations for Digital Media | 4 QH |
| DGM 6168 | Usability and Human Interaction | 4 QH |
| DGM 6217 | Typography for Interactivity | 4 QH |
| DGM 6461 | Interactive Information Design 1 | 4 QH |
| DGM 6880 | Portfolio | 2 QH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

22 total quarter hours required
Minimum 3.000 GPA required

## Master of Professional Studies in Digital Media

New innovations, breakthrough technologies, and changing consumer habits are redefining the media landscape—fueling demand for media professionals who can apply the latest tools and techniques to create compelling digital content.

In response, the Master of Professional Studies in Digital Media provides state-of-the-art digital media courses in moving image, information design, and narrative structure—elements that are critical to producing and developing content-rich and interactive experiences. Complementing the degree's core curriculum are seven distinctive concentrations in 3-D animation, game design, interactive design, digital photography, digital video, digital media management, or social media.

Differentiating this digital media master's degree is its cohort format, a team-based structure that allows you to complete your degree with the same group of students. Designed to strengthen your project management and leadership skills, cohorts enable you to collaborate with your colleagues on complex, multimedia projects, preparing you to excel in an increasingly digital world.

## MPS in Digital Media

Complete all courses and requirements listed below unless otherwise indicated.

**REQUIRED CORE COURSES**

Complete the following nine courses (33 quarter hours):

| | | |
|---|---|---|
| DGM 6105 | Visual Communications Foundation | 4 QH |
| DGM 6108 | Programming Foundations for Digital Media | 4 QH |

| | | |
|---|---|---|
| DGM 6122 | Foundations of Digital Storytelling | 4 QH |
| DGM 6501 | Web Creation Boot Camp | 2 QH |
| DGM 6511 | Web Creation Bootcamp 2 | 2 QH |
| DGM 6145 | Information Technology and Creative Practice | 4 QH |
| DGM 6140 | Sound Design | 4 QH |
| DGM 6890 | Thesis Proposal Development | 1 to 2 QH |
| DGM 7990 | Thesis | 3 to 6 QH |

Complete one of the following courses:

| | | |
|---|---|---|
| DGM 6125 | Time-Based Media | 4 QH |
| DGM 6168 | Usability and Human Interaction | 4 QH |

## CONCENTRATION

Complete one of the following six concentrations:

***Concentration in 3-D Animation***

Complete four of the following courses:

| | | |
|---|---|---|
| DGM 6450 | Animation Basics | 4 QH |
| DGM 6510 | 3-D Modeling | 4 QH |
| DGM 6530 | Character Animation | 4 QH |
| DGM 6535 | Rigging Principles and Techniques | 4 QH |
| DGM 6540 | Compositing | 4 QH |

***Concentration in Digital Media Management***

Complete four of the following courses:

| | | |
|---|---|---|
| DGM 6230 | Digital Media Entrepreneurship | 4 QH |
| DGM 6280 | Managing for Digital Media | 4 QH |
| DGM 6285 | Interactive Marketing Fundamentals | 4 QH |
| DGM 6290 | Social Media and Brand Strategy Implementation | 4 QH |
| DGM 6279 | Project Management for Digital Media | 4 QH |

***Concentration in Digital Video***

Complete four of the following courses:

| | | |
|---|---|---|
| DGM 6300 | Digital Capture and Output | 4 QH |
| DGM 6435 | Digital Video Production | 4 QH |
| DGM 6440 | Editing in the Digital Studio | 4 QH |
| DGM 6520 | Lighting for the Camera | 4 QH |
| DGM 6540 | Compositing | 4 QH |
| DGM 6545 | Documentary and Nonfiction Production | 4 QH |
| DGM 6430 | Screenwriting: Linear and Interactive | 4 QH |

***Concentration in Game Design***

Complete four of the following courses:

| | | |
|---|---|---|
| DGM 6308 | Intermediate Programming for Digital Media | 4 QH |
| DGM 6400 | Game Design Fundamentals | 4 QH |
| DGM 6405 | Game Development | 4 QH |
| DGM 6408 | Game Design Algorithms and Data Structures | 4 QH |
| DGM 6410 | Game Design Technology Lab | 4 QH |

***Concentration in Interactive Design***

REQUIRED COURSE

| | | |
|---|---|---|
| DGM 6461 | Interactive Information Design 1 | 4 QH |

TRACK

Complete one of the following two tracks:

DESIGN TRACK

Complete three of the following courses:

| | | |
|---|---|---|
| DGM 6217 | Typography for Interactivity | 4 QH |
| DGM 6463 | Interactive Information Design 2 | 4 QH |
| DGM 6317 | Screen-Based Publication Design | 4 QH |
| DGM 6471 | Designing Infographics | 4 QH |
| DGM 6895 | Digital Portfolio Capstone | 4 QH |

USABILITY AND DEVELOPMENT TRACK

Complete three of the following courses:

| | | |
|---|---|---|
| DGM 6451 | Web Development | 4 QH |
| DGM 6268 | Usable Design for Mobile Digital Media | 4 QH |
| DGM 6308 | Intermediate Programming for Digital Media | 4 QH |
| DGM 6471 | Designing Infographics | 4 QH |
| TCC 6710 | Content Strategy | 4 QH |

***Concentration in Social Media***

Complete four of the following courses:

| | | |
|---|---|---|
| CMN 6045 | Leveraging Digital Technologies: Strategy, Assessment, and Governance | 3 QH |
| CMN 6065 | Implementation and Management of Social Media Channels and Online Communities | 3 QH |
| DGM 6285 | Interactive Marketing Fundamentals | 4 QH |
| DGM 6290 | Social Media and Brand Strategy Implementation | 4 QH |
| TCC 6710 | Content Strategy | 4 QH |

## PROGRAM CREDIT/GPA REQUIREMENTS

49 total quarter hours required

Minimum 3.000 GPA required

## EDUCATION

### Graduate Certificate in Adult and Organizational Learning

From globalization to technology, economic volatility to talent management, there is an increasing need to educate today's workforce for competitive advantage. To meet these needs, trainers, executive development professionals, human resource managers, and educators must stay current in adult and organizational learning.

The Graduate Certificate in Adult and Organizational Learning is designed to provide participants with foundational knowledge in adult learning, needs assessment, and program review. Students have an opportunity to gain expertise and understanding of the methods and models available for instruction, delivery channels, and overall program development.

Complete all courses and requirements listed below unless otherwise indicated.

**REQUIRED CORE COURSES**

| | | |
|---|---|---|
| EDU 6319 | How People Learn | 4 QH |
| EDU 6323 | Technology as a Medium for Learning | 4 QH |

Complete one of the following courses:

| | | |
|---|---|---|
| EDU 6324 | Competencies, Assessment, and Learning Analytics | 4 QH |
| EDU 6437 | Assessment in Education | 4 QH |

Complete one of the following courses:

| | | |
|---|---|---|
| EDU 6331 | E-Learning Design as a Collaborative Profession | 4 QH |
| EDU 6450 | The Globalization of Education | 4 QH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

16 total quarter hours required
Minimum 3.000 GPA required

### Graduate Certificate in Distance Learning

Distance learning is the fastest-growing area of postsecondary education in the United States. In order to meet the expanding need for qualified instructors and professionals, the CPS created the online Graduate Certificate in Distance Learning.

The curriculum is based on cutting-edge distance education techniques, recognized best practices, and proven methodologies, as applied by Northeastern University and other leading institutions. Focused on emerging trends in distance learning and hands-on instruction, this online certificate offers educators the opportunity to achieve excellence in distance learning administration and instruction.

Complete all courses and requirements listed below unless otherwise indicated.

**REQUIRED COURSES**

| | | |
|---|---|---|
| EDU 6319 | How People Learn | 4 QH |
| EDU 6323 | Technology as a Medium for Learning | 4 QH |
| EDU 6321 | Models for Learning Design | 4 QH |

**ELECTIVE COURSE**

Complete one of the following courses (4 quarter hours):

| | | |
|---|---|---|
| EDU 6558 | Issues in Education | 1 to 4 QH |
| EDU 6332 | Open Learning | 4 QH |
| EDU 6333 | Social Media and Beyond | 4 QH |
| EDU 6331 | E-Learning Design as a Collaborative Profession | 4 QH |
| EDU 6324 | Competencies, Assessment, and Learning Analytics | 4 QH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

16 total quarter hours required
Minimum 3.000 GPA required

### Graduate Certificate in Higher Education Administration

The effective administration of higher education institutions has never been so critical than at this time. Consider:

- The president of the United States of America and the secretary of education are calling for access to higher education for all.
- European and Asian universities are ascending in quality, increasing as market forces.
- The electronic delivery of education is escalating, creating new pedagogy and delivery models.

To meet these challenges, as well as changing demographics, financial concerns, and legal and policy requirements, administrators and leaders in higher education need to be increasingly sophisticated and knowledgeable.

The Graduate Certificate in Higher Education Administration is designed to provide participants with an overall understanding of managerial concepts as well as the operational and strategic concepts that lead to effective administration. This program is best suited for individuals seeking mid- to senior-level administrative roles and individuals interested in transitioning from industry and other organizations into academia.

The certificate comprises 16 quarter hours, which may be applied toward the Master of Education in Higher Education Administration.

Complete all courses and requirements listed below unless otherwise indicated.

**REQUIRED CORE COURSES**

| | | |
|---|---|---|
| EDU 6201 | The Landscape of Higher Education | 4 QH |
| EDU 6202 | Faculty, Curriculum, and Academic Community | 4 QH |
| EDU 6203 | Education Law, Policy, and Finance | 4 QH |

### ELECTIVE COURSE

Complete one of the following courses (4 quarter hours):

| | | |
|---|---|---|
| EDU 6520 | Learning and the Brain: Translating Research into Practice | 4 QH |
| EDU 6319 | How People Learn | 4 QH |
| EDU 6332 | Open Learning | 4 QH |
| EDU 6330 | Digital Media Literacy | 4 QH |
| EDU 6558 | Issues in Education | 1 to 4 QH |

### PROGRAM CREDIT/GPA REQUIREMENTS

16 total quarter hours required
Minimum 3.000 GPA required

## Master of Arts in Teaching, Elementary Licensure Curriculum

Designed for aspiring teachers and career changers, the Master of Arts in Teaching in Elementary Education (MAT)* 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.

*The MAT (grades 1–6) has been approved at the initial licensure level by the Massachusetts Department of Elementary and Secondary Education.

## MAT—Master of Arts in Teaching—Elementary Licensure

Complete all courses and requirements listed below unless otherwise indicated.

### REQUIRED COURSES

| | | |
|---|---|---|
| EDU 6051 | Culture, Equity, Power, and Influence | 4 QH |
| EDU 6086 | Foundations of Literacy Development and Instruction | 4 QH |
| EDU 6104 | Child and Adolescent Development, Learning, and Teaching | 4 QH |
| EDU 6107 | Inclusion, Equity, and Diversity | 4 QH |
| EDU 6154 | Inquiry in the Sciences and Humanities | 4 QH |
| EDU 6155 | Inquiry in Mathematics | 4 QH |
| EDU 6185 | English-Language Learners in the General Education Classroom | 4 QH |
| EDU 6183 | Collaborative Strategies for Effective Classroom Management | 1 QH |
| EDU 6866 | Teaching Practicum and Seminar | 1 to 8 QH |

### ELECTIVE COURSES

Complete 8 quarter hours from the following courses:

| | | |
|---|---|---|
| EDU 6023 | Institute in Creating a Community of Learners/Behaviors | 4 QH |
| EDU 6300 | Introduction to Language and Linguistics: How English Is Structured and Used | 4 QH |
| EDU 6425 | Special Education: Role of Special Educators in an Inclusive School | 4 QH |
| EDU 6426 | Developmental Language, Literacy, and Writing: Assessment and Instruction | 4 QH |
| EDU 6429 | Variations in Child and Adolescent Development | 4 QH |
| EDU 6436 | Best Practices for the Twenty-First-Century Education | 4 QH |
| EDU 6437 | Assessment in Education | 4 QH |
| EDU 6438 | Teachers as Curriculum Leaders | 4 QH |
| EDU 6452 | Critical Scholarly Investigation: On Location | 4 QH |
| EDU 6462 | Children's Literature | 4 QH |
| EDU 6465 | Critical and Creative Thinking | 4 QH |
| EDU 6472 | Advanced Special Education Strategies | 4 QH |
| EDU 6516 | Sheltered English Instruction and Assessment | 4 QH |
| EDU 6520 | Learning and the Brain: Translating Research into Practice | 4 QH |
| EDU 6528 | Adaptive Learning/Behavior Management Strategies: Consultation and Collaboration | 4 QH |
| EDU 6530 | Beyond Behavior Management | 4 QH |
| EDU 6569 | Differentiated Instruction and Assessment in Mathematics | 4 QH |
| EDU 6570 | Advanced Strategies in Literacy: Readers and Writers Who Struggle | 4 QH |

### 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 course work to earn either an additional license in special education (teacher of students of moderate disabilities, PreK–8 or 5–12) or a certificate in Teaching English as a Second Language (TESOL).

***MAT+ in Special Education***

This Commonwealth of Massachusetts–approved program may be completed with only an additional 10 quarter hours beyond the standard MAT curriculum. Qualifying students must take the seven licensure courses outlined in the MAT curriculum, select qualifying special education courses for the two elective course options (within the MAT curriculum), and complete three additional special education courses.

The special education course requirements are:

| | |
|---|---|
| Advanced special education course | 4 QH |
| Advanced literacy course | 4 QH |
| Advanced behavior management course | 4 QH |
| Assessment course | 4 QH |
| EDU 6874 Practicum, Portfolio, and Panel Review | 0 to 4 QH |

## Master of Arts in Teaching, Secondary Licensure Curriculum

Designed for aspiring teachers and career changers, the Master of Arts in Secondary Education (MAT)* 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.

*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.

## MAT—Master of Arts in Teaching—Secondary Licensure

Complete all courses and requirements listed below unless otherwise indicated.

### REQUIRED COURSES

| | | |
|---|---|---|
| EDU 6051 | Culture, Equity, Power, and Influence | 4 QH |
| EDU 6064 | Curriculum and Assessment | 4 QH |
| EDU 6104 | Child and Adolescent Development, Learning, and Teaching | 4 QH |
| EDU 6107 | Inclusion, Equity, and Diversity | 4 QH |
| EDU 6162 | Language, Culture, and Literacy in Middle and High Schools | 4 QH |
| EDU 6185 | English-Language Learners in the General Education Classroom | 4 QH |
| EDU 6183 | Collaborative Strategies for Effective Classroom Management | 1 QH |
| EDU 6866 | Teaching Practicum and Seminar | 1 to 8 QH |

### ELECTIVE COURSES

Complete 8 quarter hours from the following courses:

| | | |
|---|---|---|
| EDU 6023 | Institute in Creating a Community of Learners/Behaviors | 4 QH |
| EDU 6300 | Introduction to Language and Linguistics: How English Is Structured and Used | 4 QH |
| EDU 6425 | Special Education: Role of Special Educators in an Inclusive School | 4 QH |
| EDU 6426 | Developmental Language, Literacy, and Writing: Assessment and Instruction | 4 QH |
| EDU 6429 | Variations in Child and Adolescent Development | 4 QH |
| EDU 6436 | Best Practices for the Twenty-First-Century Education | 4 QH |
| EDU 6437 | Assessment in Education | 4 QH |
| EDU 6438 | Teachers as Curriculum Leaders | 4 QH |
| EDU 6452 | Critical Scholarly Investigation: On Location | 4 QH |
| EDU 6462 | Children's Literature | 4 QH |
| EDU 6465 | Critical and Creative Thinking | 4 QH |
| EDU 6472 | Advanced Special Education Strategies | 4 QH |
| EDU 6516 | Sheltered English Instruction and Assessment | 4 QH |
| EDU 6520 | Learning and the Brain: Translating Research into Practice | 4 QH |
| EDU 6528 | Adaptive Learning/Behavior Management Strategies: Consultation and Collaboration | 4 QH |
| EDU 6530 | Beyond Behavior Management | 4 QH |
| EDU 6569 | Differentiated Instruction and Assessment in Mathematics | 4 QH |
| EDU 6570 | Advanced Strategies in Literacy: Readers and Writers Who Struggle | 4 QH |

### 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 course work to earn either an additional license in special education (teacher of students of moderate disabilities, PreK–8 or 5–12) or a certificate in Teaching English as a Second Language (TESOL).

***MAT+ in Special Education***

This Commonwealth of Massachusetts–approved program may be completed with only an additional 10 quarter hours beyond the standard MAT curriculum. Qualifying students must take the seven licensure courses outlined in the MAT curriculum, select qualifying special education courses for the two elective course options (within the MAT curriculum), and complete three additional special education courses.

The special education course requirements are:

| | |
|---|---|
| Advanced special education course | 4 QH |
| Advanced literacy course | 4 QH |
| Advanced behavior management course | 4 QH |
| Assessment course | 4 QH |
| EDU 6874 Practicum, Portfolio, and Panel Review | 0 to 4 QH |

## Master of Education

### ELEARNING AND INSTRUCTIONAL DESIGN CONCENTRATION

Recent research on the science of learning has revolutionized our understanding of how people learn. As technology has become ubiquitous in society, learning takes place in many venues and formats: face-to-face, blended, online, and mobile. Seismic shifts are taking place in the education sector, such as competency-based learning and open education. These developments are creating a growing demand for professionals who can help their organizations think strategically about approaches to learning that are pedagogically sound and technology-savvy.

The elearning and instructional design concentration explores the leading edge of next-generation learning design, with the goal of preparing its graduates to thrive in a world of expanded opportunities and delivery modes for learning. The concentration's innovative approach blends academic and experiential workplace-based learning. During the course of study, students develop an online portfolio of work to demonstrate their capacity to think strategically, put creative ideas into action, and design environments that improve student learning to meet academic, personal, institutional, and organizational goals.

### HIGHER EDUCATION ADMINISTRATION CONCENTRATION

Due to advances in e-learning and increasing student enrollments, the need for capable and effective school administrators has never been greater. In addition to providing solid guidance and direction, they must work to meet the needs of faculty, students, and parents alike. In response, the CPS offers a Master of Education program with a concentration in higher education administration.

This innovative master's degree program explores complex industry issues such as student demographics, financial concerns, legal and policy requirements, technology, and competitive forces.

### LEARNING AND INSTRUCTION CONCENTRATION

As the field of education evolves, today's educators are constantly challenged to be aware of and incorporate best-in-class practices, new technologies, and the latest research and trends within their classrooms. In response, the CPS offers the Master of Education with a Concentration in Learning and Instruction.

Designed for a broad range of educators, this program provides an in-depth look at the critical issues that are transforming the face of education: technology and distance learning, globalization, creative and critical thinking, assessments, and learning outcomes.

Reflecting the new direction of education, this master's degree program also allows you to choose your area of focus by selecting from degree specializations in math, science, English-language learning, literacy, leadership, and technology.

Whether you are a classroom teacher or an administrator or work in youth development, community education, early childhood, or in a before/aftercare program, you have an opportunity to gain new perspectives and acquire fresh strategies for meeting the needs of today's students. This program seeks to produce graduates empowered to implement new ideas and innovative strategies that are designed to improve educational effectiveness.

### 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 a 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 prepares 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.

## MEd—Master of Education

Complete all courses and requirements listed below unless otherwise indicated.

### REQUIRED COURSES

| | | |
|---|---|---|
| EDU 6050 | Education as an Advanced Field of Study | 5 QH |
| EDU 6051 | Culture, Equity, Power, and Influence | 4 QH |

### CONCENTRATION

Complete one of the following five concentrations:

***Concentration in eLearning and Instructional Design***

REQUIRED COURSES

| | | |
|---|---|---|
| EDU 6319 | How People Learn | 4 QH |
| EDU 6321 | Models for Learning Design | 4 QH |
| EDU 6323 | Technology as a Medium for Learning | 4 QH |
| EDU 6324 | Competencies, Assessment, and Learning Analytics | 4 QH |
| EDU 6329 | Connecting Theory and Practice | 4 QH |
| EDU 6331 | E-Learning Design as a Collaborative Profession | 4 QH |

Complete the following course last:

| | | |
|---|---|---|
| EDU 6225 | Capstone | 4 QH |

Complete two of the following courses (8 quarter hours):

| | | |
|---|---|---|
| EDU 6322 | Iterative Design of Learning Experiences | 4 QH |
| EDU 6332 | Open Learning | 4 QH |
| EDU 6333 | Social Media and Beyond | 4 QH |
| EDU 6558 | Issues in Education | 1 to 4 QH |
| EDU 6202 | Faculty, Curriculum, and Academic Community | 4 QH |

***Concentration in Higher Education Administration***

REQUIRED COURSES

| | | |
|---|---|---|
| EDU 6201 | The Landscape of Higher Education | 4 QH |
| EDU 6202 | Faculty, Curriculum, and Academic Community | 4 QH |
| EDU 6447 | The Demographics of Higher Education | 4 QH |
| EDU 6203 | Education Law, Policy, and Finance | 4 QH |
| EDU 6324 | Competencies, Assessment, and Learning Analytics | 4 QH |
| EDU 6221 | Enrollment, Retention, Graduation, Success | 4 QH |

Complete the following course last:

| | | |
|---|---|---|
| EDU 6225 | Capstone | 4 QH |

Complete one of the following courses (4 quarter hours):

| | | |
|---|---|---|
| EDU 6450 | The Globalization of Education | 4 QH |
| INT 6900 | International Field Study Experience | 3 or 4 QH |

ELECTIVE

Complete 4 quarter hours from the following courses:

| | | |
|---|---|---|
| EDU 6520 | Learning and the Brain: Translating Research into Practice | 4 QH |
| EDU 6319 | How People Learn | 4 QH |
| EDU 6332 | Open Learning | 4 QH |
| EDU 6330 | Digital Media Literacy | 4 QH |
| EDU 6558 | Issues in Education | 1 to 4 QH |

***Concentration in Learning Analytics***

REQUIRED COURSES

| | | |
|---|---|---|
| EDU 6340 | Learning Analytics Concepts and Theories | 4 QH |
| EDU 6341 | Introduction to Data Mining in Education | 4 QH |
| EDU 6342 | Data Preparation for Learning Analytics | 4 QH |
| EDU 6343 | Predictive Modeling for Learning Analytics | 4 QH |
| EDU 6344 | Data Visualization for Learning Analytics | 4 QH |
| EDU 6345 | Text Mining for Learning Analytics | 4 QH |
| EDU 6324 | Competencies, Assessment, and Learning Analytics | 4 QH |
| EDU 6558 | Issues in Education | 1 to 4 QH |

Complete the following course last:

| | | |
|---|---|---|
| EDU 6225 | Capstone | 4 QH |

***Concentration in Learning and Instruction***

REQUIRED COURSES

| | | |
|---|---|---|
| EDU 6330 | Digital Media Literacy | 4 QH |
| EDU 6328 | Policy and Leadership | 4 QH |
| EDU 6437 | Assessment in Education | 4 QH |

Complete the following course last:

| | | |
|---|---|---|
| EDU 6225 | Capstone | 4 QH |

Complete one of the following courses:

| | | |
|---|---|---|
| EDU 6465 | Critical and Creative Thinking | 4 QH |
| EDU 6520 | Learning and the Brain: Translating Research into Practice | 4 QH |
| EDU 6319 | How People Learn | 4 QH |

Complete four courses (16 quarter hours) from any other concentration:

| | | |
|---|---|---|
| EDU 6201 | The Landscape of Higher Education | 4 QH |
| EDU 6447 | The Demographics of Higher Education | 4 QH |
| EDU 6221 | Enrollment, Retention, Graduation, Success | 4 QH |
| EDU 6450 | The Globalization of Education | 4 QH |
| EDU 6332 | Open Learning | 4 QH |
| EDU 6323 | Technology as a Medium for Learning | 4 QH |
| EDU 6426 | Developmental Language, Literacy, and Writing: Assessment and Instruction | 4 QH |
| EDU 6528 | Adaptive Learning/Behavior Management Strategies: Consultation and Collaboration | 4 QH |
| EDU 6429 | Variations in Child and Adolescent Development | 4 QH |
| EDU 6431 | Developing Skills and Accessing Ideas: Curriculum | 4 QH |
| EDU 6558 | Issues in Education | 1 to 4 QH |
| EDU 6185 | English-Language Learners in the General Education Classroom | 4 QH |
| EDU 6300 | Introduction to Language and Linguistics: How English Is Structured and Used | 4 QH |
| EDU 6534 | Bilingualism, Second Language, and Literacy Development | 4 QH |

***Concentration in Special Education***

REQUIRED COURSES

| | | |
|---|---|---|
| EDU 6425 | Special Education: Role of Special Educators in an Inclusive School | 4 QH |
| EDU 6426 | Developmental Language, Literacy, and Writing: Assessment and Instruction | 4 QH |
| EDU 6528 | Adaptive Learning/Behavior Management Strategies: Consultation and Collaboration | 4 QH |

| | | |
|---|---|---|
| EDU 6569 | Differentiated Instruction and Assessment in Mathematics | 4 QH |
| EDU 6874 | Practicum, Portfolio, and Panel Review | 0 to 4 QH |

ELECTIVES

Complete 16 quarter hours from the following courses:

| | | |
|---|---|---|
| EDU 6185 | English-Language Learners in the General Education Classroom | 4 QH |
| EDU 6429 | Variations in Child and Adolescent Development | 4 QH |
| EDU 6530 | Beyond Behavior Management | 4 QH |
| EDU 6431 | Developing Skills and Accessing Ideas: Curriculum | 4 QH |
| EDU 6570 | Advanced Strategies in Literacy: Readers and Writers Who Struggle | 4 QH |
| EDU 6437 | Assessment in Education | 4 QH |
| EDU 6465 | Critical and Creative Thinking | 4 QH |
| EDU 6520 | Learning and the Brain: Translating Research into Practice | 4 QH |
| EDU 6558 | Issues in Education | 1 to 4 QH |

### PROGRAM CREDIT/GPA REQUIREMENTS

45 total quarter hours required
Minimum 3.000 GPA required

## Doctor of Education

The Doctor of Education (EdD) program offers a rich, dynamic learning experience—one that blends critical engagement with theory, practice, and research.

Offering innovative and engaging opportunities, our EdD seeks to further cultivate the skills and knowledge necessary to effect meaningful change in your organization. As a doctor of education student, you have an opportunity to collaborate with an accomplished group of fellow practitioners, exposing you to global perspectives and strengthening your ability to think critically about today's educational challenges.

Built on Northeastern University's scholar-practitioner model, the EdD program integrates your professional experience with doctoral-level research, which should enable you to identify and address your practice-based issues while investigating matters of social justice. Through rigorous course work and collaborative opportunities, you have an opportunity to conduct empirical research culminating in a doctoral thesis that examines a compelling educational challenge.

### ADMISSION REQUIREMENTS

Note that all doctor of education degrees offered through the CPS 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 (EdD) curriculum, teaching, learning, and leadership concentration seeks to help educational leaders develop the competencies, dispositions, and values required to pursue educational reform, based on a commitment to social justice. Students have an opportunity to 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.

### HIGHER EDUCATION ADMINISTRATION CONCENTRATION

The Doctor of Education (EdD) higher education administration concentration includes the study of practice and scholarship across a variety of postsecondary education settings, including community and four-year colleges, for-profit organizations, and research institutions. Addressing globalization trends in higher education, this concentration combines theoretical with practice-based concepts.

This concentration offers students an opportunity to conduct and apply research that advances administrative practice or theory in higher education administration. Students have an opportunity to further their understanding and utilization of research design as they interpret research literature and conduct research studies.

This program seeks to produce graduates well-grounded in the educational roles and critical issues in colleges and universities, including:

- Cultural, ethical, and societal issues in higher education
- Historical considerations in higher education around the world
- Organization, governance, leadership, and administrative theories
- Higher education finance, law, and planning
- Establishing and sustaining initiatives in higher education

### ORGANIZATIONAL LEADERSHIP STUDIES CONCENTRATION

The Doctor of Education (EdD) organizational leadership studies concentration 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 twenty-first-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.
- Examine key models of organizational culture to build their own capability to understand and interact with different societal and organizational cultures across the world.
- Enhance their ability to think systemically by developing the required competencies to create cultures and structuring processes for learning in their organizations.
- 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.

## EdD—Doctor of Education

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

| | | |
|---|---|---|
| EDU 7209 | Introduction to Doctoral Studies | 3 QH |
| EDU 7214 | Changing Conceptions of Learning and Human Development: Research and Practice | 3 QH |
| EDU 7202 | Transforming Human Systems | 3 QH |
| EDU 7210 | Leadership Theory and Research | 3 QH |

### REQUIRED RESEARCH COURSES

***Research Courses***

| | | |
|---|---|---|
| EDU 7280 | Fundamentals of Research | 3 QH |
| EDU 7281 | Research Design | 3 QH |

***Proposal Development***

Complete one of the following courses:

| | | |
|---|---|---|
| EDU 7282 | Proposal Development—Quantitative | 3 QH |
| EDU 7283 | Proposal Development—Qualitative | 3 QH |

### CONCENTRATION

Complete one of the following three concentrations:

***Concentration in Curriculum, Teaching, Learning, and Leadership***

CURRICULUM, TEACHING, LEARNING, AND LEADERSHIP COURSES

| | | |
|---|---|---|
| EDU 7216 | Social Justice and Educational Equity | 3 QH |
| EDU 7217 | Educational Systems: The Dynamics between Policy, Values, and Practice | 3 QH |
| EDU 7213 | Education Entrepreneurship | 3 QH |
| EDU 7242 | Situated Leadership | 3 QH |
| EDU 7244 | Curriculum Theory and Practice Over Time: Implications for Educational Leadership | 3 QH |

ELECTIVE COURSES

Complete 12 quarter hours in the following range:
EDU 7000 to EDU 7999

DOCTORAL THESIS COURSES

| | | |
|---|---|---|
| EDU 8796 | Thesis Proposal and the Internal Review Board | 0 QH |
| EDU 8797 | Thesis Data Collection, Initial Analysis, and Management | 0 QH |
| EDU 8798 | Thesis Data Analysis and Presentation | 0 QH |
| EDU 8799 | Thesis Findings and Discussion | 12 QH |

***Concentration in Higher Education Administration***

HIGHER EDUCATION ADMINISTRATION COURSES

| | | |
|---|---|---|
| EDU 7204 | Global and Historical Perspectives on Higher Education | 3 QH |
| EDU 7250 | Organizational Systems and Institutional Governance | 3 QH |
| EDU 7253 | The Legal Environment of Higher Education | 3 QH |
| EDU 7256 | Financial Decision Making in Higher Education | 3 QH |
| EDU 7258 | Strategic Management in Higher Education | 3 QH |

ELECTIVE COURSES

Complete 12 quarter hours in the following range:
EDU 7000 to EDU 7999

DOCTORAL THESIS COURSES

| | | |
|---|---|---|
| EDU 8796 | Thesis Proposal and the Internal Review Board | 0 QH |

| | | |
|---|---|---|
| EDU 8797 | Thesis Data Collection, Initial Analysis, and Management | 0 QH |
| EDU 8798 | Thesis Data Analysis and Presentation | 0 QH |
| EDU 8799 | Thesis Findings and Discussion | 12 QH |

***Concentration in Organizational Leadership Studies***

ORGANIZATIONAL LEADERSHIP COURSES

| | | |
|---|---|---|
| EDU 7277 | Organizational Learning and Systems Thinking | 3 QH |
| EDU 7272 | Global Perspectives of Organizational Culture | 3 QH |
| EDU 7276 | Organizational Communication: Institutional and Global Perspectives | 3 QH |
| EDU 7275 | Contemporary Models of Leadership | 3 QH |
| EDU 7278 | Organization Theory and Design | 3 QH |

ELECTIVE COURSES

Complete 12 quarter hours in the following range:
EDU 7000 to EDU 7999

DOCTORAL THESIS COURSES

| | | |
|---|---|---|
| EDU 8796 | Thesis Proposal and the Internal Review Board | 0 QH |
| EDU 8797 | Thesis Data Collection, Initial Analysis, and Management | 0 QH |
| EDU 8798 | Thesis Data Analysis and Presentation | 0 QH |
| EDU 8799 | Thesis Findings and Discussion | 12 QH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

60 total quarter hours required
Minimum 3.000 GPA required

## FINANCIAL MARKETS AND INSTITUTIONS

### Graduate Certificate in Financial Markets and Institutions

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.

Complete all courses and requirements listed below unless otherwise indicated.

**REQUIRED COURSES**

Complete the following four courses (16 quarter hours):

| | | |
|---|---|---|
| FIN 6101 | Accounting Fundamentals for Financial Institutions | 3 or 4 QH |
| FIN 6161 | Investment Analysis | 4 QH |
| FIN 6102 | Asset and Liability Management | 3 or 4 QH |
| FIN 6120 | Building Financial Relationships | 3 or 4 QH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

16 total quarter hours required
Minimum 3.000 GPA required

## GEOGRAPHIC INFORMATION SYSTEMS

### Graduate Certificate in Geographic Information Systems

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.

Complete all courses and requirements listed below unless otherwise indicated.

#### REQUIRED COURSES

| | | |
|---|---|---|
| GIS 5101 | Introduction to Geographic Information Systems | 3 QH |
| GIS 5102 | Fundamentals of GIS Analysis | 3 QH |
| RMS 5105 | Fundamentals of Remote Sensing | 3 QH |
| GIS 5201 | Advanced Spatial Analysis | 3 QH |

#### GEOGRAPHIC INFORMATION SYSTEM ELECTIVES

Complete two of the following courses:

| | | |
|---|---|---|
| GIS 6320 | Use and Applications of Free and Open-Source GIS Desktop Software | 3 QH |
| GIS 6340 | GIS Customization | 3 QH |
| GIS 6350 | GIS Management and Implementation | 3 QH |
| GIS 6360 | Spatial Databases | 3 QH |
| GIS 6370 | Internet-Based GIS | 3 QH |
| GIS 6385 | GIS/Cartography | 3 QH |
| GIS 6390 | Business Applications of Geographic Information Systems | 3 QH |
| GIS 6391 | Healthcare Applications of Geographic Information Systems | 3 QH |
| GIS 6394 | Crisis Mapping for Humanitarian Action | 3 QH |
| GIS 6395 | Geospatial Analysis of Crime | 3 QH |
| GIS 6396 | GIS for Defense, Homeland Security, and Emergency Response | 3 QH |

#### PROGRAM CREDIT/GPA REQUIREMENTS

18 total quarter hours required
Minimum 3.000 GPA required

### Master of Professional Studies in Geographic Information Technology

Increased interest in geographic information and its applications is fueling demand for surveyors, cartographers, photogrammetrists, and mapping technicians. In response to this increased demand, Northeastern University's College of Professional Studies has developed the Master of Professional Studies in Geographic Information Technology (GIT).

Designed to advance your technical expertise, this online degree in geographic information technology explores a range of topics that are essential to the geographic information systems (GIS) field—from project management and system implementation to database design and execution. In addition, advanced concepts and techniques in areas such as raster-based GIS, geospatial information, and GIS modeling are also addressed within this online master's degree. Combining technical knowledge with hands-on GIS training, this results-oriented program seeks to enhance your skills and broaden your knowledge base—equipping you to competently apply GIS in your chosen field.

*Note:* High-speed Internet service is required for course work in this program.

### MPS in Geographic Information Technology

Complete all courses and requirements listed below unless otherwise indicated.

#### REQUIRED COURSES

| | | |
|---|---|---|
| GIS 5101 | Introduction to Geographic Information Systems | 3 QH |
| GIS 5102 | Fundamentals of GIS Analysis | 3 QH |
| RMS 5105 | Fundamentals of Remote Sensing | 3 QH |
| GIS 5201 | Advanced Spatial Analysis | 3 QH |
| GIS 6980 | Capstone | 1 to 4 QH |

Complete two of the following courses:

| | | |
|---|---|---|
| CMN 6000 | Introduction to Organizational Communication | 2 or 3 QH |
| with INT 6000 | Writing Lab | 1 QH |
| ITC 6020 | Information Systems Design and Development | 3 QH |
| LDR 6100 | Developing Your Leadership Capability | 3 to 6 QH |
| LDR 6125 | Managing Organizational Culture | 3 QH |
| PJM 5900 | Foundations of Project Management | 4 QH |

#### CONCENTRATION

Complete one of the following two concentrations:

***Concentration in Geographic Information Systems***

CONCENTRATION COURSES

Complete six of the following courses:

| | | |
|---|---|---|
| GIS 6320 | Use and Applications of Free and Open-Source GIS Desktop Software | 3 QH |
| GIS 6340 | GIS Customization | 3 QH |
| GIS 6350 | GIS Management and Implementation | 3 QH |
| GIS 6360 | Spatial Databases | 3 QH |

| | | |
|---|---|---|
| GIS 6370 | Internet-Based GIS | 3 QH |
| GIS 6385 | GIS/Cartography | 3 QH |
| GIS 6390 | Business Applications of Geographic Information Systems | 3 QH |
| GIS 6391 | Healthcare Applications of Geographic Information Systems | 3 QH |
| GIS 6394 | Crisis Mapping for Humanitarian Action | 3 QH |
| GIS 6395 | Geospatial Analysis of Crime | 3 QH |
| GIS 6396 | GIS for Defense, Homeland Security, and Emergency Response | 3 QH |

OPEN ELECTIVES

Complete 6 quarter hours from the following courses:

| | | |
|---|---|---|
| GIS 6340 | GIS Customization | 3 QH |
| GIS 6350 | GIS Management and Implementation | 3 QH |
| GIS 6360 | Spatial Databases | 3 QH |
| GIS 6370 | Internet-Based GIS | 3 QH |
| GIS 6385 | GIS/Cartography | 3 QH |
| GIS 6390 | Business Applications of Geographic Information Systems | 3 QH |
| GIS 6391 | Healthcare Applications of Geographic Information Systems | 3 QH |
| GIS 6395 | Geospatial Analysis of Crime | 3 QH |
| GIS 6396 | GIS for Defense, Homeland Security, and Emergency Response | 3 QH |
| RMS 6110 | Digital Image Processing | 3 QH |
| RMS 6220 | Geographic Information Systems for Remote Sensing | 3 QH |
| RMS 6230 | Remote Sensing and Global Change | 3 QH |
| RMS 6240 | Introduction to Radar and LIDAR Remote Sensing | 3 QH |
| RMS 6250 | Remote Sensing of Vegetation | 3 QH |
| RMS 6260 | Remote Sensing for Archaeology | 3 QH |
| RMS 6270 | Remote Sensing for Disaster Management | 3 QH |
| RMS 6280 | Automated Feature Extraction for the Geospatial Professional | 3 QH |
| RMS 6290 | Spectroscopic Image Analysis | 3 QH |
| RMS 6292 | Photogrammetry and GPS | 3 QH |
| COP 6940 | Personal and Career Development | 1 to 4 QH |
| INT 6943 | Integrative Experiential Learning | 3 QH |

***Concentration in Remote Sensing***

REQUIRED COURSES

| | | |
|---|---|---|
| RMS 6110 | Digital Image Processing | 3 QH |

Complete five of the following courses:

| | | |
|---|---|---|
| RMS 6210 | Technology, Operations, and Requirements for Drones, Helicopters, and Airplanes | 3 QH |
| RMS 6220 | Geographic Information Systems for Remote Sensing | 3 QH |
| RMS 6230 | Remote Sensing and Global Change | 3 QH |
| RMS 6240 | Introduction to Radar and LIDAR Remote Sensing | 3 QH |
| RMS 6250 | Remote Sensing of Vegetation | 3 QH |
| RMS 6260 | Remote Sensing for Archaeology | 3 QH |
| RMS 6270 | Remote Sensing for Disaster Management | 3 QH |
| RMS 6280 | Automated Feature Extraction for the Geospatial Professional | 3 QH |
| RMS 6290 | Spectroscopic Image Analysis | 3 QH |
| RMS 6292 | Photogrammetry and GPS | 3 QH |

OPEN ELECTIVES

Complete 6 quarter hours from the following courses:

| | | |
|---|---|---|
| GIS 6340 | GIS Customization | 3 QH |
| GIS 6350 | GIS Management and Implementation | 3 QH |
| GIS 6360 | Spatial Databases | 3 QH |
| GIS 6370 | Internet-Based GIS | 3 QH |
| GIS 6385 | GIS/Cartography | 3 QH |
| GIS 6390 | Business Applications of Geographic Information Systems | 3 QH |
| GIS 6391 | Healthcare Applications of Geographic Information Systems | 3 QH |
| GIS 6395 | Geospatial Analysis of Crime | 3 QH |
| GIS 6396 | GIS for Defense, Homeland Security, and Emergency Response | 3 QH |
| RMS 6110 | Digital Image Processing | 3 QH |
| RMS 6220 | Geographic Information Systems for Remote Sensing | 3 QH |
| RMS 6230 | Remote Sensing and Global Change | 3 QH |
| RMS 6240 | Introduction to Radar and LIDAR Remote Sensing | 3 QH |
| RMS 6250 | Remote Sensing of Vegetation | 3 QH |
| RMS 6260 | Remote Sensing for Archaeology | 3 QH |
| RMS 6270 | Remote Sensing for Disaster Management | 3 QH |
| RMS 6280 | Automated Feature Extraction for the Geospatial Professional | 3 QH |
| RMS 6290 | Spectroscopic Image Analysis | 3 QH |
| RMS 6292 | Photogrammetry and GPS | 3 QH |
| COP 6940 | Personal and Career Development | 1 to 4 QH |
| INT 6943 | Integrative Experiential Learning | 3 QH |

## PROGRAM CREDIT/GPA REQUIREMENTS

45 total quarter hours required

Minimum 3.000 GPA required

## GLOBAL STUDIES AND INTERNATIONAL RELATIONS

### Graduate Certificate in Global Studies and International Relations

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.

Complete all courses and requirements listed below unless otherwise indicated.

**REQUIRED COURSES**

| | | |
|---|---|---|
| GST 6100 | Globalization and Global Politics and Economics | 4 QH |
| GST 6101 | Global Literacy, Culture, and Community | 4 QH |
| GST 6320 | Peace and Conflict | 4 QH |

**ELECTIVE COURSE**

Complete one of the following courses:

| | | |
|---|---|---|
| GST 6501 | Regional Studies: East Asia | 4 QH |
| GST 6502 | Regional Studies: Middle East | 4 QH |
| GST 6503 | Regional Studies: Sub-Saharan Africa | 4 QH |
| GST 6504 | Regional Studies: Europe | 4 QH |
| GST 6505 | Regional Studies: Southwest and Central Asia | 4 QH |
| GST 6506 | Regional Studies: Latin America | 4 QH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

16 total quarter hours required
Minimum 3.000 GPA required

### Master of Science in Global Studies and International Relations

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 prepares 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.

### MS in Global Studies and International Relations

Complete all courses and requirements listed below unless otherwise indicated.

**REQUIRED COURSES**

| | | |
|---|---|---|
| GST 6100 | Globalization and Global Politics and Economics | 4 QH |
| GST 6101 | Global Literacy, Culture, and Community | 4 QH |
| GST 6109 | Basic Field Research Methods | 4 QH |
| GST 6320 | Peace and Conflict | 4 QH |

**ELECTIVE COURSE**

Complete one of the following courses:

| | | |
|---|---|---|
| GST 6501 | Regional Studies: East Asia | 4 QH |
| GST 6502 | Regional Studies: Middle East | 4 QH |
| GST 6503 | Regional Studies: Sub-Saharan Africa | 4 QH |
| GST 6504 | Regional Studies: Europe | 4 QH |
| GST 6505 | Regional Studies: Southwest and Central Asia | 4 QH |
| GST 6506 | Regional Studies: Latin America | 4 QH |

**CAPSTONE COURSE**

Complete one of the following courses:

| | | |
|---|---|---|
| GST 6920 | Case Study in Global Studies | 4 QH |
| GST 7990 | Thesis | 1 to 8 QH |
| INT 6900 | International Field Study Experience | 3 or 4 QH |
| GST 7976 | Directed Study | 1 to 4 QH |

**ELECTIVES**

Complete 2–4 quarter hours from the following courses:

| | | |
|---|---|---|
| GST 6102 | Global Corporate and Social Responsibility | 4 QH |
| GST 6200 | The Funders | 4 QH |
| GST 6210 | The Developers | 4 QH |
| GST 6220 | Globalization of Emerging Economies | 4 QH |
| GST 6300 | Security and Terrorism | 4 QH |
| GST 6310 | Immigration and Labor | 4 QH |
| GST 6324 | Divided Societies in the Modern World | 4 QH |
| GST 6326 | International Conflict and Cooperation | 4 QH |
| GST 6327 | Conflict and Postconflict Development | 4 QH |
| GST 6340 | Poverty and Wealth | 4 QH |
| GST 6350 | Global Economics of Food and Agriculture | 4 QH |
| GST 6360 | Nuclear Nonproliferation | 4 QH |
| GST 6410 | Education and Information Technology | 4 QH |
| GST 6430 | Leadership and Management | 4 QH |
| GST 6540 | Politics of the European Union | 4 QH |
| GST 6550 | U.S. Foreign Policy | 4 QH |

| | | |
|---|---|---|
| GST 6580 | Opportunities in International Consulting | 4 QH |
| GST 6590 | Public Diplomacy | 4 QH |
| GST 6600 | The Practice of Diplomacy | 4 QH |
| GST 6610 | Sustainable Development | 4 QH |
| GST 6700 | Global Health Perspectives, Politics, and Experiences in International Development | 4 QH |
| GST 6710 | Critical Issues and Challenges in the Practice of Global Health | 4 QH |
| GST 6740 | Human Rights | 4 QH |
| GST 6810 | International Higher Education | 4 QH |
| GST 6820 | Managing Study Abroad | 4 QH |
| GST 6830 | Managing International Students | 4 QH |
| GST 6840 | The Business of International Education | 4 QH |
| GST 6850 | Immigration and Legal Issues in International Higher Education | 4 QH |
| GST 7983 | Topics | 1 to 4 QH |
| COP 6940 | Personal and Career Development | 1 to 4 QH |

## CONCENTRATIONS

Complete one of the following five concentrations:

***Concentration in Conflict Resolution***

Complete five of the following courses:

| | | |
|---|---|---|
| GST 6324 | Divided Societies in the Modern World | 4 QH |
| GST 6326 | International Conflict and Cooperation | 4 QH |
| GST 6327 | Conflict and Postconflict Development | 4 QH |
| GST 6300 | Security and Terrorism | 4 QH |
| GST 6360 | Nuclear Nonproliferation | 4 QH |
| GST 6740 | Human Rights | 4 QH |

One of five courses may be a global studies concentration course from the following list:

| | | |
|---|---|---|
| GST 6102 | Global Corporate and Social Responsibility | 4 QH |
| GST 6200 | The Funders | 4 QH |
| GST 6210 | The Developers | 4 QH |
| GST 6220 | Globalization of Emerging Economies | 4 QH |
| GST 6310 | Immigration and Labor | 4 QH |
| GST 6340 | Poverty and Wealth | 4 QH |
| GST 6350 | Global Economics of Food and Agriculture | 4 QH |
| GST 6410 | Education and Information Technology | 4 QH |
| GST 6430 | Leadership and Management | 4 QH |
| GST 6360 | Nuclear Nonproliferation | 4 QH |
| GST 6501 | Regional Studies: East Asia | 4 QH |
| GST 6502 | Regional Studies: Middle East | 4 QH |
| GST 6503 | Regional Studies: Sub-Saharan Africa | 4 QH |
| GST 6504 | Regional Studies: Europe | 4 QH |
| GST 6505 | Regional Studies: Southwest and Central Asia | 4 QH |
| GST 6506 | Regional Studies: Latin America | 4 QH |
| GST 6540 | Politics of the European Union | 4 QH |
| GST 6550 | U.S. Foreign Policy | 4 QH |
| GST 6560 | Multilateral Diplomacy | 4 QH |
| GST 6580 | Opportunities in International Consulting | 4 QH |
| GST 6590 | Public Diplomacy | 4 QH |
| GST 6600 | The Practice of Diplomacy | 4 QH |
| GST 6610 | Sustainable Development | 4 QH |
| GST 6700 | Global Health Perspectives, Politics, and Experiences in International Development | 4 QH |
| GST 6710 | Critical Issues and Challenges in the Practice of Global Health | 4 QH |
| GST 6810 | International Higher Education | 4 QH |
| GST 6820 | Managing Study Abroad | 4 QH |
| GST 6830 | Managing International Students | 4 QH |
| GST 6840 | The Business of International Education | 4 QH |
| GST 6850 | Immigration and Legal Issues in International Higher Education | 4 QH |

***Concentration in Development and Global Health***

Complete five of the following courses:

| | | |
|---|---|---|
| GST 6210 | The Developers | 4 QH |
| GST 6340 | Poverty and Wealth | 4 QH |
| GST 6350 | Global Economics of Food and Agriculture | 4 QH |
| GST 6610 | Sustainable Development | 4 QH |
| GST 6700 | Global Health Perspectives, Politics, and Experiences in International Development | 4 QH |
| GST 6710 | Critical Issues and Challenges in the Practice of Global Health | 4 QH |

One of five courses may be a global studies concentration course from the following list:

| | | |
|---|---|---|
| GST 6102 | Global Corporate and Social Responsibility | 4 QH |
| GST 6200 | The Funders | 4 QH |
| GST 6220 | Globalization of Emerging Economies | 4 QH |
| GST 6300 | Security and Terrorism | 4 QH |
| GST 6310 | Immigration and Labor | 4 QH |
| GST 6324 | Divided Societies in the Modern World | 4 QH |
| GST 6326 | International Conflict and Cooperation | 4 QH |
| GST 6327 | Conflict and Postconflict Development | 4 QH |
| GST 6360 | Nuclear Nonproliferation | 4 QH |
| GST 6410 | Education and Information Technology | 4 QH |
| GST 6430 | Leadership and Management | 4 QH |
| GST 6501 | Regional Studies: East Asia | 4 QH |
| GST 6502 | Regional Studies: Middle East | 4 QH |
| GST 6503 | Regional Studies: Sub-Saharan Africa | 4 QH |
| GST 6504 | Regional Studies: Europe | 4 QH |

| | | |
|---|---|---|
| GST 6505 | Regional Studies: Southwest and Central Asia | 4 QH |
| GST 6506 | Regional Studies: Latin America | 4 QH |
| GST 6540 | Politics of the European Union | 4 QH |
| GST 6550 | U.S. Foreign Policy | 4 QH |
| GST 6560 | Multilateral Diplomacy | 4 QH |
| GST 6580 | Opportunities in International Consulting | 4 QH |
| GST 6590 | Public Diplomacy | 4 QH |
| GST 6600 | The Practice of Diplomacy | 4 QH |
| GST 6740 | Human Rights | 4 QH |
| GST 6810 | International Higher Education | 4 QH |
| GST 6820 | Managing Study Abroad | 4 QH |
| GST 6830 | Managing International Students | 4 QH |
| GST 6840 | The Business of International Education | 4 QH |
| GST 6850 | Immigration and Legal Issues in International Higher Education | 4 QH |

***Concentration in Diplomacy***

Complete five of the following courses:

| | | |
|---|---|---|
| GST 6600 | The Practice of Diplomacy | 4 QH |
| GST 6540 | Politics of the European Union | 4 QH |
| GST 6550 | U.S. Foreign Policy | 4 QH |
| GST 6560 | Multilateral Diplomacy | 4 QH |
| GST 6590 | Public Diplomacy | 4 QH |
| GST 6740 | Human Rights | 4 QH |

One of five courses may be a global studies concentration course from the following list:

| | | |
|---|---|---|
| GST 6102 | Global Corporate and Social Responsibility | 4 QH |
| GST 6200 | The Funders | 4 QH |
| GST 6210 | The Developers | 4 QH |
| GST 6220 | Globalization of Emerging Economies | 4 QH |
| GST 6300 | Security and Terrorism | 4 QH |
| GST 6310 | Immigration and Labor | 4 QH |
| GST 6324 | Divided Societies in the Modern World | 4 QH |
| GST 6326 | International Conflict and Cooperation | 4 QH |
| GST 6327 | Conflict and Postconflict Development | 4 QH |
| GST 6340 | Poverty and Wealth | 4 QH |
| GST 6350 | Global Economics of Food and Agriculture | 4 QH |
| GST 6360 | Nuclear Nonproliferation | 4 QH |
| GST 6410 | Education and Information Technology | 4 QH |
| GST 6430 | Leadership and Management | 4 QH |
| GST 6501 | Regional Studies: East Asia | 4 QH |
| GST 6502 | Regional Studies: Middle East | 4 QH |
| GST 6503 | Regional Studies: Sub-Saharan Africa | 4 QH |
| GST 6504 | Regional Studies: Europe | 4 QH |
| GST 6505 | Regional Studies: Southwest and Central Asia | 4 QH |
| GST 6506 | Regional Studies: Latin America | 4 QH |
| GST 6580 | Opportunities in International Consulting | 4 QH |
| GST 6610 | Sustainable Development | 4 QH |
| GST 6700 | Global Health Perspectives, Politics, and Experiences in International Development | 4 QH |
| GST 6710 | Critical Issues and Challenges in the Practice of Global Health | 4 QH |
| GST 6810 | International Higher Education | 4 QH |
| GST 6820 | Managing Study Abroad | 4 QH |
| GST 6830 | Managing International Students | 4 QH |
| GST 6840 | The Business of International Education | 4 QH |
| GST 6850 | Immigration and Legal Issues in International Higher Education | 4 QH |

***Concentration in International Economics and Consulting***

Complete five of the following courses:

| | | |
|---|---|---|
| GST 6580 | Opportunities in International Consulting | 4 QH |
| GST 6102 | Global Corporate and Social Responsibility | 4 QH |
| GST 6200 | The Funders | 4 QH |
| GST 6220 | Globalization of Emerging Economies | 4 QH |
| GST 6310 | Immigration and Labor | 4 QH |
| GST 6340 | Poverty and Wealth | 4 QH |
| GST 6430 | Leadership and Management | 4 QH |

One of five courses may be a global studies concentration course from the following list:

| | | |
|---|---|---|
| GST 6210 | The Developers | 4 QH |
| GST 6300 | Security and Terrorism | 4 QH |
| GST 6324 | Divided Societies in the Modern World | 4 QH |
| GST 6326 | International Conflict and Cooperation | 4 QH |
| GST 6327 | Conflict and Postconflict Development | 4 QH |
| GST 6350 | Global Economics of Food and Agriculture | 4 QH |
| GST 6360 | Nuclear Nonproliferation | 4 QH |
| GST 6410 | Education and Information Technology | 4 QH |
| GST 6501 | Regional Studies: East Asia | 4 QH |
| GST 6502 | Regional Studies: Middle East | 4 QH |
| GST 6503 | Regional Studies: Sub-Saharan Africa | 4 QH |
| GST 6504 | Regional Studies: Europe | 4 QH |
| GST 6505 | Regional Studies: Southwest and Central Asia | 4 QH |
| GST 6506 | Regional Studies: Latin America | 4 QH |
| GST 6540 | Politics of the European Union | 4 QH |
| GST 6550 | U.S. Foreign Policy | 4 QH |
| GST 6560 | Multilateral Diplomacy | 4 QH |
| GST 6590 | Public Diplomacy | 4 QH |
| GST 6600 | The Practice of Diplomacy | 4 QH |
| GST 6610 | Sustainable Development | 4 QH |

| | | |
|---|---|---|
| GST 6700 | Global Health Perspectives, Politics, and Experiences in International Development | 4 QH |
| GST 6710 | Critical Issues and Challenges in the Practice of Global Health | 4 QH |
| GST 6740 | Human Rights | 4 QH |
| GST 6810 | International Higher Education | 4 QH |
| GST 6820 | Managing Study Abroad | 4 QH |
| GST 6830 | Managing International Students | 4 QH |
| GST 6840 | The Business of International Education | 4 QH |
| GST 6850 | Immigration and Legal Issues in International Higher Education | 4 QH |

***Concentration in Global Student Mobility***

Complete five of the following courses:

| | | |
|---|---|---|
| GST 6810 | International Higher Education | 4 QH |
| GST 6820 | Managing Study Abroad | 4 QH |
| GST 6830 | Managing International Students | 4 QH |
| GST 6840 | The Business of International Education | 4 QH |
| GST 6850 | Immigration and Legal Issues in International Higher Education | 4 QH |
| GST 6410 | Education and Information Technology | 4 QH |

One of five courses may be a global studies concentration course from the following list:

| | | |
|---|---|---|
| GST 6102 | Global Corporate and Social Responsibility | 4 QH |
| GST 6200 | The Funders | 4 QH |
| GST 6210 | The Developers | 4 QH |
| GST 6220 | Globalization of Emerging Economies | 4 QH |
| GST 6300 | Security and Terrorism | 4 QH |
| GST 6310 | Immigration and Labor | 4 QH |
| GST 6324 | Divided Societies in the Modern World | 4 QH |
| GST 6326 | International Conflict and Cooperation | 4 QH |
| GST 6327 | Conflict and Postconflict Development | 4 QH |
| GST 6340 | Poverty and Wealth | 4 QH |
| GST 6350 | Global Economics of Food and Agriculture | 4 QH |
| GST 6360 | Nuclear Nonproliferation | 4 QH |
| GST 6430 | Leadership and Management | 4 QH |
| GST 6501 | Regional Studies: East Asia | 4 QH |
| GST 6502 | Regional Studies: Middle East | 4 QH |
| GST 6503 | Regional Studies: Sub-Saharan Africa | 4 QH |
| GST 6504 | Regional Studies: Europe | 4 QH |
| GST 6505 | Regional Studies: Southwest and Central Asia | 4 QH |
| GST 6506 | Regional Studies: Latin America | 4 QH |
| GST 6540 | Politics of the European Union | 4 QH |
| GST 6550 | U.S. Foreign Policy | 4 QH |
| GST 6560 | Multilateral Diplomacy | 4 QH |
| GST 6580 | Opportunities in International Consulting | 4 QH |
| GST 6590 | Public Diplomacy | 4 QH |
| GST 6600 | The Practice of Diplomacy | 4 QH |
| GST 6610 | Sustainable Development | 4 QH |
| GST 6700 | Global Health Perspectives, Politics, and Experiences in International Development | 4 QH |
| GST 6710 | Critical Issues and Challenges in the Practice of Global Health | 4 QH |
| GST 6740 | Human Rights | 4 QH |

## PROGRAM CREDIT/GPA REQUIREMENTS

46 total quarter hours required

Minimum 3.000 GPA required

## HEALTH MANAGEMENT

### Graduate Certificate in Health Management

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.

Complete all courses and requirements listed below unless otherwise indicated.

#### REQUIRED COURSES

| | | |
|---|---|---|
| HMG 6110 | Organization, Administration, Financing, and History of Healthcare | 3 QH |
| HMG 6120 | Human Resource Management in Healthcare | 3 QH |
| NPM 6120 | Financial Management for Nonprofit Organizations | 3 QH |
| HMG 6130 | Healthcare Strategic Management | 3 QH |

#### ELECTIVE COURSES

Complete two of the following courses (minimum of 6 quarter hours):

| | | |
|---|---|---|
| NPM 6110 | Legal and Governance Issues in Nonprofit Organizations | 3 QH |
| NPM 6150 | Human Resources Management in Nonprofit Organizations | 3 QH |
| HMG 6140 | Principles of Population-Based Management | 3 QH |
| HMG 6150 | Seminar in Health Services Research: Issues and Research | 2 QH |
| HMG 6160 | Healthcare Information Systems Management | 3 QH |
| HMG 6170 | Health Law, Politics, and Policy | 3 QH |
| HRM 6020 | Strategic Recruitment, Training, and Performance Management | 3 QH |

#### PROGRAM CREDIT/GPA REQUIREMENTS

18 total quarter hours required
Minimum 3.000 GPA required

# HOMELAND SECURITY

## Master of Arts in Homeland Security

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 MA 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.

## MA in Homeland Security

Complete all courses and requirements listed below unless otherwise indicated.

### REQUIRED COURSES

| | | |
|---|---|---|
| HLS 6000 | Introduction to Homeland Security | 3 QH |
| HLS 6010 | The Unconventional Threat to Homeland Security | 3 QH |
| HLS 6020 | Technology for Homeland Security | 3 QH |
| HLS 6030 | Intelligence for Homeland Security | 3 QH |
| HLS 6040 | Critical Infrastructure: Vulnerability Analysis and Protection | 3 QH |
| HLS 6050 | Multidisciplinary Approaches to Homeland Security | 3 QH |
| CMN 6050 | Crisis Communication | 3 QH |

### ELECTIVE COURSES

Complete two of the following courses (6–8 quarter hours):

| | | |
|---|---|---|
| HLS 6983 | Topics in Homeland Security | 1 to 4 QH |
| CJS 6105 | Domestic and International Terrorism | 3 QH |
| CJS 6125 | Issues in National Security | 3 QH |
| CJS 6000 | Management for Security Professionals | 3 QH |
| CJS 6010 | Advanced Principles of Security Management and Threat Assessment | 3 QH |
| CJS 6005 | Legal and Regulatory Issues for Security Management | 3 QH |
| CJS 6430 | Risk Management | 3 QH |
| GST 6720 | Emerging Infectious Diseases and Health Impacts of Social and Environmental Changes | 4 QH |
| GST 6300 | Security and Terrorism | 4 QH |
| CMN 6060 | Negotiation, Mediation, and Facilitation | 3 QH |
| CJS 6964 | Co-op | 0 QH |
| INT 6943 | Integrative Experiential Learning | 3 QH |
| CJS 5978 | Independent Study | 1 to 4 QH |
| HLS 6100 | Maritime and Port Security 1 | 4 QH |
| HLS 6110 | Maritime and Port Security 2 | 4 QH |
| HLS 6120 | Aviation Security 1 | 4 QH |
| HLS 6130 | Aviation Security 2 | 4 QH |
| HLS 6140 | Port Security Capstone | 4 QH |

### CONCENTRATION

Complete one of the following two concentrations:

***Concentration in Emergency Management***

| | | |
|---|---|---|
| HLS 6070 | Emergency Management and Geographic Information Systems | 3 QH |
| HLS 6060 | Strategic Planning and Budgeting | 3 QH |
| HLS 6080 | Continuity of Operations and Planning | 3 QH |
| GIS 5101 | Introduction to Geographic Information Systems | 3 QH |
| GIS 5102 | Fundamentals of GIS Analysis | 3 QH |
| GIS 6394 | Crisis Mapping for Humanitarian Action | 3 QH |

***Concentration in Organization and Infrastructure Continuity***

| | | |
|---|---|---|
| CJS 6430 | Risk Management | 3 QH |
| HLS 6090 | Organization and Structural Continuity Planning | 3 QH |
| GIS 5101 | Introduction to Geographic Information Systems | 3 QH |
| GIS 5102 | Fundamentals of GIS Analysis | 3 QH |
| ITC 6315 | Information Security Risk Management | 3 QH |
| ITC 6310 | Information Security Governance | 3 QH |

### PROGRAM CREDIT/GPA REQUIREMENTS

45 total quarter hours required

Minimum 3.000 GPA required

## HUMAN RESOURCES MANAGEMENT

### Graduate Certificate in Human Resources Management

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.

Complete all courses and requirements listed below unless otherwise indicated.

**REQUIRED COURSES**

| | | |
|---|---|---|
| HRM 6005 | Creating a High-Performance Organization: Strategic Organizational and HRM Choices | 3 QH |
| HRM 6010 | Total Compensation | 3 QH |
| HRM 6020 | Strategic Recruitment, Training, and Performance Management | 3 QH |
| HRM 6030 | Employee Rights and Employer Obligations | 3 QH |
| HRM 6040 | High-Performance Human Resources Systems and Development | 3 QH |
| HRM 6045 | Change, Challenge, and Competence | 3 QH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

18 total quarter hours required
Minimum 3.000 GPA required

## HUMAN SERVICES

### Master of Science in Human Services

Professionals with graduate degrees in human services are needed to address a wide range of societal issues—whether by providing direct services, supervising personnel, or administering programs and policies. Often responsible for working with vulnerable populations, human services professionals must be adept at conducting assessments, developing service plans and policies, leading interdisciplinary teams, and managing care for at-risk clients.

To address this important need, the CPS offers the online Master of Science in Human Services. In addition to a solid core curriculum, the program offers several electives, as well as concentrations in leadership, organizational communication, and global studies—enabling you to focus your graduate studies in the area that best matches your interests and career objectives. Reflecting Northeastern's philosophy of practice-oriented education, this human services master's degree includes work-based applications and a capstone service-learning project, offering you an opportunity to deepen your knowledge within your chosen specialty. This human services graduate degree program seeks to produce graduates with the knowledge and skills they need to pursue a leadership role in the fulfilling field of human services.

### MS in Human Services

Complete all courses and requirements listed below unless otherwise indicated.

**REQUIRED COURSES**

| | | |
|---|---|---|
| HSV 6100 | Theory and Practice of Human Services | 3 QH |
| HSV 6110 | Human Services Management and Development | 3 QH |
| HSV 6120 | Social Inequality, Social Change, and Community Building | 3 QH |
| HSV 6630 | Research and Evaluation in Human Services | 3 QH |
| HSV 6640 | Policy Issues in Human Services | 3 QH |
| HSV 6160 | Introduction to Employee Assistance Programs | 3 QH |

The following course should be taken last:

| | | |
|---|---|---|
| HSV 6980 | Capstone | 1 to 4 QH |

**ELECTIVE COURSES**

Complete three of the following courses:

| | | |
|---|---|---|
| NPM 6120 | Financial Management for Nonprofit Organizations | 3 QH |
| NPM 6130 | Fund-Raising and Development for Nonprofit Organizations | 3 QH |
| NPM 6140 | Grant and Report Writing | 3 QH |
| NPM 6150 | Human Resources Management in Nonprofit Organizations | 3 QH |

| | | |
|---|---|---|
| CMN 6015 | Introduction to the Digital Era: The Power of Social Media | 3 QH |
| CMN 6080 | Intercultural Communication | 3 QH |
| INT 6943 | Integrative Experiential Learning | 3 QH |

### CONCENTRATIONS

Complete one of the following three concentrations:

***Concentration in Global Studies***

GLOBAL STUDIES COURSES

| | | |
|---|---|---|
| GST 6100 | Globalization and Global Politics and Economics | 4 QH |
| GST 6101 | Global Literacy, Culture, and Community | 4 QH |
| GST 6320 | Peace and Conflict | 4 QH |

GLOBAL STUDIES ELECTIVE

Complete one of the following courses:

| | | |
|---|---|---|
| GST 6501 | Regional Studies: East Asia | 4 QH |
| GST 6502 | Regional Studies: Middle East | 4 QH |
| GST 6503 | Regional Studies: Sub-Saharan Africa | 4 QH |
| GST 6504 | Regional Studies: Europe | 4 QH |
| GST 6505 | Regional Studies: Southwest and Central Asia | 4 QH |
| GST 6506 | Regional Studies: Latin America | 4 QH |

***Concentration in Leadership***

LEADERSHIP COURSES

| | | |
|---|---|---|
| LDR 6100 | Developing Your Leadership Capability | 3 to 6 QH |
| LDR 6110 | Leading Teams | 3 to 6 QH |
| LDR 6120 | Organizational Leadership | 3 to 6 QH |
| LDR 6140 | Strategic Leadership | 3 to 6 QH |

LEADERSHIP ELECTIVE

Complete one of the following courses:

| | | |
|---|---|---|
| LDR 6135 | Ethical Leadership | 3 QH |
| LDR 6125 | Managing Organizational Culture | 3 QH |

***Concentration in Organizational Communication***

| | | |
|---|---|---|
| CMN 6000 | Introduction to Organizational Communication | 2 or 3 QH |
| with INT 6000 | Writing Lab | 1 QH |
| CMN 6020 | Ethical Issues in Organizational Communication | 3 QH |
| CMN 6050 | Crisis Communication | 3 QH |
| CMN 6090 | Organizational Culture, Climate, and Communication | 3 QH |
| CMN 6110 | Group Dynamics and Interpersonal Conflict: Meeting Management | 3 QH |

### PROGRAM CREDIT/GPA REQUIREMENTS

45 total quarter hours required

Minimum 3.000 GPA required

## INFORMATICS

## Master of Professional Studies in Informatics

A relatively new and rapidly evolving area, informatics is increasingly used to solve today's problems. Whether it's used to create information and communication technologies, design decision support systems, develop 3-D visualizations, or devise mobile applications, informatics can be applied across a wide range of industries to address a variety of privacy, security, healthcare, environmental, educational, and social challenges. In response, Northeastern University offers the Master of Professional Studies in Informatics. Designed to improve your computing skills and enhance your knowledge of computing applications, this master's degree seeks to prepare you to excel in the fast-growing and dynamic field of informatics.

## MPS in Informatics

Complete all courses and requirements listed below unless otherwise indicated.

### REQUIRED COURSES

| | | |
|---|---|---|
| ITC 6000 | Database Management Systems | 3 QH |
| ITC 6010 | Information Technology Strategy and Governance | 3 QH |
| ITC 6020 | Information Systems Design and Development | 3 QH |
| ITC 6030 | Computer Systems and Networks | 3 QH |
| ITC 6035 | Information Technology Project Management | 3 QH |
| ITC 6040 | Informatics Capstone | 3 QH |
| ITC 6045 | Information Technology Policy, Ethics, and Social Responsibility | 3 QH |
| ITC 6300 | Foundations of Information Security | 3 QH |

### ELECTIVE COURSES

Complete 3–4 quarter hours from the following courses:

| | | |
|---|---|---|
| DGM 6500 | Working with Digital Images | 2 QH |
| DGM 6501 | Web Creation Boot Camp | 2 QH |
| DGM 6511 | Web Creation Bootcamp 2 | 2 QH |
| DGM 6145 | Information Technology and Creative Practice | 4 QH |
| ITC 6015 | Enterprise Information Architecture | 3 QH |
| ITC 6335 | Data Warehousing and Data Mining | 3 QH |
| ITC 6340 | Mobile and Wireless Networks and Applications | 3 QH |
| ITC 6345 | Systems and Network Administration | 3 QH |
| ITC 6355 | Web Application Design and Development | 3 QH |
| ITC 7120 | Healthcare Information Systems | 3 QH |
| GIS 5101 | Introduction to Geographic Information Systems | 3 QH |
| GIS 5102 | Fundamentals of GIS Analysis | 3 QH |
| GIS 6360 | Spatial Databases | 3 QH |
| GIS 6370 | Internet-Based GIS | 3 QH |

| | | |
|---|---|---|
| PJM 6000 | Project Management Practices | 3 QH |
| TCC 6110 | Information Architecture | 4 QH |
| TCC 6120 | Usability and User Experience | 4 QH |

### CONCENTRATION

Complete one of the following three concentrations:

***Concentration in Information Security Management***

| | | |
|---|---|---|
| ITC 6305 | IT Infrastructure (Systems, Networks, Telecom) | 3 QH |
| ITC 6310 | Information Security Governance | 3 QH |
| ITC 6315 | Information Security Risk Management | 3 QH |
| ITC 6320 | Information Security Technology | 3 QH |

Complete two of the following courses:

| | | |
|---|---|---|
| ITC 6325 | CISA Preparation | 3 QH |
| ITC 6330 | CISSP Preparation | 3 QH |
| MIS 6082 | Network Protection | 4 QH |
| MIS 6080 | Network Security Concepts | 4 QH |

***Concentration in Geographic Information Systems***

| | | |
|---|---|---|
| GIS 5101 | Introduction to Geographic Information Systems | 3 QH |
| GIS 5102 | Fundamentals of GIS Analysis | 3 QH |
| RMS 5105 | Fundamentals of Remote Sensing | 3 QH |
| GIS 5201 | Advanced Spatial Analysis | 3 QH |

Complete two of the following courses:

| | | |
|---|---|---|
| GIS 6340 | GIS Customization | 3 QH |
| GIS 6350 | GIS Management and Implementation | 3 QH |
| GIS 6360 | Spatial Databases | 3 QH |
| GIS 6370 | Internet-Based GIS | 3 QH |
| GIS 6385 | GIS/Cartography | 3 QH |
| GIS 6390 | Business Applications of Geographic Information Systems | 3 QH |
| GIS 6391 | Healthcare Applications of Geographic Information Systems | 3 QH |

***Concentration in Leading and Managing Technical Projects***

| | | |
|---|---|---|
| PJM 6000 | Project Management Practices | 3 QH |
| PJM 6205 | Leading and Managing Technical Projects | 3 QH |
| PJM 6210 | Communication Skills for Project Managers | 3 QH |
| PJM 6215 | Leading Remote Project Teams | 3 QH |
| PJM 6220 | Planning and Scheduling Technical Projects | 3 QH |
| ITC 6305 | IT Infrastructure (Systems, Networks, Telecom) | 3 QH |

### PROGRAM CREDIT/GPA REQUIREMENTS

45 total quarter hours required
Minimum 3.000 GPA required

## INFORMATION SECURITY

## Graduate Certificate in Information Security Management

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.

Complete all courses and requirements listed below unless otherwise indicated.

### REQUIRED COURSES

| | | |
|---|---|---|
| ITC 6305 | IT Infrastructure (Systems, Networks, Telecom) | 3 QH |
| ITC 6310 | Information Security Governance | 3 QH |
| ITC 6315 | Information Security Risk Management | 3 QH |
| ITC 6320 | Information Security Technology | 3 QH |

### INFORMATION SECURITY MANAGEMENT ELECTIVES

Complete two of the following courses:

| | | |
|---|---|---|
| ITC 6325 | CISA Preparation | 3 QH |
| ITC 6330 | CISSP Preparation | 3 QH |
| MIS 6082 | Network Protection | 4 QH |
| MIS 6080 | Network Security Concepts | 4 QH |

### PROGRAM CREDIT/GPA REQUIREMENTS

18 total quarter hours required
Minimum 3.000 GPA required

## LAW AND POLICY

### Doctor of Law and Policy

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 Law and 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 Law, Policy, and Society. To learn more, visit the law and public policy program website at www.northeastern.edu/law/academics/curriculum/dual-degrees/lawpolicy.html.

Complete all courses and requirements listed below unless otherwise indicated.

#### REQUIRED COURSES

| | | |
|---|---|---|
| LWP 6120 | Law and Legal Reasoning 1 | 2 QH |
| LWP 6401 | Law and Policy Concepts 1: The Policy Making Process | 2 QH |
| LWP 6424 | Research Methods | 2 QH |
| LWP 6121 | Law and Legal Reasoning 2 | 2 QH |
| LWP 6402 | Law and Policy Concepts 2: Strategizing for Public Policy | 2 QH |
| LWP 6423 | Qualitative Methods | 2 QH |
| LWP 6122 | Law and Legal Reasoning 3 | 2 QH |
| LWP 6403 | Law and Policy Concepts 3: Policy Case Studies | 2 QH |
| LWP 6420 | Quantitative Methods | 2 QH |
| LWP 6123 | Law and Legal Reasoning 4 | 2 QH |
| LWP 6410 | Economics for Policy Analysis | 2 QH |
| LWP 6404 | Evaluation Research | 2 QH |
| LWP 6431 | Political and Moral Ethics and Dilemmas | 2 QH |
| LWP 6425 | Methods and Theory as Applied to Doctoral Research | 2 QH |
| LWP 6500 | Doctoral Research Design 1 | 2 QH |
| LWP 6450 | Public Policy Theory and Practice 1 | 4 QH |
| LWP 6501 | Doctoral Research Design 2 | 2 QH |
| LWP 6451 | Public Policy Theory and Practice 2 | 4 QH |
| LWP 6502 | Doctoral Research Design 3 | 2 QH |
| LWP 6452 | Public Policy Theory and Practice 3 | 4 QH |
| LWP 6503 | Doctoral Research Design 4 | 2 QH |

#### PROGRAM CREDIT/GPA REQUIREMENTS

48 total quarter hours required
Minimum 3.000 GPA required

# LEADERSHIP

## Graduate Certificate in Leadership

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.

Complete all courses and requirements listed below unless otherwise indicated.

### REQUIRED COURSES

| | | |
|---|---|---|
| LDR 6100 | Developing Your Leadership Capability | 3 to 6 QH |
| LDR 6110 | Leading Teams | 3 to 6 QH |
| LDR 6120 | Organizational Leadership | 3 to 6 QH |
| LDR 6140 | Strategic Leadership | 3 to 6 QH |

### LEADERSHIP ELECTIVES

Complete two of the following courses:

| | | |
|---|---|---|
| LDR 6135 | Ethical Leadership | 3 QH |
| LDR 6125 | Managing Organizational Culture | 3 QH |
| HRM 6005 | Creating a High-Performance Organization: Strategic Organizational and HRM Choices | 3 QH |
| CMN 6010 | Strategic Communication Management | 3 QH |

### PROGRAM CREDIT/GPA REQUIREMENTS

18 total quarter hours required
Minimum 3.000 GPA required

## Master of Science in Leadership

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.

## MS in Leadership

### REQUIRED COURSES

| | | |
|---|---|---|
| LDR 6100 | Developing Your Leadership Capability | 3 to 6 QH |
| LDR 6110 | Leading Teams | 3 to 6 QH |
| LDR 6115 | Powerful Communication | 3 QH |
| LDR 6120 | Organizational Leadership | 3 to 6 QH |
| LDR 6135 | Ethical Leadership | 3 QH |
| LDR 6140 | Strategic Leadership | 3 to 6 QH |
| LDR 6145 | Leadership for a Diverse World | 3 QH |
| LDR 6150 | Transforming Organizations | 3 QH |
| LDR 7980 | Capstone | 1 to 4 QH |

### REQUIRED ELECTIVE COURSE

Complete one of the following courses:

| | | |
|---|---|---|
| LDR 6125 | Managing Organizational Culture | 3 QH |
| CMN 6060 | Negotiation, Mediation, and Facilitation | 3 QH |
| CMN 6110 | Group Dynamics and Interpersonal Conflict: Meeting Management | 3 QH |
| CMN 6080 | Intercultural Communication | 3 QH |
| COP 6940 | Personal and Career Development | 1 to 4 QH |
| INT 6943 | Integrative Experiential Learning | 3 QH |
| CMN 6015 | Introduction to the Digital Era: The Power of Social Media | 3 QH |

### CONCENTRATION

Complete one of the following seven concentrations:

***Concentration in Health Management***

| | | |
|---|---|---|
| HMG 6110 | Organization, Administration, Financing, and History of Healthcare | 3 QH |
| HMG 6130 | Healthcare Strategic Management | 3 QH |
| HMG 6140 | Principles of Population-Based Management | 3 QH |
| HMG 6160 | Healthcare Information Systems Management | 3 QH |
| HMG 6170 | Health Law, Politics, and Policy | 3 QH |

***Concentration in Human Resources***

| | | |
|---|---|---|
| HRM 6005 | Creating a High-Performance Organization: Strategic Organizational and HRM Choices | 3 QH |
| HRM 6010 | Total Compensation | 3 QH |

| | | |
|---|---|---|
| HRM 6020 | Strategic Recruitment, Training, and Performance Management | 3 QH |
| HRM 6030 | Employee Rights and Employer Obligations | 3 QH |
| HRM 6040 | High-Performance Human Resources Systems and Development | 3 QH |

***Concentration in Leading and Managing Technical Projects***

| | | |
|---|---|---|
| PJM 6000 | Project Management Practices | 3 QH |
| PJM 6205 | Leading and Managing Technical Projects | 3 QH |
| PJM 6210 | Communication Skills for Project Managers | 3 QH |
| PJM 6215 | Leading Remote Project Teams | 3 QH |
| PJM 6220 | Planning and Scheduling Technical Projects | 3 QH |

***Concentration in Nonprofit Management***

| | | |
|---|---|---|
| NPM 6110 | Legal and Governance Issues in Nonprofit Organizations | 3 QH |
| NPM 6120 | Financial Management for Nonprofit Organizations | 3 QH |
| NPM 6125 | Promoting Nonprofit Organizations | 3 QH |
| NPM 6130 | Fund-Raising and Development for Nonprofit Organizations | 3 QH |
| NPM 6140 | Grant and Report Writing | 3 QH |

***Concentration in Organizational Communication***

| | | |
|---|---|---|
| CMN 6000 | Introduction to Organizational Communication | 2 or 3 QH |
| with INT 6000 | Writing Lab | 1 QH |
| CMN 6020 | Ethical Issues in Organizational Communication | 3 QH |
| CMN 6050 | Crisis Communication | 3 QH |
| CMN 6090 | Organizational Culture, Climate, and Communication | 3 QH |
| CMN 6110 | Group Dynamics and Interpersonal Conflict: Meeting Management | 3 QH |

***Concentration in Project Management***

PROJECT MANAGEMENT COURSES

*Note:* Students with project management experience are not required to take PJM 5900:

| | | |
|---|---|---|
| PJM 5900 | Foundations of Project Management | 4 QH |
| PJM 6000 | Project Management Practices | 3 QH |
| PJM 6025 | Project Scheduling and Cost Planning | 3 QH |
| PJM 6015 | Project Risk Management | 3 QH |

PROJECT MANAGEMENT ELECTIVES

Complete two of the following courses. *Note:* Students who take PJM 5900 are required to take only one course in this section:

| | | |
|---|---|---|
| PJM 6125 | Project Evaluation and Assessment | 3 QH |
| PJM 6135 | Project Quality Management | 3 QH |
| PJM 6140 | Managing Troubled Projects | 3 QH |
| PJM 6705 | Portfolio Management in the Enterprise Environment | 3 QH |

***Concentration in Sport and Social Change***

| | | |
|---|---|---|
| LDR 6410 | Leadership and Organization in Sport | 3 QH |
| GST 6102 | Global Corporate and Social Responsibility | 4 QH |
| HSV 6120 | Social Inequality, Social Change, and Community Building | 3 QH |
| LDR 6360 | Dynamics of Change at the Community and Social Level | 3 QH |
| LDR 6427 | Gender and Diversity in Sport | 3 QH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

45 total quarter hours required

Minimum 3.000 GPA required

## Master of Sports Leadership

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 an intensive one-week summer institute in Boston, this practice-oriented degree seeks to provide you with a well-rounded educational experience, equipping you to advance your career in the sports industry.

Complete all courses and requirements listed below unless otherwise indicated.

**REQUIRED COURSES**

*Note:* LDR 6405 and LDR 6441 are summer institute courses, available only on-campus in Boston. Summer institute courses should be taken only after students have completed their first year of classes.

| | | |
|---|---|---|
| LDR 6100 | Developing Your Leadership Capability | 3 to 6 QH |
| LDR 6135 | Ethical Leadership | 3 QH |
| LDR 6400 | Sports Management | 3 QH |
| LDR 6405 | Sport in Society | 3 QH |
| LDR 6410 | Leadership and Organization in Sport | 3 QH |
| LDR 6430 | Sports Law | 3 QH |
| LDR 6441 | Sports Media Relations | 3 QH |

**REQUIRED ELECTIVE**

Complete one of the following courses. This course should be the last course taken:

| | | |
|---|---|---|
| LDR 6961 | Internship | 1 to 4 QH |
| LDR 6980 | Capstone | 1 to 4 QH |

### ELECTIVE COURSES

Complete six of the following courses:

| | | |
|---|---|---|
| CMN 6015 | Introduction to the Digital Era: The Power of Social Media | 3 QH |
| LDR 6615 | Academic Advising for Student-Athletes | 3 QH |
| LDR 6323 | Event Management | 3 QH |
| LDR 6427 | Gender and Diversity in Sport | 3 QH |
| LDR 6435 | Fiscal Practices in Sports | 3 QH |
| LDR 6440 | Sports Marketing and Promotions | 3 QH |
| LDR 6442 | Athletic Fund-Raising | 3 QH |
| LDR 6443 | Ticket Sales and Strategies | 3 QH |
| LDR 6445 | Corporate Sponsorships | 3 QH |
| LDR 6455 | NCAA Compliance | 3 QH |
| LDR 6460 | Risk Management in Athletics | 3 QH |
| LDR 6465 | Title IX | 3 QH |
| LDR 6470 | Bystander Strategies for the Prevention of Gender-Based Violence | 3 QH |
| INT 6943 | Integrative Experiential Learning | 3 QH |

### OPEN ELECTIVE

Complete one course (3 quarter hours) from any College of Professional Studies graduate program.

### PROGRAM CREDIT/GPA REQUIREMENTS

45 total quarter hours required
Minimum 3.000 GPA required

## NONPROFIT MANAGEMENT

## Graduate Certificate in Nonprofit Management

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.

Complete all courses and requirements listed below unless otherwise indicated.

### REQUIRED COURSES

| | | |
|---|---|---|
| NPM 6110 | Legal and Governance Issues in Nonprofit Organizations | 3 QH |
| NPM 6120 | Financial Management for Nonprofit Organizations | 3 QH |
| NPM 6125 | Promoting Nonprofit Organizations | 3 QH |
| NPM 6130 | Fund-Raising and Development for Nonprofit Organizations | 3 QH |
| NPM 6140 | Grant and Report Writing | 3 QH |
| NPM 6150 | Human Resources Management in Nonprofit Organizations | 3 QH |

### PROGRAM CREDIT/GPA REQUIREMENTS

18 total quarter hours required
Minimum 3.000 GPA required

## Master of Science in Nonprofit Management

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 fund-raising, 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. This nonprofit degree program seeks to produce graduates well equipped to embark on a career in nonprofit management—prepared, and inspired, to make a meaningful impact.

## MS in Nonprofit Management

Complete all courses and requirements listed below unless otherwise indicated.

### REQUIRED COURSES

| | | |
|---|---|---|
| LDR 6100 | Developing Your Leadership Capability | 3 to 6 QH |
| NPM 6110 | Legal and Governance Issues in Nonprofit Organizations | 3 QH |
| NPM 6120 | Financial Management for Nonprofit Organizations | 3 QH |
| NPM 6125 | Promoting Nonprofit Organizations | 3 QH |
| NPM 6130 | Fund-Raising and Development for Nonprofit Organizations | 3 QH |
| NPM 6140 | Grant and Report Writing | 3 QH |
| NPM 6150 | Human Resources Management in Nonprofit Organizations | 3 QH |
| NPM 6980 | Capstone | 3 QH |

### ELECTIVES

Complete two of the following courses:

| | | |
|---|---|---|
| LDR 6110 | Leading Teams | 3 to 6 QH |
| LDR 6360 | Dynamics of Change at the Community and Social Level | 3 QH |
| CMN 6080 | Intercultural Communication | 3 QH |
| CMN 6050 | Crisis Communication | 3 QH |
| COP 6940 | Personal and Career Development | 1 to 4 QH |
| INT 6943 | Integrative Experiential Learning | 3 QH |

### CONCENTRATION

Complete one of the following seven concentrations:

***Concentration in Global Studies***

REQUIRED COURSES

| | | |
|---|---|---|
| GST 6100 | Globalization and Global Politics and Economics | 4 QH |
| GST 6101 | Global Literacy, Culture, and Community | 4 QH |
| GST 6320 | Peace and Conflict | 4 QH |

ELECTIVE COURSE

Complete one of the following courses:

| | | |
|---|---|---|
| GST 6501 | Regional Studies: East Asia | 4 QH |
| GST 6502 | Regional Studies: Middle East | 4 QH |
| GST 6503 | Regional Studies: Sub-Saharan Africa | 4 QH |
| GST 6504 | Regional Studies: Europe | 4 QH |
| GST 6505 | Regional Studies: Southwest and Central Asia | 4 QH |
| GST 6506 | Regional Studies: Latin America | 4 QH |

***Concentration in Human Services***

| | | |
|---|---|---|
| HSV 6100 | Theory and Practice of Human Services | 3 QH |
| HSV 6110 | Human Services Management and Development | 3 QH |
| HSV 6630 | Research and Evaluation in Human Services | 3 QH |
| HSV 6160 | Introduction to Employee Assistance Programs | 3 QH |
| HSV 6640 | Policy Issues in Human Services | 3 QH |

***Concentration in Leadership***

| | | |
|---|---|---|
| LDR 6110 | Leading Teams | 3 to 6 QH |
| LDR 6120 | Organizational Leadership | 3 to 6 QH |
| LDR 6125 | Managing Organizational Culture | 3 QH |
| LDR 6135 | Ethical Leadership | 3 QH |
| LDR 6140 | Strategic Leadership | 3 to 6 QH |

***Concentration in Organizational Communication***

| | | |
|---|---|---|
| CMN 6000 | Introduction to Organizational Communication | 2 or 3 QH |
| with INT 6000 | Writing Lab | 1 QH |
| CMN 6020 | Ethical Issues in Organizational Communication | 3 QH |
| CMN 6050 | Crisis Communication | 3 QH |
| CMN 6090 | Organizational Culture, Climate, and Communication | 3 QH |
| CMN 6110 | Group Dynamics and Interpersonal Conflict: Meeting Management | 3 QH |

***Concentration in Project Management***

PROJECT MANAGEMENT COURSES

*Note:* Students with project management experience are not required to take PJM 5900:

| | | |
|---|---|---|
| PJM 5900 | Foundations of Project Management | 4 QH |
| PJM 6000 | Project Management Practices | 3 QH |
| PJM 6025 | Project Scheduling and Cost Planning | 3 QH |
| PJM 6015 | Project Risk Management | 3 QH |

PROJECT MANAGEMENT ELECTIVES

Complete two of the following courses. *Note:* Students who take PJM 5900 are required to take only one course in this section:

| | | |
|---|---|---|
| PJM 6125 | Project Evaluation and Assessment | 3 QH |
| PJM 6135 | Project Quality Management | 3 QH |
| PJM 6140 | Managing Troubled Projects | 3 QH |
| PJM 6705 | Portfolio Management in the Enterprise Environment | 3 QH |

***Concentration in Social Media and Online Communication***

Complete five of the following courses:

| | | |
|---|---|---|
| CMN 6015 | Introduction to the Digital Era: The Power of Social Media | 3 QH |
| CMN 6025 | Digital Era Skills: Platforms, Tools, and Techniques | 3 QH |
| CMN 6035 | Legal, Policy, and Ethical Issues in the Digital Era | 3 QH |
| CMN 6045 | Leveraging Digital Technologies: Strategy, Assessment, and Governance | 3 QH |
| CMN 6065 | Implementation and Management of Social Media Channels and Online Communities | 3 QH |
| DGM 6285 | Interactive Marketing Fundamentals | 4 QH |
| DGM 6290 | Social Media and Brand Strategy Implementation | 4 QH |

***Concentration in Sport and Social Change***

| | | |
|---|---|---|
| LDR 6410 | Leadership and Organization in Sport | 3 QH |
| GST 6102 | Global Corporate and Social Responsibility | 4 QH |
| HSV 6120 | Social Inequality, Social Change, and Community Building | 3 QH |
| LDR 6360 | Dynamics of Change at the Community and Social Level | 3 QH |
| LDR 6427 | Gender and Diversity in Sport | 3 QH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

45 total quarter hours required
Minimum 3.000 GPA required

## ORGANIZATIONAL COMMUNICATION

### Graduate Certificate in Organizational Communication

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.

Complete all courses and requirements listed below unless otherwise indicated.

**REQUIRED COURSES**

| | | |
|---|---|---|
| CMN 6010 | Strategic Communication Management | 3 QH |
| CMN 6020 | Ethical Issues in Organizational Communication | 3 QH |
| CMN 6910 | Organizational Communication Assessment | 3 QH |

Complete two of the following courses:

| | | |
|---|---|---|
| CMN 6061 | Personal Branding | 3 QH |
| CMN 6050 | Crisis Communication | 3 QH |
| CMN 6060 | Negotiation, Mediation, and Facilitation | 3 QH |
| CMN 6070 | Interviewing | 3 QH |

Complete one of the following courses:

| | | |
|---|---|---|
| CMN 6080 | Intercultural Communication | 3 QH |
| CMN 6090 | Organizational Culture, Climate, and Communication | 3 QH |
| CMN 6100 | Communication Networks and Managing Information | 3 QH |
| CMN 6110 | Group Dynamics and Interpersonal Conflict: Meeting Management | 3 QH |
| CMN 6015 | Introduction to the Digital Era: The Power of Social Media | 3 QH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

18 total quarter hours required
Minimum 3.000 GPA required

### Master of Science in Corporate and Organizational Communication

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 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.

## MS in Corporate and Organizational Communication

Complete all courses and requirements listed below unless otherwise indicated.

### REQUIRED COURSES

*Note:* CMN 6000 is required for students who do not have any professional experience in communication. Students with professional communication experience should begin the program with CMN 6010:

| | | |
|---|---|---|
| CMN 6000 | Introduction to Organizational Communication | 2 or 3 QH |
| with INT 6000 | Writing Lab | 1 QH |
| CMN 6010 | Strategic Communication Management | 3 QH |
| CMN 6020 | Ethical Issues in Organizational Communication | 3 QH |
| CMN 6080 | Intercultural Communication | 3 QH |
| CMN 6050 | Crisis Communication | 3 QH |
| CMN 6090 | Organizational Culture, Climate, and Communication | 3 QH |
| CMN 6100 | Communication Networks and Managing Information | 3 QH |
| CMN 6910 | Organizational Communication Assessment | 3 QH |

### ELECTIVE COURSES

Complete three of the following courses.

*Note:* Students who take CMN 6000 are only required to take two courses in this section:

| | | |
|---|---|---|
| CMN 6015 | Introduction to the Digital Era: The Power of Social Media | 3 QH |
| CMN 6025 | Digital Era Skills: Platforms, Tools, and Techniques | 3 QH |
| CMN 6061 | Personal Branding | 3 QH |
| CMN 6070 | Interviewing | 3 QH |
| CMN 6110 | Group Dynamics and Interpersonal Conflict: Meeting Management | 3 QH |
| CMN 6060 | Negotiation, Mediation, and Facilitation | 3 QH |
| COP 6940 | Personal and Career Development | 1 to 4 QH |
| INT 6943 | Integrative Experiential Learning | 3 QH |
| DGM 6501 | Web Creation Boot Camp | 2 QH |
| DGM 6506 | Introduction to Digital Video | 2 QH |

### CONCENTRATION

Complete one of the following five concentrations:

***Concentration in Human Resource Management***

| | | |
|---|---|---|
| HRM 6005 | Creating a High-Performance Organization: Strategic Organizational and HRM Choices | 3 QH |
| HRM 6010 | Total Compensation | 3 QH |
| HRM 6020 | Strategic Recruitment, Training, and Performance Management | 3 QH |
| HRM 6030 | Employee Rights and Employer Obligations | 3 QH |
| HRM 6040 | High-Performance Human Resources Systems and Development | 3 QH |

***Concentration in Public and Media Relations***

REQUIRED COURSES

| | | |
|---|---|---|
| PBR 6100 | Introduction to Public Relations | 3 QH |
| PBR 6130 | Public Relations Writing Seminar 1 | 3 QH |
| PBR 6140 | Public Relations Writing Seminar 2 | 3 QH |

PUBLIC AND MEDIA RELATIONS ELECTIVES

Complete two of the following courses:

| | | |
|---|---|---|
| CMN 6025 | Digital Era Skills: Platforms, Tools, and Techniques | 3 QH |
| CMN 6035 | Legal, Policy, and Ethical Issues in the Digital Era | 3 QH |
| CMN 6045 | Leveraging Digital Technologies: Strategy, Assessment, and Governance | 3 QH |
| DGM 6280 | Managing for Digital Media | 4 QH |
| PBR 6710 | Public Relations Research: Understanding External Audiences | 3 QH |

***Concentration in Leadership***

REQUIRED COURSES

| | | |
|---|---|---|
| LDR 6100 | Developing Your Leadership Capability | 3 to 6 QH |
| LDR 6110 | Leading Teams | 3 to 6 QH |
| LDR 6120 | Organizational Leadership | 3 to 6 QH |
| LDR 6140 | Strategic Leadership | 3 to 6 QH |

LEADERSHIP ELECTIVES

Complete one of the following courses:

| | | |
|---|---|---|
| LDR 6135 | Ethical Leadership | 3 QH |
| LDR 6125 | Managing Organizational Culture | 3 QH |

***Concentration in Project Management***

REQUIRED COURSES

*Note:* Students with project management experience are not required to take PJM 5900:

| | | |
|---|---|---|
| PJM 5900 | Foundations of Project Management | 4 QH |
| PJM 6000 | Project Management Practices | 3 QH |
| PJM 6025 | Project Scheduling and Cost Planning | 3 QH |
| PJM 6015 | Project Risk Management | 3 QH |

PROJECT MANAGEMENT ELECTIVES

Complete two of the following courses.

*Note:* Students who take PJM 5900 are required to take only one course in this section:

| | | |
|---|---|---|
| PJM 5900 | Foundations of Project Management | 4 QH |
| PJM 6125 | Project Evaluation and Assessment | 3 QH |
| PJM 6135 | Project Quality Management | 3 QH |
| PJM 6140 | Managing Troubled Projects | 3 QH |
| PJM 6705 | Portfolio Management in the Enterprise Environment | 3 QH |

***Concentration in Social Media and Online Communication***

Complete five of the following courses:

| | | |
|---|---|---|
| CMN 6015 | Introduction to the Digital Era: The Power of Social Media | 3 QH |
| CMN 6025 | Digital Era Skills: Platforms, Tools, and Techniques | 3 QH |
| CMN 6035 | Legal, Policy, and Ethical Issues in the Digital Era | 3 QH |
| CMN 6045 | Leveraging Digital Technologies: Strategy, Assessment, and Governance | 3 QH |
| CMN 6065 | Implementation and Management of Social Media Channels and Online Communities | 3 QH |
| DGM 6285 | Interactive Marketing Fundamentals | 4 QH |
| DGM 6290 | Social Media and Brand Strategy Implementation | 4 QH |
| TCC 6710 | Content Strategy | 4 QH |

### PROGRAM CREDIT/GPA REQUIREMENTS

45 total quarter hours required

Minimum 3.000 GPA required

## PHYSICAL THERAPY

### Transitional Doctor of Physical Therapy

Designed for practicing physical therapists, the transitional Doctor of Physical Therapy (DPT) is an innovative, 100 percent online program. Integrating art and science, as well as professional and experiential learning, this curriculum seeks to provide you with the necessary knowledge base for today's practitioners with earned a doctoral degree.

Core courses within this physical therapy doctoral program include differential diagnosis and medical screening, diagnostic imaging, pharmacology, nutrition, and motor control. The capstone course, "Comprehensive Case Analysis," is a culmination of all work within the transitional DPT curriculum. Students have an opportunity to prepare a comprehensive and publishable case report or other scholarly work in partial fulfillment of the requirement for a transitional DPT degree.

The transitional DPT also includes specializations in a variety of areas such as orthopedics, pediatrics, geriatrics, advanced nutrition, women's health, education, and business management. If you have a unique specialization interest, you may also complete a directed study on a preapproved topic of your choosing.

### CREDIT REQUIREMENT

The transitional DPT degree is built upon a core of six courses. Beyond the common core, requirements may vary depending on whether the physical therapist is MSPT or BSPT prepared in addition to the student's past experiences.

For students entering with a Master of Science in Physical Therapy, 26 quarter hours required.

Residents of the state of North Carolina must have an earned master's degree to be eligible for admission to the Transitional Doctor of Physical Therapy program.

For students entering with a Bachelor of Science in Physical Therapy, 35 quarter hours required.

### Transitional Doctor of Physical Therapy

Complete all courses and requirements listed below unless otherwise indicated.

*Note: 2*6 quarter hours are required for students entering with a Master of Science in Physical Therapy.

### REQUIRED COURSES FOR ALL STUDENTS

| | | |
|---|---|---|
| PTH 6100 | Differential Diagnosis and Medical Screening | 4 QH |
| PTH 6110 | Diagnostic Imaging | 4 QH |
| PTH 6130 | Pharmacology | 3 QH |
| PTH 6900 | Comprehensive Case Analysis | 4 QH |
| PTH 6140 | Motor Control | 4 QH |

### REQUIRED NUTRITION COURSE

Complete one of the following courses:

| | | |
|---|---|---|
| PTH 6120 | Clinical Nutrition | 3 QH |
| NTR 6120 | Healthy Aging: Nutrition Strategies for Optimal Longevity | 4 QH |
| NTR 6119 | Pediatric Nutrition | 4 QH |
| NTR 7147 | Sports and Fitness Nutrition | 3 QH |

### ELECTIVE COURSE

Complete one of the following courses:

| | | |
|---|---|---|
| PTH 6430 | Educational Strategies for Effective Healthcare Delivery | 4 QH |
| PTH 6983 | Topics in Physical Therapy | 4 QH |
| PTH 6480 | Evidence-Based Exercise for the Older Adult | 4 QH |
| PTH 6490 | Pediatric Physical Therapy: Emerging Topics and Evidence-Based Practice | 4 QH |
| PTH 6985 | Psychosocial and Emotional Challenges Facing Older Adults | 4 QH |
| PTH 6200 | Research Methods and Statistical Analysis | 5 QH |
| PTH 6235 | Administrative and Management Keys for Contemporary Physical Therapist Practice | 4 QH |
| PTH 6220 | Fostering Change in Health Behavior | 4 QH |
| PTH 6561 | Evidence-Based Examination and Outcomes for the Cervical-Thoracic Spine and Temporomandibular Joint | 4 QH |
| PTH 6562 | Evidence-Based Examination and Outcomes for Upper Extremity: Shoulder, Elbow, and Hand | 4 QH |
| PTH 6563 | Evidence-Based Examination and Outcomes for Lumbar Spine and Sacroiliac Joint | 4 QH |
| PTH 6564 | Evidence-Based Examination and Outcomes for Lower Extremity: Hip, Knee, Foot, and Ankle | 4 QH |

### PROGRAM CREDIT/GPA REQUIREMENTS

26 total quarter hours required
Minimum 3.000 GPA required

## Transitional Doctor of Physical Therapy—Direct Entry

Complete all courses and requirements listed below unless otherwise indicated.

*Note:* 35 quarter hours are required for students entering with a Bachelor of Science in Physical Therapy.

### REQUIRED COURSES FOR ALL STUDENTS

| | | |
|---|---|---|
| PTH 6100 | Differential Diagnosis and Medical Screening | 4 QH |
| PTH 6110 | Diagnostic Imaging | 4 QH |
| PTH 6130 | Pharmacology | 3 QH |
| PTH 6900 | Comprehensive Case Analysis | 4 QH |
| PTH 6140 | Motor Control | 4 QH |
| PTH 6200 | Research Methods and Statistical Analysis | 5 QH |

### REQUIRED NUTRITION COURSE

Complete one of the following courses:

| | | |
|---|---|---|
| PTH 6120 | Clinical Nutrition | 3 QH |
| NTR 6120 | Healthy Aging: Nutrition Strategies for Optimal Longevity | 4 QH |
| NTR 6119 | Pediatric Nutrition | 4 QH |
| NTR 7147 | Sports and Fitness Nutrition | 3 QH |

### ADDITIONAL REQUIRED ELECTIVE FOR BS ENTRY STUDENTS

Complete one of the following courses:

| | | |
|---|---|---|
| PTH 6235 | Administrative and Management Keys for Contemporary Physical Therapist Practice | 4 QH |
| PTH 6220 | Fostering Change in Health Behavior | 4 QH |
| PTH 6430 | Educational Strategies for Effective Healthcare Delivery | 4 QH |

### ELECTIVE COURSE

Complete one of the following courses:

| | | |
|---|---|---|
| PTH 6983 | Topics in Physical Therapy | 4 QH |
| PTH 6480 | Evidence-Based Exercise for the Older Adult | 4 QH |
| PTH 6490 | Pediatric Physical Therapy: Emerging Topics and Evidence-Based Practice | 4 QH |
| PTH 6985 | Psychosocial and Emotional Challenges Facing Older Adults | 4 QH |
| PTH 6200 | Research Methods and Statistical Analysis | 5 QH |
| PTH 6235 | Administrative and Management Keys for Contemporary Physical Therapist Practice | 4 QH |
| PTH 6561 | Evidence-Based Examination and Outcomes for the Cervical-Thoracic Spine and Temporomandibular Joint | 4 QH |
| PTH 6562 | Evidence-Based Examination and Outcomes for Upper Extremity: Shoulder, Elbow, and Hand | 4 QH |
| PTH 6563 | Evidence-Based Examination and Outcomes for Lumbar Spine and Sacroiliac Joint | 4 QH |
| PTH 6564 | Evidence-Based Examination and Outcomes for Lower Extremity: Hip, Knee, Foot, and Ankle | 4 QH |

### PROGRAM CREDIT/GPA REQUIREMENTS

35 total quarter hours required
Minimum 3.000 GPA required

# PROJECT MANAGEMENT

## Graduate Certificate in Project Management

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.

Complete all courses and requirements listed below unless otherwise indicated.

### REQUIRED COURSES

*Note:* PJM 5900 is required for students who do not have at least two years of professional experience working on projects. This course is intended only for those who are not familiar with professional project work. Students with two years or more of professional project experience should not take this course:

| | | |
|---|---|---|
| PJM 5900 | Foundations of Project Management | 4 QH |
| PJM 6000 | Project Management Practices | 3 QH |
| PJM 6025 | Project Scheduling and Cost Planning | 3 QH |
| PJM 6015 | Project Risk Management | 3 QH |

### PROJECT MANAGEMENT ELECTIVES

Complete three of the following courses. *Note:* Students who take PJM 5900 are required to take only two courses in this section:

| | | |
|---|---|---|
| PJM 6125 | Project Evaluation and Assessment | 3 QH |
| PJM 6135 | Project Quality Management | 3 QH |
| PJM 6140 | Managing Troubled Projects | 3 QH |
| PJM 6705 | Portfolio Management in the Enterprise Environment | 3 QH |

### PROGRAM CREDIT/GPA REQUIREMENTS

18 total quarter hours required
Minimum 3.000 GPA required

## Master of Science in Project Management

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.

## MS in Project Management

Complete all courses and requirements listed below unless otherwise indicated.

### REQUIRED COURSES

Complete three of the following courses. *Note:* PJM 5900 must be completed *before* taking PJM 6000 for students who do not have at least three years of professional experience directing or leading project tasks. This course is highly recommended for students who do not have a basic working knowledge of Microsoft Project software. Students with project management experience are not required to take PJM 5900:

| | | |
|---|---|---|
| PJM 5900 | Foundations of Project Management | 4 QH |
| PJM 6000 | Project Management Practices | 3 QH |
| PJM 6005 | Project Scope Management | 3 QH |
| PJM 6015 | Project Risk Management | 3 QH |
| PJM 6025 | Project Scheduling and Cost Planning | 3 QH |
| PJM 6135 | Project Quality Management | 3 QH |

The following course should be taken last:

| | | |
|---|---|---|
| PJM 6910 | Capstone | 3 QH |

### PROJECT MANAGEMENT REQUIRED ELECTIVES

Complete two of the following courses. *Note:* Students who take PJM 5900 are required to take only one course in this section:

| | | |
|---|---|---|
| PJM 6125 | Project Evaluation and Assessment | 3 QH |
| PJM 6140 | Managing Troubled Projects | 3 QH |
| PJM 6145 | Global Project Management | 3 QH |
| PJM 6705 | Portfolio Management in the Enterprise Environment | 3 QH |

### ELECTIVES

Complete two of the following courses:

| | | |
|---|---|---|
| CMN 6000 | Introduction to Organizational Communication | 2 or 3 QH |

| | | |
|---|---|---|
| CMN 6060 | Negotiation, Mediation, and Facilitation | 3 QH |
| CMN 6090 | Organizational Culture, Climate, and Communication | 3 QH |
| CMN 6110 | Group Dynamics and Interpersonal Conflict: Meeting Management | 3 QH |
| COP 6940 | Personal and Career Development | 1 to 4 QH |
| INT 6943 | Integrative Experiential Learning | 3 QH |
| PJM 6205 | Leading and Managing Technical Projects | 3 QH |
| PJM 6210 | Communication Skills for Project Managers | 3 QH |
| PJM 6215 | Leading Remote Project Teams | 3 QH |

## CONCENTRATION

Complete one of the following seven concentrations:

***Concentration in Clinical Trial Design***

| | | |
|---|---|---|
| BTC 6211 | Validation and Auditing of Clinical Trial Information | 4 QH |
| BTC 6213 | Clinical Trial Design Optimization and Problem Solving | 4 QH |
| PMC 6212 | Clinical Drug Development Data Analysis: Concepts | 4 QH |
| RGA 6210 | Strategic Planning and Project Management for Regulatory Affairs | 4 QH |

***Concentration in Construction Management***

| | | |
|---|---|---|
| CMG 6400 | Introduction to Construction Management | 4 QH |
| CMG 6402 | Alternative Project Delivery Methods and Project Controls | 4 QH |
| CMG 6403 | Safety, Project Risk, and Quality Management | 4 QH |
| CMG 6405 | Construction Law | 4 QH |

***Concentration in Geographic Information Systems***

GEOGRAPHIC INFORMATION SYSTEMS COURSES

| | | |
|---|---|---|
| GIS 5101 | Introduction to Geographic Information Systems | 3 QH |
| GIS 5102 | Fundamentals of GIS Analysis | 3 QH |
| RMS 5105 | Fundamentals of Remote Sensing | 3 QH |
| GIS 5201 | Advanced Spatial Analysis | 3 QH |

GEOGRAPHIC INFORMATION SYSTEMS ELECTIVE

Complete one of the following courses:

| | | |
|---|---|---|
| GIS 6340 | GIS Customization | 3 QH |
| GIS 6350 | GIS Management and Implementation | 3 QH |
| GIS 6370 | Internet-Based GIS | 3 QH |
| GIS 6360 | Spatial Databases | 3 QH |

***Concentration in Information Security Management***

INFORMATION SECURITY MANAGEMENT COURSES

| | | |
|---|---|---|
| ITC 6300 | Foundations of Information Security | 3 QH |
| ITC 6315 | Information Security Risk Management | 3 QH |
| ITC 6310 | Information Security Governance | 3 QH |
| ITC 6320 | Information Security Technology | 3 QH |

INFORMATION SECURITY MANAGEMENT ELECTIVE

Complete one of the following courses:

| | | |
|---|---|---|
| ITC 6020 | Information Systems Design and Development | 3 QH |
| ITC 6305 | IT Infrastructure (Systems, Networks, Telecom) | 3 QH |
| ITC 6335 | Data Warehousing and Data Mining | 3 QH |
| ITC 6345 | Systems and Network Administration | 3 QH |

***Concentration in Leadership***

LEADERSHIP COURSES

| | | |
|---|---|---|
| LDR 6100 | Developing Your Leadership Capability | 3 to 6 QH |
| LDR 6110 | Leading Teams | 3 to 6 QH |
| LDR 6120 | Organizational Leadership | 3 to 6 QH |
| LDR 6150 | Transforming Organizations | 3 QH |

LEADERSHIP ELECTIVE

Complete one of the following courses:

| | | |
|---|---|---|
| LDR 6125 | Managing Organizational Culture | 3 QH |
| LDR 6135 | Ethical Leadership | 3 QH |
| LDR 6140 | Strategic Leadership | 3 to 6 QH |

***Concentration in Leading and Managing Technical Projects***

| | | |
|---|---|---|
| PJM 6205 | Leading and Managing Technical Projects | 3 QH |
| PJM 6210 | Communication Skills for Project Managers | 3 QH |
| PJM 6215 | Leading Remote Project Teams | 3 QH |
| PJM 6220 | Planning and Scheduling Technical Projects | 3 QH |
| ITC 6035 | Information Technology Project Management | 3 QH |

***Concentration in Organizational Communication***

ORGANIZATIONAL COMMUNICATION COURSE

| | | |
|---|---|---|
| CMN 6000 | Introduction to Organizational Communication | 2 or 3 QH |
| with INT 6000 | Writing Lab | 1 QH |

ORGANIZATIONAL COMMUNICATION ELECTIVES

Complete four of the following courses:

| | | |
|---|---|---|
| CMN 6020 | Ethical Issues in Organizational Communication | 3 QH |
| CMN 6050 | Crisis Communication | 3 QH |
| CMN 6060 | Negotiation, Mediation, and Facilitation | 3 QH |
| CMN 6080 | Intercultural Communication | 3 QH |
| CMN 6090 | Organizational Culture, Climate, and Communication | 3 QH |
| CMN 6110 | Group Dynamics and Interpersonal Conflict: Meeting Management | 3 QH |

## PROGRAM CREDIT/GPA REQUIREMENTS

45 total quarter hours required

Minimum 3.000 GPA required

REGULATORY AFFAIRS

## Graduate Certificate in Domestic Biopharmaceutical Regulatory Affairs

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 Domestic 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.

Complete all courses and requirements listed below unless otherwise indicated.

### REQUIRED COURSES

| | | |
|---|---|---|
| RGA 6200 | Biologics Development: A Regulatory Overview | 4 QH |
| RGA 6201 | New Drug Development: A Regulatory Overview | 4 QH |
| RGA 6202 | Medical Device Development: A Regulatory Overview | 4 QH |

Complete one of the following courses:

| | | |
|---|---|---|
| RGA 6203 | Food, Drug, and Medical Device Law: Topics and Cases | 5 QH |
| RGA 6210 | Strategic Planning and Project Management for Regulatory Affairs | 4 QH |
| RGA 6211 | Combination Products and Convergence | 4 QH |
| RGA 6212 | Safety Sciences 1: Introduction to Safety and Surveillance | 4 QH |
| RGA 6214 | The Food and Drug Administration: Creation, Behavior, Regulatory Culture | 4 QH |
| RGA 6216 | The Medical, Social, and Financial Dimensions of Orphan Drugs | 4 QH |
| RGA 6217 | Biomedical Product Development: From Biotech to Boardroom to Market | 4 QH |
| TCC 6370 | Regulatory Writing: Medical Device Submissions | 4 QH |
| TCC 6380 | Regulatory Writing: New Drug Applications | 4 QH |

### PROGRAM CREDIT/GPA REQUIREMENTS

16 total quarter hours required
Minimum 3.000 GPA required

## Graduate Certificate in International Biopharmaceutical Regulatory Affairs

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.

Complete all courses and requirements listed below unless otherwise indicated.

### REQUIRED COURSES

| | | |
|---|---|---|
| RGA 6220 | Global Biotechnology Product Registration: E.U., U.S. Product Regulation | 5 QH |
| RGA 6221 | European Union Compliance Process and Regulatory Affairs | 4 QH |

Complete two of the following courses:

| | | |
|---|---|---|
| RGA 6228 | Managing International Clinical Trials | 4 QH |
| RGA 6222 | European Medical Device Regulations | 4 QH |
| RGA 6223 | Introduction to Canadian, Asian, and Latin American Regulatory Affairs | 4 QH |
| RGA 6225 | Japanese Medical Device Regulations and Registration | 4 QH |
| RGA 6226 | Canadian and Australian Medical Device Regulations | 4 QH |
| RGA 6227 | Emerging Medical Device Markets | 4 QH |
| RGA 6210 | Strategic Planning and Project Management for Regulatory Affairs | 4 QH |
| RGA 6212 | Safety Sciences 1: Introduction to Safety and Surveillance | 4 QH |

### PROGRAM CREDIT/GPA REQUIREMENTS

16 total quarter hours required
Minimum 3.000 GPA required

## Graduate Certificate in Medical Devices Regulatory Affairs

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 Devices 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 for Drugs, Biologics, and Medical Devices.

Complete all courses and requirements listed below unless otherwise indicated.

### REQUIRED COURSES

| | | |
|---|---|---|
| RGA 6202 | Medical Device Development: A Regulatory Overview | 4 QH |
| RGA 6205 | Emerging Trends and Issues in the Medical Device Industry | 4 QH |

### MEDICAL DEVICES REGULATORY AFFAIRS ELECTIVES

Complete two of the following courses:

| | | |
|---|---|---|
| BTC 6260 | The Business of Medicine and Biotechnology | 4 QH |
| RGA 6211 | Combination Products and Convergence | 4 QH |
| RGA 6112 | Biomedical Intellectual Property Management: Patents | 4 QH |
| RGA 6222 | European Medical Device Regulations | 4 QH |
| RGA 6225 | Japanese Medical Device Regulations and Registration | 4 QH |
| RGA 6226 | Canadian and Australian Medical Device Regulations | 4 QH |
| RGA 6227 | Emerging Medical Device Markets | 4 QH |
| RGA 6203 | Food, Drug, and Medical Device Law: Topics and Cases | 5 QH |
| TCC 6370 | Regulatory Writing: Medical Device Submissions | 4 QH |
| ITP 6305 | Technology Licensing | 4 QH |

### PROGRAM CREDIT/GPA REQUIREMENTS

16 total quarter hours required
Minimum 3.000 GPA required

## Master of Science in Regulatory Affairs for Drugs, Biologics, and Medical Devices

The rapid growth of the biomedical product industries and the ever-evolving regulatory landscape have driven high demand for trained regulatory affairs professionals in both the public and private sectors. In response to this demand, Northeastern University's College of Professional Studies offers the Master of Science in Regulatory Affairs for Drugs, Biologics, and Medical Devices.

This unique graduate degree is designed to both broaden and deepen the student's understanding of current regulations and their practical application in the development of biomedical products. Courses within this program provide students with the opportunity to integrate both scientific knowledge and regulatory perspectives, within the larger context of global commercialization. From discovery through the postmarket phase of product development, this master's degree covers the regulatory and market access requirements to bring a medical product to—and maintain its presence in—the global marketplace.

## MS in Regulatory Affairs for Drugs, Biologics, and Medical Devices with Concentration in Clinical Research Regulatory Affairs

Complete all courses and requirements listed below unless otherwise indicated.

### REQUIRED COURSES

| | | |
|---|---|---|
| RGA 6201 | New Drug Development: A Regulatory Overview | 4 QH |
| RGA 6202 | Medical Device Development: A Regulatory Overview | 4 QH |
| RGA 6200 | Biologics Development: A Regulatory Overview | 4 QH |
| RGA 6203 | Food, Drug, and Medical Device Law: Topics and Cases | 5 QH |
| BTC 6210 | Human Experimentation: Methodological Issues Fundamentals | 4 QH |
| BTC 6213 | Clinical Trial Design Optimization and Problem Solving | 4 QH |

## REGULATORY AND CLINICAL OPERATIONS

Complete one of the following courses:

| | | |
|---|---|---|
| BTC 6211 | Validation and Auditing of Clinical Trial Information | 4 QH |
| RGA 6212 | Safety Sciences 1: Introduction to Safety and Surveillance | 4 QH |
| RGA 6230 | Clinical Laboratory Management in Clinical Trials | 4 QH |
| RGA 6280 | Advanced Writing on International Biomedical Topics | 4 QH |
| TCC 6310 | Regulatory Documentation Processes | 4 QH |

## REGULATORY PERSPECTIVE

Complete one of the following courses:

| | | |
|---|---|---|
| BTC 6260 | The Business of Medicine and Biotechnology | 4 QH |
| RGA 6210 | Strategic Planning and Project Management for Regulatory Affairs | 4 QH |
| RGA 6211 | Combination Products and Convergence | 4 QH |
| RGA 6215 | Project Management in Early Drug Discovery and Development | 4 QH |
| RGA 6217 | Biomedical Product Development: From Biotech to Boardroom to Market | 4 QH |
| RGA 6235 | Emerging Product Categories in the Regulation of Drugs and Biologics | 4 QH |
| RGA 6245 | Regulation of Generic Pharmaceutical and Biosimilar Products | 4 QH |
| RGA 6250 | Financing and Reimbursement in Biomedical Product Development | 4 QH |

## INTERNATIONAL COURSE

Complete one of the following courses:

| | | |
|---|---|---|
| RGA 6220 | Global Biotechnology Product Registration: E.U., U.S. Product Regulation | 5 QH |
| RGA 6221 | European Union Compliance Process and Regulatory Affairs | 4 QH |
| RGA 6223 | Introduction to Canadian, Asian, and Latin American Regulatory Affairs | 4 QH |
| RGA 6228 | Managing International Clinical Trials | 4 QH |

## ADDITIONAL CONCENTRATION COURSE

Complete one of the following courses:

| | | |
|---|---|---|
| BTC 6211 | Validation and Auditing of Clinical Trial Information | 4 QH |
| BTC 6260 | The Business of Medicine and Biotechnology | 4 QH |
| RGA 6210 | Strategic Planning and Project Management for Regulatory Affairs | 4 QH |
| RGA 6211 | Combination Products and Convergence | 4 QH |
| RGA 6212 | Safety Sciences 1: Introduction to Safety and Surveillance | 4 QH |
| RGA 6215 | Project Management in Early Drug Discovery and Development | 4 QH |
| RGA 6217 | Biomedical Product Development: From Biotech to Boardroom to Market | 4 QH |
| RGA 6220 | Global Biotechnology Product Registration: E.U., U.S. Product Regulation | 5 QH |
| RGA 6221 | European Union Compliance Process and Regulatory Affairs | 4 QH |
| RGA 6223 | Introduction to Canadian, Asian, and Latin American Regulatory Affairs | 4 QH |
| RGA 6228 | Managing International Clinical Trials | 4 QH |
| RGA 6230 | Clinical Laboratory Management in Clinical Trials | 4 QH |
| RGA 6235 | Emerging Product Categories in the Regulation of Drugs and Biologics | 4 QH |
| RGA 6245 | Regulation of Generic Pharmaceutical and Biosimilar Products | 4 QH |
| RGA 6250 | Financing and Reimbursement in Biomedical Product Development | 4 QH |
| RGA 6280 | Advanced Writing on International Biomedical Topics | 4 QH |
| TCC 6310 | Regulatory Documentation Processes | 4 QH |

## OPEN ELECTIVE

Complete one of the following three options (4 quarter hours):

***Personal and Career Development***

| | | |
|---|---|---|
| COP 6940 | Personal and Career Development | 1 to 4 QH |
| RGA 6920 | Internship Reflection | 1 QH |

***Integrative Experiential Learning***

| | | |
|---|---|---|
| INT 6943 | Integrative Experiential Learning | 3 QH |
| COP 6942 | Strategies for Professional Growth | 1 QH |

***Additional Course***

Complete one of the following courses:

| | | |
|---|---|---|
| BTC 6211 | Validation and Auditing of Clinical Trial Information | 4 QH |
| BTC 6260 | The Business of Medicine and Biotechnology | 4 QH |
| PMC 6212 | Clinical Drug Development Data Analysis: Concepts | 4 QH |
| RGA 6112 | Biomedical Intellectual Property Management: Patents | 4 QH |
| RGA 6205 | Emerging Trends and Issues in the Medical Device Industry | 4 QH |
| RGA 6206 | Practical Aspects of Regulatory Compliance | 4 QH |
| RGA 6210 | Strategic Planning and Project Management for Regulatory Affairs | 4 QH |
| RGA 6211 | Combination Products and Convergence | 4 QH |
| RGA 6212 | Safety Sciences 1: Introduction to Safety and Surveillance | 4 QH |

| | | |
|---|---|---|
| RGA 6215 | Project Management in Early Drug Discovery and Development | 4 QH |
| RGA 6216 | The Medical, Social, and Financial Dimensions of Orphan Drugs | 4 QH |
| RGA 6217 | Biomedical Product Development: From Biotech to Boardroom to Market | 4 QH |
| RGA 6219 | The Advertising and Promotion of Drug and Medical Device Products | 4 QH |
| RGA 6220 | Global Biotechnology Product Registration: E.U., U.S. Product Regulation | 5 QH |
| RGA 6221 | European Union Compliance Process and Regulatory Affairs | 4 QH |
| RGA 6222 | European Medical Device Regulations | 4 QH |
| RGA 6223 | Introduction to Canadian, Asian, and Latin American Regulatory Affairs | 4 QH |
| RGA 6225 | Japanese Medical Device Regulations and Registration | 4 QH |
| RGA 6226 | Canadian and Australian Medical Device Regulations | 4 QH |
| RGA 6227 | Emerging Medical Device Markets | 4 QH |
| RGA 6228 | Managing International Clinical Trials | 4 QH |
| RGA 6230 | Clinical Laboratory Management in Clinical Trials | 4 QH |
| RGA 6233 | Application of Quality System Regulation in Medical Device Design and Manufacturing | 4 QH |
| RGA 6234 | Drug and Device Supplier Risk Management: Compliance and Processes | 4 QH |
| RGA 6235 | Emerging Product Categories in the Regulation of Drugs and Biologics | 4 QH |
| RGA 6245 | Regulation of Generic Pharmaceutical and Biosimilar Products | 4 QH |
| RGA 6250 | Financing and Reimbursement in Biomedical Product Development | 4 QH |
| RGA 6280 | Advanced Writing on International Biomedical Topics | 4 QH |
| TCC 6310 | Regulatory Documentation Processes | 4 QH |
| TCC 6370 | Regulatory Writing: Medical Device Submissions | 4 QH |
| TCC 6380 | Regulatory Writing: New Drug Applications | 4 QH |

### PROGRAM CREDIT/GPA REQUIREMENTS

45 total quarter hours required
Minimum 3.000 GPA required

## MS in Regulatory Affairs for Drugs, Biologics, and Medical Devices with Concentration in General Regulatory Affairs

Complete all courses and requirements listed below unless otherwise indicated.

### REQUIRED COURSES

| | | |
|---|---|---|
| RGA 6100 | Introduction to Drug and Medical Device Regulation | 4 QH |
| BTC 6210 | Human Experimentation: Methodological Issues Fundamentals | 4 QH |
| RGA 6201 | New Drug Development: A Regulatory Overview | 4 QH |
| RGA 6202 | Medical Device Development: A Regulatory Overview | 4 QH |
| RGA 6200 | Biologics Development: A Regulatory Overview | 4 QH |
| RGA 6203 | Food, Drug, and Medical Device Law: Topics and Cases | 5 QH |

### REGULATORY AND CLINICAL OPERATIONS

Complete one of the following courses:

| | | |
|---|---|---|
| BTC 6211 | Validation and Auditing of Clinical Trial Information | 4 QH |
| BTC 6213 | Clinical Trial Design Optimization and Problem Solving | 4 QH |
| RGA 6212 | Safety Sciences 1: Introduction to Safety and Surveillance | 4 QH |
| RGA 6230 | Clinical Laboratory Management in Clinical Trials | 4 QH |
| RGA 6233 | Application of Quality System Regulation in Medical Device Design and Manufacturing | 4 QH |
| RGA 6234 | Drug and Device Supplier Risk Management: Compliance and Processes | 4 QH |
| RGA 6280 | Advanced Writing on International Biomedical Topics | 4 QH |
| TCC 6310 | Regulatory Documentation Processes | 4 QH |
| TCC 6370 | Regulatory Writing: Medical Device Submissions | 4 QH |
| TCC 6380 | Regulatory Writing: New Drug Applications | 4 QH |

### REGULATORY PERSPECTIVE

Complete one of the following courses:

| | | |
|---|---|---|
| BTC 6260 | The Business of Medicine and Biotechnology | 4 QH |
| PMC 6212 | Clinical Drug Development Data Analysis: Concepts | 4 QH |
| RGA 6205 | Emerging Trends and Issues in the Medical Device Industry | 4 QH |
| RGA 6210 | Strategic Planning and Project Management for Regulatory Affairs | 4 QH |

| | | |
|---|---|---|
| RGA 6211 | Combination Products and Convergence | 4 QH |
| RGA 6112 | Biomedical Intellectual Property Management: Patents | 4 QH |
| RGA 6216 | The Medical, Social, and Financial Dimensions of Orphan Drugs | 4 QH |
| RGA 6217 | Biomedical Product Development: From Biotech to Boardroom to Market | 4 QH |
| RGA 6219 | The Advertising and Promotion of Drug and Medical Device Products | 4 QH |
| RGA 6245 | Regulation of Generic Pharmaceutical and Biosimilar Products | 4 QH |
| RGA 6250 | Financing and Reimbursement in Biomedical Product Development | 4 QH |

## INTERNATIONAL COURSE

Complete one of the following courses:

| | | |
|---|---|---|
| RGA 6220 | Global Biotechnology Product Registration: E.U., U.S. Product Regulation | 5 QH |
| RGA 6221 | European Union Compliance Process and Regulatory Affairs | 4 QH |
| RGA 6222 | European Medical Device Regulations | 4 QH |
| RGA 6223 | Introduction to Canadian, Asian, and Latin American Regulatory Affairs | 4 QH |
| RGA 6225 | Japanese Medical Device Regulations and Registration | 4 QH |
| RGA 6226 | Canadian and Australian Medical Device Regulations | 4 QH |
| RGA 6227 | Emerging Medical Device Markets | 4 QH |
| RGA 6228 | Managing International Clinical Trials | 4 QH |

## ADDITIONAL CONCENTRATION COURSE

Complete one of the following courses:

| | | |
|---|---|---|
| BTC 6211 | Validation and Auditing of Clinical Trial Information | 4 QH |
| BTC 6213 | Clinical Trial Design Optimization and Problem Solving | 4 QH |
| BTC 6260 | The Business of Medicine and Biotechnology | 4 QH |
| PMC 6212 | Clinical Drug Development Data Analysis: Concepts | 4 QH |
| RGA 6112 | Biomedical Intellectual Property Management: Patents | 4 QH |
| RGA 6205 | Emerging Trends and Issues in the Medical Device Industry | 4 QH |
| RGA 6210 | Strategic Planning and Project Management for Regulatory Affairs | 4 QH |
| RGA 6211 | Combination Products and Convergence | 4 QH |
| RGA 6212 | Safety Sciences 1: Introduction to Safety and Surveillance | 4 QH |
| RGA 6216 | The Medical, Social, and Financial Dimensions of Orphan Drugs | 4 QH |
| RGA 6217 | Biomedical Product Development: From Biotech to Boardroom to Market | 4 QH |
| RGA 6219 | The Advertising and Promotion of Drug and Medical Device Products | 4 QH |
| RGA 6220 | Global Biotechnology Product Registration: E.U., U.S. Product Regulation | 5 QH |
| RGA 6221 | European Union Compliance Process and Regulatory Affairs | 4 QH |
| RGA 6222 | European Medical Device Regulations | 4 QH |
| RGA 6223 | Introduction to Canadian, Asian, and Latin American Regulatory Affairs | 4 QH |
| RGA 6225 | Japanese Medical Device Regulations and Registration | 4 QH |
| RGA 6226 | Canadian and Australian Medical Device Regulations | 4 QH |
| RGA 6227 | Emerging Medical Device Markets | 4 QH |
| RGA 6228 | Managing International Clinical Trials | 4 QH |
| RGA 6230 | Clinical Laboratory Management in Clinical Trials | 4 QH |
| RGA 6233 | Application of Quality System Regulation in Medical Device Design and Manufacturing | 4 QH |
| RGA 6234 | Drug and Device Supplier Risk Management: Compliance and Processes | 4 QH |
| RGA 6245 | Regulation of Generic Pharmaceutical and Biosimilar Products | 4 QH |
| RGA 6250 | Financing and Reimbursement in Biomedical Product Development | 4 QH |
| RGA 6280 | Advanced Writing on International Biomedical Topics | 4 QH |
| TCC 6310 | Regulatory Documentation Processes | 4 QH |
| TCC 6370 | Regulatory Writing: Medical Device Submissions | 4 QH |
| TCC 6380 | Regulatory Writing: New Drug Applications | 4 QH |

## OPEN ELECTIVE

Complete one of the following three options (4 quarter hours):

***Personal and Career Development***

| | | |
|---|---|---|
| COP 6940 | Personal and Career Development | 1 to 4 QH |
| RGA 6920 | Internship Reflection | 1 QH |

***Integrative Experiential Learning***

| | | |
|---|---|---|
| INT 6943 | Integrative Experiential Learning | 3 QH |
| COP 6942 | Strategies for Professional Growth | 1 QH |

***Additional Course***

Complete one of the following courses:

| | | |
|---|---|---|
| BTC 6211 | Validation and Auditing of Clinical Trial Information | 4 QH |
| BTC 6213 | Clinical Trial Design Optimization and Problem Solving | 4 QH |

| | | |
|---|---|---|
| BTC 6260 | The Business of Medicine and Biotechnology | 4 QH |
| PMC 6212 | Clinical Drug Development Data Analysis: Concepts | 4 QH |
| RGA 6112 | Biomedical Intellectual Property Management: Patents | 4 QH |
| RGA 6205 | Emerging Trends and Issues in the Medical Device Industry | 4 QH |
| RGA 6206 | Practical Aspects of Regulatory Compliance | 4 QH |
| RGA 6210 | Strategic Planning and Project Management for Regulatory Affairs | 4 QH |
| RGA 6211 | Combination Products and Convergence | 4 QH |
| RGA 6212 | Safety Sciences 1: Introduction to Safety and Surveillance | 4 QH |
| RGA 6215 | Project Management in Early Drug Discovery and Development | 4 QH |
| RGA 6216 | The Medical, Social, and Financial Dimensions of Orphan Drugs | 4 QH |
| RGA 6217 | Biomedical Product Development: From Biotech to Boardroom to Market | 4 QH |
| RGA 6219 | The Advertising and Promotion of Drug and Medical Device Products | 4 QH |
| RGA 6220 | Global Biotechnology Product Registration: E.U., U.S. Product Regulation | 5 QH |
| RGA 6221 | European Union Compliance Process and Regulatory Affairs | 4 QH |
| RGA 6222 | European Medical Device Regulations | 4 QH |
| RGA 6223 | Introduction to Canadian, Asian, and Latin American Regulatory Affairs | 4 QH |
| RGA 6225 | Japanese Medical Device Regulations and Registration | 4 QH |
| RGA 6226 | Canadian and Australian Medical Device Regulations | 4 QH |
| RGA 6227 | Emerging Medical Device Markets | 4 QH |
| RGA 6228 | Managing International Clinical Trials | 4 QH |
| RGA 6230 | Clinical Laboratory Management in Clinical Trials | 4 QH |
| RGA 6233 | Application of Quality System Regulation in Medical Device Design and Manufacturing | 4 QH |
| RGA 6234 | Drug and Device Supplier Risk Management: Compliance and Processes | 4 QH |
| RGA 6235 | Emerging Product Categories in the Regulation of Drugs and Biologics | 4 QH |
| RGA 6245 | Regulation of Generic Pharmaceutical and Biosimilar Products | 4 QH |
| RGA 6250 | Financing and Reimbursement in Biomedical Product Development | 4 QH |
| RGA 6280 | Advanced Writing on International Biomedical Topics | 4 QH |
| TCC 6310 | Regulatory Documentation Processes | 4 QH |
| TCC 6370 | Regulatory Writing: Medical Device Submissions | 4 QH |
| TCC 6380 | Regulatory Writing: New Drug Applications | 4 QH |

### PROGRAM CREDIT/GPA REQUIREMENTS

45 total quarter hours required
Minimum 3.000 GPA required

## MS in Regulatory Affairs for Drugs, Biologics, and Medical Devices with Concentration in International Regulatory Affairs

Complete all courses and requirements listed below unless otherwise indicated.

### REQUIRED COURSES

| | | |
|---|---|---|
| RGA 6100 | Introduction to Drug and Medical Device Regulation | 4 QH |
| RGA 6201 | New Drug Development: A Regulatory Overview | 4 QH |
| RGA 6202 | Medical Device Development: A Regulatory Overview | 4 QH |
| RGA 6200 | Biologics Development: A Regulatory Overview | 4 QH |
| RGA 6220 | Global Biotechnology Product Registration: E.U., U.S. Product Regulation | 5 QH |
| RGA 6223 | Introduction to Canadian, Asian, and Latin American Regulatory Affairs | 4 QH |

### REGULATORY AND CLINICAL OPERATIONS

Complete one of the following courses:

| | | |
|---|---|---|
| BTC 6211 | Validation and Auditing of Clinical Trial Information | 4 QH |
| BTC 6213 | Clinical Trial Design Optimization and Problem Solving | 4 QH |
| RGA 6212 | Safety Sciences 1: Introduction to Safety and Surveillance | 4 QH |
| RGA 6280 | Advanced Writing on International Biomedical Topics | 4 QH |
| TCC 6370 | Regulatory Writing: Medical Device Submissions | 4 QH |
| TCC 6380 | Regulatory Writing: New Drug Applications | 4 QH |

### REGULATORY PERSPECTIVE

Complete one of the following courses:

| | | |
|---|---|---|
| BTC 6260 | The Business of Medicine and Biotechnology | 4 QH |
| RGA 6203 | Food, Drug, and Medical Device Law: Topics and Cases | 5 QH |
| RGA 6205 | Emerging Trends and Issues in the Medical Device Industry | 4 QH |

| | | |
|---|---|---|
| RGA 6210 | Strategic Planning and Project Management for Regulatory Affairs | 4 QH |
| RGA 6211 | Combination Products and Convergence | 4 QH |
| RGA 6217 | Biomedical Product Development: From Biotech to Boardroom to Market | 4 QH |
| RGA 6235 | Emerging Product Categories in the Regulation of Drugs and Biologics | 4 QH |
| RGA 6245 | Regulation of Generic Pharmaceutical and Biosimilar Products | 4 QH |

## INTERNATIONAL COURSE

Complete one of the following courses:

| | | |
|---|---|---|
| RGA 6211 | Combination Products and Convergence | 4 QH |
| RGA 6221 | European Union Compliance Process and Regulatory Affairs | 4 QH |
| RGA 6222 | European Medical Device Regulations | 4 QH |
| RGA 6225 | Japanese Medical Device Regulations and Registration | 4 QH |
| RGA 6226 | Canadian and Australian Medical Device Regulations | 4 QH |
| RGA 6227 | Emerging Medical Device Markets | 4 QH |
| RGA 6228 | Managing International Clinical Trials | 4 QH |

## ADDITIONAL CONCENTRATION COURSE

Complete one of the following courses:

| | | |
|---|---|---|
| BTC 6211 | Validation and Auditing of Clinical Trial Information | 4 QH |
| BTC 6213 | Clinical Trial Design Optimization and Problem Solving | 4 QH |
| BTC 6260 | The Business of Medicine and Biotechnology | 4 QH |
| RGA 6203 | Food, Drug, and Medical Device Law: Topics and Cases | 5 QH |
| RGA 6205 | Emerging Trends and Issues in the Medical Device Industry | 4 QH |
| RGA 6210 | Strategic Planning and Project Management for Regulatory Affairs | 4 QH |
| RGA 6211 | Combination Products and Convergence | 4 QH |
| RGA 6212 | Safety Sciences 1: Introduction to Safety and Surveillance | 4 QH |
| RGA 6217 | Biomedical Product Development: From Biotech to Boardroom to Market | 4 QH |
| RGA 6221 | European Union Compliance Process and Regulatory Affairs | 4 QH |
| RGA 6222 | European Medical Device Regulations | 4 QH |
| RGA 6225 | Japanese Medical Device Regulations and Registration | 4 QH |
| RGA 6226 | Canadian and Australian Medical Device Regulations | 4 QH |
| RGA 6227 | Emerging Medical Device Markets | 4 QH |
| RGA 6228 | Managing International Clinical Trials | 4 QH |
| RGA 6235 | Emerging Product Categories in the Regulation of Drugs and Biologics | 4 QH |
| RGA 6245 | Regulation of Generic Pharmaceutical and Biosimilar Products | 4 QH |
| RGA 6280 | Advanced Writing on International Biomedical Topics | 4 QH |
| TCC 6370 | Regulatory Writing: Medical Device Submissions | 4 QH |
| TCC 6380 | Regulatory Writing: New Drug Applications | 4 QH |

## OPEN ELECTIVE

Complete one of the following three options (4 quarter hours):

***Personal and Career Development***

| | | |
|---|---|---|
| COP 6940 | Personal and Career Development | 1 to 4 QH |
| RGA 6920 | Internship Reflection | 1 QH |

***Integrative Experiential Learning***

| | | |
|---|---|---|
| INT 6943 | Integrative Experiential Learning | 3 QH |
| COP 6942 | Strategies for Professional Growth | 1 QH |

***Additional Course***

Complete one of the following courses:

| | | |
|---|---|---|
| BTC 6210 | Human Experimentation: Methodological Issues Fundamentals | 4 QH |
| BTC 6211 | Validation and Auditing of Clinical Trial Information | 4 QH |
| BTC 6213 | Clinical Trial Design Optimization and Problem Solving | 4 QH |
| BTC 6260 | The Business of Medicine and Biotechnology | 4 QH |
| PMC 6212 | Clinical Drug Development Data Analysis: Concepts | 4 QH |
| RGA 6112 | Biomedical Intellectual Property Management: Patents | 4 QH |
| RGA 6203 | Food, Drug, and Medical Device Law: Topics and Cases | 5 QH |
| RGA 6205 | Emerging Trends and Issues in the Medical Device Industry | 4 QH |
| RGA 6206 | Practical Aspects of Regulatory Compliance | 4 QH |
| RGA 6210 | Strategic Planning and Project Management for Regulatory Affairs | 4 QH |
| RGA 6211 | Combination Products and Convergence | 4 QH |
| RGA 6212 | Safety Sciences 1: Introduction to Safety and Surveillance | 4 QH |
| RGA 6215 | Project Management in Early Drug Discovery and Development | 4 QH |
| RGA 6216 | The Medical, Social, and Financial Dimensions of Orphan Drugs | 4 QH |
| RGA 6217 | Biomedical Product Development: From Biotech to Boardroom to Market | 4 QH |

| | | |
|---|---|---|
| RGA 6219 | The Advertising and Promotion of Drug and Medical Device Products | 4 QH |
| RGA 6221 | European Union Compliance Process and Regulatory Affairs | 4 QH |
| RGA 6222 | European Medical Device Regulations | 4 QH |
| RGA 6225 | Japanese Medical Device Regulations and Registration | 4 QH |
| RGA 6226 | Canadian and Australian Medical Device Regulations | 4 QH |
| RGA 6227 | Emerging Medical Device Markets | 4 QH |
| RGA 6228 | Managing International Clinical Trials | 4 QH |
| RGA 6230 | Clinical Laboratory Management in Clinical Trials | 4 QH |
| RGA 6233 | Application of Quality System Regulation in Medical Device Design and Manufacturing | 4 QH |
| RGA 6234 | Drug and Device Supplier Risk Management: Compliance and Processes | 4 QH |
| RGA 6235 | Emerging Product Categories in the Regulation of Drugs and Biologics | 4 QH |
| RGA 6245 | Regulation of Generic Pharmaceutical and Biosimilar Products | 4 QH |
| RGA 6250 | Financing and Reimbursement in Biomedical Product Development | 4 QH |
| RGA 6280 | Advanced Writing on International Biomedical Topics | 4 QH |
| TCC 6310 | Regulatory Documentation Processes | 4 QH |
| TCC 6370 | Regulatory Writing: Medical Device Submissions | 4 QH |
| TCC 6380 | Regulatory Writing: New Drug Applications | 4 QH |

### PROGRAM CREDIT/GPA REQUIREMENTS

45 total quarter hours required
Minimum 3.000 GPA required

## MS in Regulatory Affairs for Drugs, Biologics, and Medical Devices with Concentration in Operational Regulatory Affairs

Complete all courses and requirements listed below unless otherwise indicated.

### REQUIRED COURSES

| | | |
|---|---|---|
| RGA 6100 | Introduction to Drug and Medical Device Regulation | 4 QH |
| RGA 6201 | New Drug Development: A Regulatory Overview | 4 QH |
| RGA 6202 | Medical Device Development: A Regulatory Overview | 4 QH |
| RGA 6200 | Biologics Development: A Regulatory Overview | 4 QH |
| RGA 6203 | Food, Drug, and Medical Device Law: Topics and Cases | 5 QH |
| TCC 6370 | Regulatory Writing: Medical Device Submissions | 4 QH |
| TCC 6380 | Regulatory Writing: New Drug Applications | 4 QH |

### REGULATORY AND CLINICAL OPERATIONS

Complete one of the following courses:

| | | |
|---|---|---|
| BTC 6210 | Human Experimentation: Methodological Issues Fundamentals | 4 QH |
| BTC 6211 | Validation and Auditing of Clinical Trial Information | 4 QH |
| RGA 6212 | Safety Sciences 1: Introduction to Safety and Surveillance | 4 QH |
| RGA 6280 | Advanced Writing on International Biomedical Topics | 4 QH |
| TCC 6310 | Regulatory Documentation Processes | 4 QH |

### REGULATORY PERSPECTIVE

Complete one of the following courses:

| | | |
|---|---|---|
| BTC 6260 | The Business of Medicine and Biotechnology | 4 QH |
| RGA 6205 | Emerging Trends and Issues in the Medical Device Industry | 4 QH |
| RGA 6210 | Strategic Planning and Project Management for Regulatory Affairs | 4 QH |
| RGA 6211 | Combination Products and Convergence | 4 QH |
| RGA 6112 | Biomedical Intellectual Property Management: Patents | 4 QH |
| RGA 6235 | Emerging Product Categories in the Regulation of Drugs and Biologics | 4 QH |
| RGA 6245 | Regulation of Generic Pharmaceutical and Biosimilar Products | 4 QH |

### INTERNATIONAL COURSE

Complete one of the following courses:

| | | |
|---|---|---|
| RGA 6220 | Global Biotechnology Product Registration: E.U., U.S. Product Regulation | 5 QH |
| RGA 6221 | European Union Compliance Process and Regulatory Affairs | 4 QH |
| RGA 6222 | European Medical Device Regulations | 4 QH |
| RGA 6223 | Introduction to Canadian, Asian, and Latin American Regulatory Affairs | 4 QH |
| RGA 6225 | Japanese Medical Device Regulations and Registration | 4 QH |
| RGA 6226 | Canadian and Australian Medical Device Regulations | 4 QH |

### OPEN ELECTIVE

Complete one of the following three options (4 quarter hours):

***Personal and Career Development***

| | | |
|---|---|---|
| COP 6940 | Personal and Career Development | 1 to 4 QH |
| RGA 6920 | Internship Reflection | 1 QH |

***Integrative Experiential Learning***

| | | |
|---|---|---|
| INT 6943 | Integrative Experiential Learning | 3 QH |
| COP 6942 | Strategies for Professional Growth | 1 QH |

***Additional Course***

Complete one of the following courses:

| | | |
|---|---|---|
| BTC 6210 | Human Experimentation: Methodological Issues Fundamentals | 4 QH |
| BTC 6211 | Validation and Auditing of Clinical Trial Information | 4 QH |
| BTC 6213 | Clinical Trial Design Optimization and Problem Solving | 4 QH |
| BTC 6260 | The Business of Medicine and Biotechnology | 4 QH |
| PMC 6212 | Clinical Drug Development Data Analysis: Concepts | 4 QH |
| RGA 6112 | Biomedical Intellectual Property Management: Patents | 4 QH |
| RGA 6205 | Emerging Trends and Issues in the Medical Device Industry | 4 QH |
| RGA 6206 | Practical Aspects of Regulatory Compliance | 4 QH |
| RGA 6210 | Strategic Planning and Project Management for Regulatory Affairs | 4 QH |
| RGA 6211 | Combination Products and Convergence | 4 QH |
| RGA 6212 | Safety Sciences 1: Introduction to Safety and Surveillance | 4 QH |
| RGA 6215 | Project Management in Early Drug Discovery and Development | 4 QH |
| RGA 6216 | The Medical, Social, and Financial Dimensions of Orphan Drugs | 4 QH |
| RGA 6217 | Biomedical Product Development: From Biotech to Boardroom to Market | 4 QH |
| RGA 6219 | The Advertising and Promotion of Drug and Medical Device Products | 4 QH |
| RGA 6220 | Global Biotechnology Product Registration: E.U., U.S. Product Regulation | 5 QH |
| RGA 6221 | European Union Compliance Process and Regulatory Affairs | 4 QH |
| RGA 6222 | European Medical Device Regulations | 4 QH |
| RGA 6223 | Introduction to Canadian, Asian, and Latin American Regulatory Affairs | 4 QH |
| RGA 6225 | Japanese Medical Device Regulations and Registration | 4 QH |
| RGA 6226 | Canadian and Australian Medical Device Regulations | 4 QH |
| RGA 6227 | Emerging Medical Device Markets | 4 QH |
| RGA 6228 | Managing International Clinical Trials | 4 QH |
| RGA 6230 | Clinical Laboratory Management in Clinical Trials | 4 QH |
| RGA 6233 | Application of Quality System Regulation in Medical Device Design and Manufacturing | 4 QH |
| RGA 6234 | Drug and Device Supplier Risk Management: Compliance and Processes | 4 QH |
| RGA 6235 | Emerging Product Categories in the Regulation of Drugs and Biologics | 4 QH |
| RGA 6245 | Regulation of Generic Pharmaceutical and Biosimilar Products | 4 QH |
| RGA 6250 | Financing and Reimbursement in Biomedical Product Development | 4 QH |
| RGA 6280 | Advanced Writing on International Biomedical Topics | 4 QH |
| TCC 6310 | Regulatory Documentation Processes | 4 QH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

45 total quarter hours required

Minimum 3.000 GPA required

## MS in Regulatory Affairs for Drugs, Biologics, and Medical Devices with Concentration in Regulatory Compliance

Complete all courses and requirements listed below unless otherwise indicated.

**REQUIRED COURSES**

| | | |
|---|---|---|
| RGA 6100 | Introduction to Drug and Medical Device Regulation | 4 QH |
| RGA 6201 | New Drug Development: A Regulatory Overview | 4 QH |
| RGA 6202 | Medical Device Development: A Regulatory Overview | 4 QH |
| RGA 6200 | Biologics Development: A Regulatory Overview | 4 QH |
| RGA 6203 | Food, Drug, and Medical Device Law: Topics and Cases | 5 QH |
| RGA 6206 | Practical Aspects of Regulatory Compliance | 4 QH |

**REGULATORY AND CLINICAL OPERATIONS**

Complete one of the following courses:

| | | |
|---|---|---|
| BTC 6211 | Validation and Auditing of Clinical Trial Information | 4 QH |
| BTC 6213 | Clinical Trial Design Optimization and Problem Solving | 4 QH |
| RGA 6212 | Safety Sciences 1: Introduction to Safety and Surveillance | 4 QH |
| RGA 6230 | Clinical Laboratory Management in Clinical Trials | 4 QH |
| RGA 6234 | Drug and Device Supplier Risk Management: Compliance and Processes | 4 QH |
| RGA 6280 | Advanced Writing on International Biomedical Topics | 4 QH |

## REGULATORY PERSPECTIVE

Complete one of the following courses:

| | | |
|---|---|---|
| BTC 6260 | The Business of Medicine and Biotechnology | 4 QH |
| RGA 6205 | Emerging Trends and Issues in the Medical Device Industry | 4 QH |
| RGA 6210 | Strategic Planning and Project Management for Regulatory Affairs | 4 QH |
| RGA 6211 | Combination Products and Convergence | 4 QH |
| RGA 6217 | Biomedical Product Development: From Biotech to Boardroom to Market | 4 QH |
| RGA 6235 | Emerging Product Categories in the Regulation of Drugs and Biologics | 4 QH |
| RGA 6245 | Regulation of Generic Pharmaceutical and Biosimilar Products | 4 QH |

## INTERNATIONAL COURSE

Complete one of the following courses:

| | | |
|---|---|---|
| RGA 6221 | European Union Compliance Process and Regulatory Affairs | 4 QH |
| RGA 6222 | European Medical Device Regulations | 4 QH |
| RGA 6223 | Introduction to Canadian, Asian, and Latin American Regulatory Affairs | 4 QH |
| RGA 6225 | Japanese Medical Device Regulations and Registration | 4 QH |
| RGA 6226 | Canadian and Australian Medical Device Regulations | 4 QH |

## ADDITIONAL CONCENTRATION COURSE

Complete one of the following courses:

| | | |
|---|---|---|
| BTC 6211 | Validation and Auditing of Clinical Trial Information | 4 QH |
| BTC 6213 | Clinical Trial Design Optimization and Problem Solving | 4 QH |
| BTC 6260 | The Business of Medicine and Biotechnology | 4 QH |
| RGA 6205 | Emerging Trends and Issues in the Medical Device Industry | 4 QH |
| RGA 6210 | Strategic Planning and Project Management for Regulatory Affairs | 4 QH |
| RGA 6211 | Combination Products and Convergence | 4 QH |
| RGA 6212 | Safety Sciences 1: Introduction to Safety and Surveillance | 4 QH |
| RGA 6217 | Biomedical Product Development: From Biotech to Boardroom to Market | 4 QH |
| RGA 6221 | European Union Compliance Process and Regulatory Affairs | 4 QH |
| RGA 6222 | European Medical Device Regulations | 4 QH |
| RGA 6223 | Introduction to Canadian, Asian, and Latin American Regulatory Affairs | 4 QH |
| RGA 6225 | Japanese Medical Device Regulations and Registration | 4 QH |
| RGA 6226 | Canadian and Australian Medical Device Regulations | 4 QH |
| RGA 6230 | Clinical Laboratory Management in Clinical Trials | 4 QH |
| RGA 6234 | Drug and Device Supplier Risk Management: Compliance and Processes | 4 QH |
| RGA 6235 | Emerging Product Categories in the Regulation of Drugs and Biologics | 4 QH |
| RGA 6245 | Regulation of Generic Pharmaceutical and Biosimilar Products | 4 QH |
| RGA 6280 | Advanced Writing on International Biomedical Topics | 4 QH |

## OPEN ELECTIVE

Complete one of the following three options (4 quarter hours):

***Personal and Career Development***

| | | |
|---|---|---|
| COP 6940 | Personal and Career Development | 1 to 4 QH |
| RGA 6920 | Internship Reflection | 1 QH |

***Integrative Experiential Learning***

| | | |
|---|---|---|
| INT 6943 | Integrative Experiential Learning | 3 QH |
| COP 6942 | Strategies for Professional Growth | 1 QH |

***Additional Course***

Complete one of the following courses:

| | | |
|---|---|---|
| BTC 6210 | Human Experimentation: Methodological Issues Fundamentals | 4 QH |
| BTC 6211 | Validation and Auditing of Clinical Trial Information | 4 QH |
| BTC 6213 | Clinical Trial Design Optimization and Problem Solving | 4 QH |
| BTC 6260 | The Business of Medicine and Biotechnology | 4 QH |
| PMC 6212 | Clinical Drug Development Data Analysis: Concepts | 4 QH |
| RGA 6112 | Biomedical Intellectual Property Management: Patents | 4 QH |
| RGA 6205 | Emerging Trends and Issues in the Medical Device Industry | 4 QH |
| RGA 6210 | Strategic Planning and Project Management for Regulatory Affairs | 4 QH |
| RGA 6211 | Combination Products and Convergence | 4 QH |
| RGA 6212 | Safety Sciences 1: Introduction to Safety and Surveillance | 4 QH |
| RGA 6215 | Project Management in Early Drug Discovery and Development | 4 QH |
| RGA 6216 | The Medical, Social, and Financial Dimensions of Orphan Drugs | 4 QH |
| RGA 6217 | Biomedical Product Development: From Biotech to Boardroom to Market | 4 QH |

| | | |
|---|---|---|
| RGA 6219 | The Advertising and Promotion of Drug and Medical Device Products | 4 QH |
| RGA 6220 | Global Biotechnology Product Registration: E.U., U.S. Product Regulation | 5 QH |
| RGA 6221 | European Union Compliance Process and Regulatory Affairs | 4 QH |
| RGA 6222 | European Medical Device Regulations | 4 QH |
| RGA 6223 | Introduction to Canadian, Asian, and Latin American Regulatory Affairs | 4 QH |
| RGA 6225 | Japanese Medical Device Regulations and Registration | 4 QH |
| RGA 6226 | Canadian and Australian Medical Device Regulations | 4 QH |
| RGA 6227 | Emerging Medical Device Markets | 4 QH |
| RGA 6228 | Managing International Clinical Trials | 4 QH |
| RGA 6230 | Clinical Laboratory Management in Clinical Trials | 4 QH |
| RGA 6233 | Application of Quality System Regulation in Medical Device Design and Manufacturing | 4 QH |
| RGA 6234 | Drug and Device Supplier Risk Management: Compliance and Processes | 4 QH |
| RGA 6235 | Emerging Product Categories in the Regulation of Drugs and Biologics | 4 QH |
| RGA 6245 | Regulation of Generic Pharmaceutical and Biosimilar Products | 4 QH |
| RGA 6250 | Financing and Reimbursement in Biomedical Product Development | 4 QH |
| RGA 6280 | Advanced Writing on International Biomedical Topics | 4 QH |
| TCC 6310 | Regulatory Documentation Processes | 4 QH |
| TCC 6370 | Regulatory Writing: Medical Device Submissions | 4 QH |
| TCC 6380 | Regulatory Writing: New Drug Applications | 4 QH |

### PROGRAM CREDIT/GPA REQUIREMENTS

45 total quarter hours required
Minimum 3.000 GPA required

## MS in Regulatory Affairs for Drugs, Biologics, and Medical Devices with Concentration in Strategic Regulatory Affairs

Complete all courses and requirements listed below unless otherwise indicated.

### REQUIRED COURSES

| | | |
|---|---|---|
| RGA 6201 | New Drug Development: A Regulatory Overview | 4 QH |
| RGA 6202 | Medical Device Development: A Regulatory Overview | 4 QH |
| RGA 6200 | Biologics Development: A Regulatory Overview | 4 QH |
| RGA 6203 | Food, Drug, and Medical Device Law: Topics and Cases | 5 QH |
| RGA 6217 | Biomedical Product Development: From Biotech to Boardroom to Market | 4 QH |

### REGULATORY AND CLINICAL OPERATIONS

Complete one of the following courses:

| | | |
|---|---|---|
| BTC 6210 | Human Experimentation: Methodological Issues Fundamentals | 4 QH |
| BTC 6211 | Validation and Auditing of Clinical Trial Information | 4 QH |
| BTC 6213 | Clinical Trial Design Optimization and Problem Solving | 4 QH |
| RGA 6212 | Safety Sciences 1: Introduction to Safety and Surveillance | 4 QH |
| RGA 6280 | Advanced Writing on International Biomedical Topics | 4 QH |

### REGULATORY PERSPECTIVE

Complete one of the following courses:

| | | |
|---|---|---|
| BTC 6260 | The Business of Medicine and Biotechnology | 4 QH |
| RGA 6205 | Emerging Trends and Issues in the Medical Device Industry | 4 QH |
| RGA 6210 | Strategic Planning and Project Management for Regulatory Affairs | 4 QH |
| RGA 6211 | Combination Products and Convergence | 4 QH |
| RGA 6112 | Biomedical Intellectual Property Management: Patents | 4 QH |
| RGA 6216 | The Medical, Social, and Financial Dimensions of Orphan Drugs | 4 QH |
| RGA 6235 | Emerging Product Categories in the Regulation of Drugs and Biologics | 4 QH |
| RGA 6245 | Regulation of Generic Pharmaceutical and Biosimilar Products | 4 QH |
| RGA 6250 | Financing and Reimbursement in Biomedical Product Development | 4 QH |

### INTERNATIONAL COURSE

Complete one of the following courses:

| | | |
|---|---|---|
| RGA 6220 | Global Biotechnology Product Registration: E.U., U.S. Product Regulation | 5 QH |
| RGA 6221 | European Union Compliance Process and Regulatory Affairs | 4 QH |
| RGA 6222 | European Medical Device Regulations | 4 QH |
| RGA 6223 | Introduction to Canadian, Asian, and Latin American Regulatory Affairs | 4 QH |
| RGA 6225 | Japanese Medical Device Regulations and Registration | 4 QH |
| RGA 6226 | Canadian and Australian Medical Device Regulations | 4 QH |

## ADDITIONAL CONCENTRATION COURSES

Complete two of the following courses:

| | | |
|---|---|---|
| BTC 6210 | Human Experimentation: Methodological Issues Fundamentals | 4 QH |
| BTC 6211 | Validation and Auditing of Clinical Trial Information | 4 QH |
| BTC 6213 | Clinical Trial Design Optimization and Problem Solving | 4 QH |
| BTC 6260 | The Business of Medicine and Biotechnology | 4 QH |
| RGA 6112 | Biomedical Intellectual Property Management: Patents | 4 QH |
| RGA 6205 | Emerging Trends and Issues in the Medical Device Industry | 4 QH |
| RGA 6210 | Strategic Planning and Project Management for Regulatory Affairs | 4 QH |
| RGA 6211 | Combination Products and Convergence | 4 QH |
| RGA 6212 | Safety Sciences 1: Introduction to Safety and Surveillance | 4 QH |
| RGA 6216 | The Medical, Social, and Financial Dimensions of Orphan Drugs | 4 QH |
| RGA 6220 | Global Biotechnology Product Registration: E.U., U.S. Product Regulation | 5 QH |
| RGA 6221 | European Union Compliance Process and Regulatory Affairs | 4 QH |
| RGA 6222 | European Medical Device Regulations | 4 QH |
| RGA 6223 | Introduction to Canadian, Asian, and Latin American Regulatory Affairs | 4 QH |
| RGA 6225 | Japanese Medical Device Regulations and Registration | 4 QH |
| RGA 6226 | Canadian and Australian Medical Device Regulations | 4 QH |
| RGA 6235 | Emerging Product Categories in the Regulation of Drugs and Biologics | 4 QH |
| RGA 6245 | Regulation of Generic Pharmaceutical and Biosimilar Products | 4 QH |
| RGA 6250 | Financing and Reimbursement in Biomedical Product Development | 4 QH |
| RGA 6280 | Advanced Writing on International Biomedical Topics | 4 QH |

## OPEN ELECTIVE

Complete one of the following three options (4 quarter hours):

***Personal and Career Development***

| | | |
|---|---|---|
| COP 6940 | Personal and Career Development | 1 to 4 QH |
| RGA 6920 | Internship Reflection | 1 QH |

***Integrative Experiential Learning***

| | | |
|---|---|---|
| INT 6943 | Integrative Experiential Learning | 3 QH |
| COP 6942 | Strategies for Professional Growth | 1 QH |

***Additional Course***

Complete one of the following courses:

| | | |
|---|---|---|
| BTC 6210 | Human Experimentation: Methodological Issues Fundamentals | 4 QH |
| BTC 6211 | Validation and Auditing of Clinical Trial Information | 4 QH |
| BTC 6213 | Clinical Trial Design Optimization and Problem Solving | 4 QH |
| BTC 6260 | The Business of Medicine and Biotechnology | 4 QH |
| PMC 6212 | Clinical Drug Development Data Analysis: Concepts | 4 QH |
| RGA 6112 | Biomedical Intellectual Property Management: Patents | 4 QH |
| RGA 6203 | Food, Drug, and Medical Device Law: Topics and Cases | 5 QH |
| RGA 6205 | Emerging Trends and Issues in the Medical Device Industry | 4 QH |
| RGA 6206 | Practical Aspects of Regulatory Compliance | 4 QH |
| RGA 6210 | Strategic Planning and Project Management for Regulatory Affairs | 4 QH |
| RGA 6211 | Combination Products and Convergence | 4 QH |
| RGA 6212 | Safety Sciences 1: Introduction to Safety and Surveillance | 4 QH |
| RGA 6215 | Project Management in Early Drug Discovery and Development | 4 QH |
| RGA 6216 | The Medical, Social, and Financial Dimensions of Orphan Drugs | 4 QH |
| RGA 6219 | The Advertising and Promotion of Drug and Medical Device Products | 4 QH |
| RGA 6220 | Global Biotechnology Product Registration: E.U., U.S. Product Regulation | 5 QH |
| RGA 6221 | European Union Compliance Process and Regulatory Affairs | 4 QH |
| RGA 6222 | European Medical Device Regulations | 4 QH |
| RGA 6223 | Introduction to Canadian, Asian, and Latin American Regulatory Affairs | 4 QH |
| RGA 6225 | Japanese Medical Device Regulations and Registration | 4 QH |
| RGA 6226 | Canadian and Australian Medical Device Regulations | 4 QH |
| RGA 6227 | Emerging Medical Device Markets | 4 QH |
| RGA 6228 | Managing International Clinical Trials | 4 QH |
| RGA 6230 | Clinical Laboratory Management in Clinical Trials | 4 QH |
| RGA 6233 | Application of Quality System Regulation in Medical Device Design and Manufacturing | 4 QH |

| | | |
|---|---|---|
| RGA 6234 | Drug and Device Supplier Risk Management: Compliance and Processes | 4 QH |
| RGA 6235 | Emerging Product Categories in the Regulation of Drugs and Biologics | 4 QH |
| RGA 6245 | Regulation of Generic Pharmaceutical and Biosimilar Products | 4 QH |
| RGA 6250 | Financing and Reimbursement in Biomedical Product Development | 4 QH |
| RGA 6280 | Advanced Writing on International Biomedical Topics | 4 QH |
| TCC 6310 | Regulatory Documentation Processes | 4 QH |
| TCC 6370 | Regulatory Writing: Medical Device Submissions | 4 QH |
| TCC 6380 | Regulatory Writing: New Drug Applications | 4 QH |

### PROGRAM CREDIT/GPA REQUIREMENTS

45 total quarter hours required
Minimum 3.000 GPA required

## REMOTE SENSING

### Graduate Certificate in Remote Sensing

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.

Complete all courses and requirements listed below unless otherwise indicated.

### CORE COURSES

| | | |
|---|---|---|
| RMS 5105 | Fundamentals of Remote Sensing | 3 QH |
| RMS 6110 | Digital Image Processing | 3 QH |

### REMOTE SENSING ELECTIVES

Complete four of the following courses:

| | | |
|---|---|---|
| RMS 6210 | Technology, Operations, and Requirements for Drones, Helicopters, and Airplanes | 3 QH |
| RMS 6220 | Geographic Information Systems for Remote Sensing | 3 QH |
| RMS 6230 | Remote Sensing and Global Change | 3 QH |
| RMS 6240 | Introduction to Radar and LIDAR Remote Sensing | 3 QH |
| RMS 6250 | Remote Sensing of Vegetation | 3 QH |
| RMS 6260 | Remote Sensing for Archaeology | 3 QH |
| RMS 6270 | Remote Sensing for Disaster Management | 3 QH |
| RMS 6280 | Automated Feature Extraction for the Geospatial Professional | 3 QH |
| RMS 6290 | Spectroscopic Image Analysis | 3 QH |
| RMS 6292 | Photogrammetry and GPS | 3 QH |

### PROGRAM CREDIT/GPA REQUIREMENTS

18 total quarter hours required
Minimum 3.000 GPA required

# RESPIRATORY CARE

## Master of Science in Respiratory Care Leadership

Emerging environmental issues, recent technological advances, and a growing elderly population are escalating the need for skilled respiratory therapists. To be successful, today's respiratory care leaders must be skilled educators, practitioners, and case managers. In response, Northeastern University's College of Professional Studies has developed the Master of Science in Respiratory Care Leadership.

Created for practicing respiratory therapists, this master's degree in respiratory care incorporates an action-learning approach that seeks to build leadership competencies and to advance your clinical knowledge. Core respiratory care courses cover areas such as advanced cardiopulmonary physiology and research design. In addition, you have the opportunity to focus your studies in one of six concentrations: adult and organizational learning, clinical trial design, health management, higher education administration, nonprofit management, and regulatory affairs.

## MS in Respiratory Care Leadership

Complete all courses and requirements listed below unless otherwise indicated.

### REQUIRED RESPIRATORY CARE COURSES

| | | |
|---|---|---|
| RPT 7200 | Advanced Cardiopulmonary Physiology | 3 QH |
| RPT 7205 | The Evolving Roles of Respiratory Care Professionals | 3 QH |
| RPT 7210 | Research Design | 4 QH |
| RPT 7215 | Applied Research in Respiratory Care | 3 QH |
| RPT 7300 | Development of Clinical Practice Guidelines and Respiratory Care Protocols | 4 QH |
| RPT 7302 | Respiratory Therapist Education | 4 QH |
| RPT 6970 | Seminar | 1 to 4 QH |

### REQUIRED LEADERSHIP COURSES

Complete two of the following courses:

| | | |
|---|---|---|
| LDR 6100 | Developing Your Leadership Capability | 3 to 6 QH |
| LDR 6110 | Leading Teams | 3 to 6 QH |
| LDR 6135 | Ethical Leadership | 3 QH |
| LDR 6140 | Strategic Leadership | 3 to 6 QH |

### CONCENTRATION

Complete one of the following three concentrations:

***Concentration in Adult and Organizational Learning***

Complete four of the following courses:

| | | |
|---|---|---|
| EDU 6051 | Culture, Equity, Power, and Influence | 4 QH |
| EDU 6201 | The Landscape of Higher Education | 4 QH |
| EDU 6202 | Faculty, Curriculum, and Academic Community | 4 QH |
| EDU 6221 | Enrollment, Retention, Graduation, Success | 4 QH |
| EDU 6319 | How People Learn | 4 QH |
| EDU 6323 | Technology as a Medium for Learning | 4 QH |
| EDU 6447 | The Demographics of Higher Education | 4 QH |

***Concentration in Clinical Trial Design***

Complete four of the following courses:

| | | |
|---|---|---|
| BTC 6210 | Human Experimentation: Methodological Issues Fundamentals | 4 QH |
| BTC 6211 | Validation and Auditing of Clinical Trial Information | 4 QH |
| BTC 6213 | Clinical Trial Design Optimization and Problem Solving | 4 QH |
| BTC 6260 | The Business of Medicine and Biotechnology | 4 QH |
| RGA 6100 | Introduction to Drug and Medical Device Regulation | 4 QH |
| RGA 6202 | Medical Device Development: A Regulatory Overview | 4 QH |
| RGA 6205 | Emerging Trends and Issues in the Medical Device Industry | 4 QH |

***Concentration in Health Management***

Complete five of the following courses:

| | | |
|---|---|---|
| HMG 6110 | Organization, Administration, Financing, and History of Healthcare | 3 QH |
| HMG 6120 | Human Resource Management in Healthcare | 3 QH |
| HMG 6130 | Healthcare Strategic Management | 3 QH |
| HMG 6140 | Principles of Population-Based Management | 3 QH |
| HMG 6160 | Healthcare Information Systems Management | 3 QH |
| HMG 6170 | Health Law, Politics, and Policy | 3 QH |
| NPM 6120 | Financial Management for Nonprofit Organizations | 3 QH |
| NPM 6125 | Promoting Nonprofit Organizations | 3 QH |
| NPM 6130 | Fund-Raising and Development for Nonprofit Organizations | 3 QH |

### PROGRAM CREDIT/GPA REQUIREMENTS

45 total quarter hours required

Minimum 3.000 GPA required

# TECHNICAL COMMUNICATION

## Master of Science in Technical Communication

A proliferation of new technologies and applications has heightened the call for professionals who can communicate complex technical ideas succinctly and articulately. In response, Northeastern University's College of Professional Services offers the Master of Science in Technical Communication.

This online master's degree is designed to improve your technical communication skills and to provide you with a foundation for applying those skills across a variety of contexts. With two concentrations from which to choose—biomedical writing or computer industry writing—this graduate degree in technical communication seeks to prepare you for a rewarding career as a technical writer, editor, tool expert, or technical trainer.

## MS in Technical Communication

Complete all courses and requirements listed below unless otherwise indicated.

### REQUIRED COURSES

| | | |
|---|---|---|
| TCC 6100 | Introduction to Technical and Professional Writing | 4 QH |
| TCC 6102 | Editing Technical Content | 4 QH |
| TCC 6110 | Information Architecture | 4 QH |
| TCC 6120 | Usability and User Experience | 4 QH |

The following course should be taken last:

| | | |
|---|---|---|
| TCC 6850 | Technical Communications Capstone Project | 4 QH |

### CONCENTRATION

Complete one of the following two concentrations:

***Concentration in Computer Industry Writing***

REQUIRED COURSES

Complete four of the following courses:

| | | |
|---|---|---|
| TCC 6430 | Writing for the Computer Industry | 4 QH |
| TCC 6440 | Advanced Writing for the Computer Industry | 4 QH |
| TCC 6400 | Structured Documentation | 4 QH |
| TCC 6450 | Managing Technical Publications | 4 QH |
| TCC 6410 | Online Documentation | 4 QH |
| TCC 6520 | Marketing Writing | 4 QH |

OPEN ELECTIVES

Complete 10 quarter hours from the following courses:

| | | |
|---|---|---|
| TCC 6310 | Regulatory Documentation Processes | 4 QH |
| TCC 6370 | Regulatory Writing: Medical Device Submissions | 4 QH |
| TCC 6380 | Regulatory Writing: New Drug Applications | 4 QH |
| TCC 6400 | Structured Documentation | 4 QH |
| TCC 6410 | Online Documentation | 4 QH |
| TCC 6430 | Writing for the Computer Industry | 4 QH |
| TCC 6440 | Advanced Writing for the Computer Industry | 4 QH |
| TCC 6450 | Managing Technical Publications | 4 QH |
| TCC 6470 | Web Accessibility for Technical Communicators | 4 QH |
| TCC 6460 | Information Management | 4 QH |
| TCC 6480 | Instructional Design for Technical Communicators | 4 QH |
| TCC 6520 | Marketing Writing | 4 QH |
| TCC 6610 | Prototyping | 2 QH |
| TCC 6620 | Collecting User Data | 2 QH |
| TCC 6630 | Introduction to XML | 2 QH |
| TCC 6640 | Wiki-Based Documentation | 2 QH |
| TCC 6710 | Content Strategy | 4 QH |
| TCC 6720 | Writing for Global Markets | 2 QH |
| DGM 6285 | Interactive Marketing Fundamentals | 4 QH |
| DGM 6290 | Social Media and Brand Strategy Implementation | 4 QH |
| DGM 6500 | Working with Digital Images | 2 QH |
| DGM 6501 | Web Creation Boot Camp | 2 QH |
| DGM 6503 | Flash Intensive | 2 QH |
| DGM 6506 | Introduction to Digital Video | 2 QH |
| DGM 6509 | Integrated Suite Workshop | 2 QH |
| DGM 6511 | Web Creation Bootcamp 2 | 2 QH |
| CMN 6035 | Legal, Policy, and Ethical Issues in the Digital Era | 3 QH |
| CMN 6045 | Leveraging Digital Technologies: Strategy, Assessment, and Governance | 3 QH |
| CMN 6065 | Implementation and Management of Social Media Channels and Online Communities | 3 QH |

***Concentration in Social Media and Online Communities***

REQUIRED COURSE

| | | |
|---|---|---|
| TCC 6710 | Content Strategy | 4 QH |

ADDITIONAL REQUIRED COURSES

Complete four of the following courses:

| | | |
|---|---|---|
| CMN 6035 | Legal, Policy, and Ethical Issues in the Digital Era | 3 QH |
| CMN 6045 | Leveraging Digital Technologies: Strategy, Assessment, and Governance | 3 QH |
| CMN 6065 | Implementation and Management of Social Media Channels and Online Communities | 3 QH |
| DGM 6285 | Interactive Marketing Fundamentals | 4 QH |
| DGM 6290 | Social Media and Brand Strategy Implementation | 4 QH |

OPEN ELECTIVES

Complete 8–10 quarter hours from the following courses:

| | | |
|---|---|---|
| TCC 6310 | Regulatory Documentation Processes | 4 QH |
| TCC 6370 | Regulatory Writing: Medical Device Submissions | 4 QH |

| | | |
|---|---|---|
| TCC 6380 | Regulatory Writing: New Drug Applications | 4 QH |
| TCC 6400 | Structured Documentation | 4 QH |
| TCC 6410 | Online Documentation | 4 QH |
| TCC 6430 | Writing for the Computer Industry | 4 QH |
| TCC 6440 | Advanced Writing for the Computer Industry | 4 QH |
| TCC 6450 | Managing Technical Publications | 4 QH |
| TCC 6470 | Web Accessibility for Technical Communicators | 4 QH |
| TCC 6460 | Information Management | 4 QH |
| TCC 6480 | Instructional Design for Technical Communicators | 4 QH |
| TCC 6520 | Marketing Writing | 4 QH |
| TCC 6610 | Prototyping | 2 QH |
| TCC 6620 | Collecting User Data | 2 QH |
| TCC 6630 | Introduction to XML | 2 QH |
| TCC 6640 | Wiki-Based Documentation | 2 QH |
| TCC 6720 | Writing for Global Markets | 2 QH |
| DGM 6285 | Interactive Marketing Fundamentals | 4 QH |
| DGM 6290 | Social Media and Brand Strategy Implementation | 4 QH |
| DGM 6500 | Working with Digital Images | 2 QH |
| DGM 6501 | Web Creation Boot Camp | 2 QH |
| DGM 6503 | Flash Intensive | 2 QH |
| DGM 6506 | Introduction to Digital Video | 2 QH |
| DGM 6509 | Integrated Suite Workshop | 2 QH |
| DGM 6511 | Web Creation Bootcamp 2 | 2 QH |
| CMN 6035 | Legal, Policy, and Ethical Issues in the Digital Era | 3 QH |
| CMN 6045 | Leveraging Digital Technologies: Strategy, Assessment, and Governance | 3 QH |
| CMN 6065 | Implementation and Management of Social Media Channels and Online Communities | 3 QH |

## PROGRAM CREDIT/GPA REQUIREMENTS

46 total quarter hours required
Minimum 3.000 GPA required

# College of Science

www.northeastern.edu/cos/graduate

**JONATHAN TILLY, PHD,** *Interim Dean*

**George O. Alverson, PhD,** *Associate Dean, Academic Affairs*
**David E. Budil, PhD,** *Associate Dean, Research*
**Frederick C. Davis, PhD,** *Associate Dean, Faculty Affairs*
**James Sarazen, MBA,** *Associate Dean, Administration and Finance*

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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 academy, government, or private sector.

Sixteen degrees are awarded in the College of Science at the graduate level. The Master of Science degree is awarded in biology, bioinformatics, biotechnology, marine biology, chemistry, mathematics, applied mathematics, operations research, and physics.

The Doctor of Philosophy degree is available in biology; chemistry; ecology, evolution, and marine biology; mathematics; network science; physics; and psychology.

## 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 course work 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.

## 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.

## Transfer Credit

A student may petition to transfer up to 9 semester hours of his or her 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 a U.S. accredited institution, and have not been used toward any other degree. 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 9-semester-hour maximum 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 than 9 transfer credits.

## 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 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.

## 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 course work and the timely completion of course work and comprehensive/qualifying examinations. See also the university's policy on academic standing ("Minimum Cumulative Grade-Point Average").

## 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 course work, 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 Academic and Faculty Affairs has final approval of time limit extensions.

## Changes in Requirements

The continuing development of the College of Science graduate programs requires regular revision of curricula. When no hardship is imposed on the student because of changes and the facilities of the school permit, the student is expected to meet the most recent requirements. However, if it can be demonstrated to the Director of Graduate Student Services that doing so does impose a substantial hardship, the requirements of the year in which the student matriculated will be applicable.

## 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 course work 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 course work.

## 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 course work 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, course work 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 coordinator 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.

## 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.

## The Master's Degree Academic Requirements

A candidate for the master's degree must complete a minimum of 30 semester hours of graduate-level course work 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 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. Students who have not completed their thesis after having registered for the specified number of thesis credits must register and pay for Master's Continuation each subsequent semester until the thesis is approved and submitted to ProQuest. Master's Continuation will carry no credit but will be recorded on the student transcript with the appropriate grade (S or U) for each semester of registration. All students must be registered in the last semester of their program.

## 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.

# BIOLOGY

**www.northeastern.edu/biology**

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The biology PhD and MS programs seek to provide a broad background knowledge base in conjunction with in-depth study of a specialized area of biology. The programs emphasize close interaction between graduate students and faculty members in developing the intellectual and experimental skills required for creative, independent research. The professional science master's program in bioinformatics seeks to prepare students to enter the research management and technology transfer fields.

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. Financial support (teaching assistantships or research assistantships) is normally provided for PhD students who are making satisfactory progress toward completion of their degree. The MS program includes the same course work, research under faculty supervision, and completion of a written MS thesis.

The Master of Science in Bioinformatics is a professional program that consists of four parts: fundamental courses, core courses, an internship, and electives. All courses are available in the late afternoon or evening to accommodate those who are employed during the day.

## MS in Biology

Complete all courses and requirements listed below unless otherwise indicated.

### MILESTONES

Proposal
Committee
Defense

### CORE REQUIREMENTS

***Research Ethics***

| | | |
|---|---|---|
| BIOL 7399 | Research Problem Solving, Ethics, and Communication Skills | 4 SH |

***Required Biology Courses***

Complete 10 semester hours of the following courses, including (repeatable) BIOL 5100 taken twice:

| | | |
|---|---|---|
| BIOL 5100 | Biology Colloquium | 1 SH |
| BIOL 6303 | Neurobiology and Behavior | 4 SH |
| BIOL 6399 | Dynamics of Microbial Ecology | 4 SH |
| BIOL 6401 | Research Methods and Critical Analysis in Molecular Cell Biology | 4 SH |
| EEMB 6402 | Concepts and Trends in Evolution and Ecology | 4 SH |

***Thesis***

One semester hour required:

| | | |
|---|---|---|
| BIOL 7990 | Thesis | 1 to 4 SH |

### ELECTIVES

Complete four courses (15 semester hours) in the following range:
BIOL 5103 to BIOL 8674

### PROGRAM CREDIT/GPA REQUIREMENTS

30 total semester hours required
Minimum 3.000 GPA required

## MS in Bioinformatics

Complete all courses and requirements listed below unless otherwise indicated.

### CORE REQUIREMENTS

***Computational Methods***

| | | |
|---|---|---|
| BIOL 6308 | Bioinformatics Computational Methods 1 | 4 SH |
| BIOL 6309 | Bioinformatics Computational Methods 2 | 4 SH |

***Research and Seminar***

| | | |
|---|---|---|
| BIOL 6381 | Ethics in Biological Research | 2 SH |
| BIOL 7385 | Bioinformatics Seminar | 2 SH |

***Statistics and Programming***

| | | |
|---|---|---|
| BIOL 6200 | Bioinformatics Programming | 4 SH |
| MATH 7340 | Statistics for Bioinformatics | 4 SH |

***Co-op***

| | | |
|---|---|---|
| BIOL 8964 | Co-op Work Experience | 0 SH |

### ELECTIVES: BIOINFORMATICS

Complete three of the following courses (12 semester hours) chosen in consultation with your faculty advisor:
BIOL 5000 to BIOL 8000

| | | |
|---|---|---|
| BIOT 5120 | Introduction to Biotechnology | 3 SH |
| BIOT 5130 | Team Skills in Biotechnology | 2 SH |
| BIOT 5145 | Basic Biotechnology Lab Skills | 1 SH |
| BIOT 5219 | The Biotechnology Enterprise | 2 SH |
| BIOT 5560 | Bioprocess Fundamentals | 3 SH |

| | | |
|---|---|---|
| BIOT 5631 | Cell Culture Processes for Biopharmaceutical Production | 3 SH |
| BIOT 5700 | Molecular Interactions of Proteins in Biopharmaceutical Formulations | 3 SH |
| CHEM 5638 | Molecular Modeling | 3 SH |
| CS 5010 | Programming Design Paradigm | 4 SH |
| CS 5100 | Foundations of Artificial Intelligence | 4 SH |
| CS 5200 | Database Management Systems | 4 SH |
| CS 5400 | Principles of Programming Language | 4 SH |
| CS 5500 | Managing Software Development | 4 SH |
| CS 5600 | Computer Systems | 4 SH |
| CS 5610 | Web Development | 4 SH |
| CS 5700 | Fundamentals of Computer Networking | 4 SH |
| CS 5800 | Algorithms | 4 SH |
| CS 6140 | Machine Learning | 4 SH |
| CS 6200 | Information Retrieval | 4 SH |
| CS 6220 | Data Mining Techniques | 4 SH |
| DSCS 6020 | Collecting, Storing, and Retrieving Data | 4 SH |
| HINF 5101 | Introduction to Health Informatics and Health Information Systems | 3 SH |
| HINF 5200 | Theoretical Foundations in Personal Health Informatics | 4 SH |
| HINF 5300 | Personal Health Interface Design and Development | 4 SH |
| HINF 6205 | Creation and Application of Medical Knowledge | 3 SH |
| HINF 6220 | Database Design, Access, Modeling, and Security | 3 SH |
| HINF 6330 | Emerging Technologies in Healthcare | 3 SH |
| PHYS 5116 | Complex Networks and Applications | 4 SH |
| PHYS 7331 | Network Science Data | 4 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

32 total semester hours required
Minimum 3.000 GPA required

## PhD in Biology—Advanced Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

### MILESTONES

Qualifying exam
Annual review
Dissertation committee
Dissertation proposal
Colloquia (minimum of three)
First author publication
Dissertation defense

### GENERAL REQUIREMENTS

***Approved Course Work***

Consult your faculty advisor for acceptable courses.

***Approved Electives***

Consult your faculty advisor for acceptable electives.

### DISSERTATION COURSES

***Dissertation***

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| BIOL 9990 | Dissertation | 0 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

Variable total semester hours required
Minimum 3.000 GPA required

## PhD in Biology—Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

### MILESTONES

Qualifying exam
Annual review
Dissertation committee
Dissertation proposal
Colloquia (minimum of three)
First author publication
Dissertation defense

### CORE REQUIREMENTS

***Research Ethics***

| | | |
|---|---|---|
| BIOL 7399 | Research Problem Solving, Ethics, and Communication Skills | 4 SH |

***Required Biology Course Work***

Complete 10 semester hours of the following courses, including (repeatable) BIOL 5100 taken twice:

| | | |
|---|---|---|
| BIOL 5100 | Biology Colloquium | 1 SH |
| BIOL 6303 | Neurobiology and Behavior | 4 SH |
| BIOL 6399 | Dynamics of Microbial Ecology | 4 SH |
| BIOL 6401 | Research Methods and Critical Analysis in Molecular Cell Biology | 4 SH |
| EEMB 6402 | Concepts and Trends in Evolution and Ecology | 4 SH |

***Electives***

Complete four courses (16 semester hours) in the following range: BIOL 5103 to BIOL 8674

### DISSERTATION COURSES

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| BIOL 9990 | Dissertation | 0 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

30 total semester hours required
Minimum 3.000 GPA required

# CHEMISTRY AND CHEMICAL BIOLOGY

**www.northeastern.edu/chem**

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The department offers thesis- and non-thesis-based advanced degrees with concentrations in analytical, inorganic, organic, and physical chemistry and in interdisciplinary fields such as polymers, materials, and chemical biology.

The PhD program 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. The program of study includes some course work, but the primary emphasis is on the completion of an original research project, its articulation in a well-written thesis, and its subsequent defense before the thesis (oral examination) committee.

The PhD program is a full-time degree program that typically takes five years to complete. Financial support (teaching assistantships or research assistantships) is normally provided for students throughout their period of study if they are found to be making satisfactory progress toward their degree in accordance with departmental and university guidelines.

The BS in Biotechnology, a Professional Master of Science degree program, seeks to provide students with a common core of knowledge in biotechnology, with particular emphasis on their ability to integrate knowledge across disciplinary boundaries. Specific objectives are to provide students with didactic and practical knowledge in genomics, proteomics, and other bioanalytical approaches; drug discovery, development, and delivery; and bioprocess development and optimization.

## Special Student Status

Special student status allows students to take up to 12 semester hours of credit in graduate courses offered in the department without being enrolled in a degree program. Students who wish to then further their education in an MS or PhD program must apply to and be accepted into one of the graduate programs. Students who are successfully admitted into a degree program may apply for transfer credit (up to 12 semester hours) for course work taken as a special student.

## MS in Chemistry

Complete all courses and requirements listed below unless otherwise indicated.

### CORE COURSE WORK

Complete six of the following courses (18 semester hours):

| | | |
|---|---|---|
| CHEM 5550 | Introduction to Glycobiology and Glycoprotein Analysis | 3 SH |
| CHEM 5601 to CHEM 7000 | | |
| CHEM 7247 | Advances in Nanomaterials | 3 SH |

### OPTIONS

Complete one of the following options:

***Course Work Option***

Complete four of the following courses (12 semester hours):

| | | |
|---|---|---|
| CHEM 5601 to CHEM 7000 | | |
| CHEM 7247 | Advances in Nanomaterials | 3 SH |

***Thesis Option***

GRADUATE SEMINAR

Requires a letter grade:

| | | |
|---|---|---|
| CHEM 5904 | Seminar | 1 SH |

SKILLS AND ETHICS

| | | |
|---|---|---|
| CHEM 5600 | Research Skills and Ethics in Chemistry | 3 SH |

LABORATORY

| | | |
|---|---|---|
| CHEM 7730 | Advanced Laboratory Methods | 4 SH |

RESEARCH

Requires 6 semester hours:

| | | |
|---|---|---|
| CHEM 5984 | Research | 1 to 6 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

30 total semester hours required
Minimum 3.000 GPA required

## MS in Biotechnology

Complete all courses and requirements listed below unless otherwise indicated.

### CORE REQUIREMENTS

***Biotechnology and Chemistry***

| | | |
|---|---|---|
| BIOT 5120 | Introduction to Biotechnology | 3 SH |
| BIOT 5145 | Basic Biotechnology Lab Skills | 1 SH |
| BIOT 5631 | Cell Culture Processes for Biopharmaceutical Production | 3 SH |
| BIOT 7245 | Biotechnology Applications Laboratory | 3 SH |
| CHEM 5620 | Protein Chemistry | 3 SH |
| CHEM 5660 | Analytical Biochemistry | 3 SH |
| PHSC 6214 | Experimental Design and Biostatistics | 2 SH |
| BIOL 6299 | Molecular Cell Biology for Biotechnology | 3 SH |

***Biotechnology Business***

| | | |
|---|---|---|
| BIOT 5219 | The Biotechnology Enterprise | 2 SH |
| BIOT 5130 | Team Skills in Biotechnology | 2 SH |

***Elective***

Complete one course (3 semester hours) in the following subject areas, or complete any other graduate course approved by your faculty advisor:

BIOL, BIOT, CHEM, PHSC, PMST, CHME, BUSN, TECE, or ENTR

***Co-op***

| | | |
|---|---|---|
| BIOT 6500 | Professional Development for Co-op | 0 SH |
| BIOT 6964 | Co-op Work Experience | 0 SH |

### CONCENTRATION

Complete one of the following three concentrations:

***Biopharmaceutical Analytical Sciences Concentration***

| | | |
|---|---|---|
| CHEM 5550 | Introduction to Glycobiology and Glycoprotein Analysis | 3 SH |
| CHEM 5616 | Protein Mass Spectrometry | 3 SH |

***Pharmaceutical Technologies Concentration***

| | | |
|---|---|---|
| BIOT 5640 | Drug Product Processes for Biopharmaceuticals | 3 SH |
| BIOT 5700 | Molecular Interactions of Proteins in Biopharmaceutical Formulations | 3 SH |

***Process Sciences Concentration***

| | | |
|---|---|---|
| BIOT 5560 | Bioprocess Fundamentals | 3 SH |
| BIOT 5635 | Downstream Processes for Biopharmaceutical Production | 3 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

34 total semester hours required
Minimum 3.000 GPA required

## MS in Biotechnology—ALIGN Program

Complete all courses and requirements listed below unless otherwise indicated.

### BIOTECHNOLOGY ALIGN COURSE WORK

*Note:* One or both of the following courses may be required. Consult your faculty advisor for information:

***Chemistry***

| | | |
|---|---|---|
| BIOT 5040 | Fundamentals of Biochemistry for Biotechnology | 4 SH |
| BIOT 5050 | Organic Chemistry for Biotechnology | 4 SH |

### CORE REQUIREMENTS

***Biotechnology and Chemistry***

| | | |
|---|---|---|
| BIOT 5120 | Introduction to Biotechnology | 3 SH |
| BIOT 5145 | Basic Biotechnology Lab Skills | 1 SH |
| BIOT 5631 | Cell Culture Processes for Biopharmaceutical Production | 3 SH |
| BIOT 7245 | Biotechnology Applications Laboratory | 3 SH |
| CHEM 5620 | Protein Chemistry | 3 SH |
| CHEM 5660 | Analytical Biochemistry | 3 SH |
| PHSC 6214 | Experimental Design and Biostatistics | 2 SH |
| BIOL 6299 | Molecular Cell Biology for Biotechnology | 3 SH |

***Biotechnology Business***

| | | |
|---|---|---|
| BIOT 5219 | The Biotechnology Enterprise | 2 SH |
| BIOT 5130 | Team Skills in Biotechnology | 2 SH |

***Elective***

Complete one elective course (3 semester hours) in the following subject areas or any other graduate course approved by your faculty advisor:

BIOL, BIOT, CHEM, PHSC, PMST, CHME, BUSN, TECE, ENTR

***Co-op***

| | | |
|---|---|---|
| BIOT 6500 | Professional Development for Co-op | 0 SH |
| BIOT 6964 | Co-op Work Experience | 0 SH |

### CONCENTRATIONS

Complete one of the following concentrations:

***Biopharmaceutical Analytical Concentration***

| | | |
|---|---|---|
| CHEM 5550 | Introduction to Glycobiology and Glycoprotein Analysis | 3 SH |
| CHEM 5616 | Protein Mass Spectrometry | 3 SH |

***Pharmaceutical Technologies Concentration***

| | | |
|---|---|---|
| BIOT 5640 | Drug Product Processes for Biopharmaceuticals | 3 SH |
| BIOT 5700 | Molecular Interactions of Proteins in Biopharmaceutical Formulations | 3 SH |

***Process Sciences Concentration***

Complete two of the following courses:

| | | |
|---|---|---|
| BIOT 5560 | Bioprocess Fundamentals | 3 SH |
| BIOT 5631 | Cell Culture Processes for Biopharmaceutical Production | 3 SH |
| BIOT 5635 | Downstream Processes for Biopharmaceutical Production | 3 SH |
| BIOT 5640 | Drug Product Processes for Biopharmaceuticals | 3 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

34 total semester hours required
Minimum 3.000 GPA required

## PhD in Chemistry—Advanced Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

### MILESTONES

Three qualifying exams
Annual review
Candidacy
Dissertation committee
Minimum of three seminars
Dissertation defense

### GENERAL REQUIREMENTS

| | | |
|---|---|---|
| CHEM 5600 | Research Skills and Ethics in Chemistry | 3 SH |
| CHEM 7750 | Advanced Problem Solving | 3 SH |
| CHEM 8504 | Graduate Seminar | 1 SH |

### DISSERTATION

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| CHEM 9990 | Dissertation | 0 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

7 total semester hours required
Minimum 3.000 GPA required

## Graduate Certificate in Biopharmaceutical Analytical Science

Complete all courses and requirements listed below unless otherwise indicated.

### COURSE WORK

| | | |
|---|---|---|
| CHEM 5550 | Introduction to Glycobiology and Glycoprotein Analysis | 3 SH |
| CHEM 5660 | Analytical Biochemistry | 3 SH |
| CHEM 5616 | Protein Mass Spectrometry | 3 SH |
| CHEM 5617 | Protein Mass Spectrometry Laboratory | 3 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

12 total semester hours required
Minimum 3.000 GPA required

## PhD in Chemistry—Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

### MILESTONES

Three qualifying exams
Annual review
Candidacy
Dissertation committee
Minimum of three seminars
Dissertation defense

### GENERAL REQUIREMENTS

***Required Courses***

Requires 15 semester hours:

| | | |
|---|---|---|
| CHEM 5600 | Research Skills and Ethics in Chemistry | 3 SH |
| CHEM 7730 | Advanced Laboratory Methods | 4 SH |
| CHEM 7750 | Advanced Problem Solving | 3 SH |
| CHEM 8504 | Graduate Seminar | 1 SH |
| CHEM 8984 | Research | 1 to 6 SH |

***Chemistry Electives***

Complete six courses (18 semester hours) in the following range:
CHEM 5550 to CHEM 7750

### DISSERTATION

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| CHEM 9990 | Dissertation | 0 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

33 total semester hours required
Minimum 3.000 GPA required

# MARINE AND ENVIRONMENTAL SCIENCES

**www.northeastern.edu/mes**

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The Department of Marine and Environmental Sciences graduate program offerings include core capacities in marine biology, ecology, and evolution. Students benefit from top-notch research facilities at both the Marine Science Center and the main campus in Boston. The MS in Marine Biology program prepares students for entry- and mid-level careers in marine research. The doctoral program in ecology, evolution, and marine biology prepares graduates for careers in academia, government agencies, and the private sector.

## MS in Marine Biology—Three Seas Program

Complete all courses and requirements listed below unless otherwise indicated.

### REQUIREMENTS

***Fall Term 1***

| | | |
|---|---|---|
| ABRS 5120 | International Study—Three Seas Program | 0 to 20 SH |
| EEMB 5502 | Marine Invertebrate Zoology | 4 SH |
| EEMB 5522 | Experimental Design Marine Ecology | 4 SH |
| with EEMB 5523 | Lab for EEMB 5522 | 1 SH |
| EEMB 5589 | Diving Research Methods | 2 SH |
| EEMB 5516 | Oceanography | 4 SH |
| with EEMB 5517 | Lab for EEMB 5516 | 1 SH |
| EEMB 5534 | Marine Invertebrate Zoology and Botany | 4 SH |
| with EEMB 5535 | Lab for EEMB 5534 | 1 SH |

***Spring Term***

| | | |
|---|---|---|
| ABRS 5120 | International Study—Three Seas Program | 0 to 20 SH |
| EEMB 5504 | Biology of Corals | 3 SH |
| EEMB 5506 | Biology and Ecology of Fishes | 3 SH |
| EEMB 5508 | Marine Birds and Mammals | 2 SH |
| with EEMB 5509 | Lab for EEMB 5508 | 1 SH |
| EEMB 5512 | Tropical Terrestrial Ecology | 1 SH |
| EEMB 5518 | Ocean and Coastal Processes | 2 SH |
| EEMB 5520 | Coral Reef Ecology | 2 SH |

| | | |
|---|---|---|
| EEMB 5528 | Marine Conservation Biology | 3 SH |
| EEMB 5532 | Physiological and Molecular Marine Ecology | 3 SH |

***Summer Term***

Requires 1 semester hour:

| | | |
|---|---|---|
| EEMB 8674 | Marine Biology Research Project | 4 SH |

***Fall Term 2***

Requires 1 semester hour:

| | | |
|---|---|---|
| EEMB 8674 | Marine Biology Research Project | 4 SH |

## PROGRAM CREDIT/GPA REQUIREMENTS

43 total semester hours required

Minimum 3.000 GPA required

# MA in Environmental Science and Policy

Complete all courses and requirements listed below unless otherwise indicated.

## CONCENTRATION OPTIONS

This program requires a concentration. Complete one of the following concentrations:

- Climate change and coastal sustainability
- Environmental health
- Environmental policy and advocacy
- Urban development

Consult college administrator for more information.

## CORE COURSE WORK

***Proseminar***

Requires 6 semester hours:

| | | |
|---|---|---|
| ENVR XXXX | (pending approval) | |
| SOCL XXXX | (pending approval) | |

***Methods of Research***

Requires 12 semester hours:

| | | |
|---|---|---|
| EEMB 5130 | Ecological Dynamics | 4 SH |
| MATH XXXX | (pending approval) | |
| CRIM 7204 | Research and Evaluation Methods | 3 SH |
| POLS 7201 | Research Design | 3 SH |

***Capstone***

Requires 3 semester hours:

| | | |
|---|---|---|
| ENVR XXXX | (pending approval) | |

## CONCENTRATION

Complete one of the following concentrations:

***Concentration in Climate Change and Coastal Sustainability***

Complete three of the following courses (9 semester hours):

| | | |
|---|---|---|
| CIVE 5270 | Environmental Protection and Management | 4 SH |
| EEMB 5130 | Ecological Dynamics | 4 SH |
| EEMB 5536 | Ocean and Coastal Sustainability | 3 SH |
| ENVR XXXX | (pending approval) | |
| ENVR XXXX | (pending approval) | |
| ENVR XXXX | (pending approval) | |
| ENVR XXXX | (pending approval) | |
| PHIL 5003 | Ethics, Justice, and Global Climate Change | 4 SH |
| PPUA 5260 | Ecological Economics | 3 SH |
| SOCL XXXX | (pending approval) | |

***Concentration in Environmental Health***

Complete three of the following courses (9 semester hours):

| | | |
|---|---|---|
| CIVE 4538 | Urban Water Quality and Public Health | 4 SH |
| ENVR 5XXX | (pending approval) | |
| PHTH 5214 | Environmental Health | 3 SH |
| PHTH 5230 | Global Health | 3 SH |
| PHTH 5440 | Community-Based Participatory Research: Environmental Health | 3 SH |
| SOCL 7243 | Sociology of Health and Illness | 3 SH |
| SOCL 7257 | Contemporary Issues in Sociology | 3 SH |
| SOCL 7267 | Environment, Health, and Society | 3 SH |
| SOCL 7287 | Social Movements in Health | 3 SH |

***Concentration in Environmental Policy and Advocacy***

Complete three of the following courses (9 semester hours):

| | | |
|---|---|---|
| COMM 5XXX | (pending approval) | |
| LPSC 7311 | Strategizing Public Policy | 3 SH |
| LPSC 7312 | Cities, Sustainability, and Climate Change | 3 SH |
| LPSC XXXX | (pending approval) | |
| PHIL 5003 | Ethics, Justice, and Global Climate Change | 4 SH |
| PHTH 5440 | Community-Based Participatory Research: Environmental Health | 3 SH |
| POLS 7331 | Environmental Policy and Politics | 3 SH |
| PPUA 5260 | Ecological Economics | 3 SH |
| PPUA 5275 | Philanthropy and Civil Society | 3 SH |
| PPUA 6506 | Techniques of Policy Analysis | 3 SH |
| PPUA 6551 | Nonprofit Organizations and Social Change | 3 SH |
| PPUA 6552 | The Nonprofit Sector in Civil Society and Public Affairs | 3 SH |
| PPUA 6553 | Nonprofit Financial Resource Development | 3 SH |
| SOCL 7230 | Political Ecology of Global Capitalism | 3 SH |
| SOCL 7257 | Contemporary Issues in Sociology | 3 SH |
| SOCL 7287 | Social Movements in Health | 3 SH |
| SOCL XXXX | (pending approval) | |

***Concentration in Urban Development***

Complete three of the following courses (9 semester hours):

| | | |
|---|---|---|
| CIVE 4538 | Urban Water Quality and Public Health | 4 SH |
| CIVE 4566 | Design for Sustainable Transportation: European and U.S. Perspectives | 4 SH |
| EEMB 5536 | Ocean and Coastal Sustainability | 3 SH |
| ENVR 5210 | Environmental Planning | 4 SH |
| ENVR 5250 | Geology and Land-Use Planning | 4 SH |
| ENVR 5XXX | (pending approval) | |

| | | |
|---|---|---|
| LPSC 7312 | Cities, Sustainability, and Climate Change | 3 SH |
| PPUA 5260 | Ecological Economics | 3 SH |
| PPUA 5265 | Urban and Regional Policy in Developing Countries | 3 SH |
| PPUA 7230 | Housing Policy | 3 SH |
| SOCL 7235 | Urban Sociology | 3 SH |

**ELECTIVES**

Complete two of the following courses (6 semester hours).

Elective courses may not be applied toward the concentration:

| | | |
|---|---|---|
| CIVE 5270 | Environmental Protection and Management | 4 SH |
| EEMB 5130 | Ecological Dynamics | 4 SH |
| EEMB 5536 | Ocean and Coastal Sustainability | 3 SH |
| ENVR XXXX | (pending approval) | |
| ENVR XXXX | (pending approval) | |
| ENVR XXXX | (pending approval) | |
| ENVR XXXX | (pending approval) | |
| ENVR XXXX | (pending approval) | |
| PHIL 5003 | Ethics, Justice, and Global Climate Change | 4 SH |
| PPUA 5260 | Ecological Economics | 3 SH |
| SOCL XXXX | (pending approval) | |
| COMM 5XXX | (pending approval) | |
| LPSC 7311 | Strategizing Public Policy | 3 SH |
| LPSC 7312 | Cities, Sustainability, and Climate Change | 3 SH |
| LPSC XXXX | (pending approval) | |
| PHIL 5003 | Ethics, Justice, and Global Climate Change | 4 SH |
| PHTH 5440 | Community-Based Participatory Research: Environmental Health | 3 SH |
| POLS 7331 | Environmental Policy and Politics | 3 SH |
| PPUA 5260 | Ecological Economics | 3 SH |
| PPUA 5275 | Philanthropy and Civil Society | 3 SH |
| PPUA 6506 | Techniques of Policy Analysis | 3 SH |
| PPUA 6551 | Nonprofit Organizations and Social Change | 3 SH |
| PPUA 6552 | The Nonprofit Sector in Civil Society and Public Affairs | 3 SH |
| PPUA 6553 | Nonprofit Financial Resource Development | 3 SH |
| SOCL 7230 | Political Ecology of Global Capitalism | 3 SH |
| SOCL 7257 | Contemporary Issues in Sociology | 3 SH |
| SOCL 7287 | Social Movements in Health | 3 SH |
| SOCL XXXX | (pending approval) | |
| CIVE 4538 | Urban Water Quality and Public Health | 4 SH |
| ENVR 5XXX | (pending approval) | |
| PHTH 5214 | Environmental Health | 3 SH |
| PHTH 5230 | Global Health | 3 SH |
| PHTH 5440 | Community-Based Participatory Research: Environmental Health | 3 SH |
| SOCL 7243 | Sociology of Health and Illness | 3 SH |
| SOCL 7257 | Contemporary Issues in Sociology | 3 SH |
| SOCL 7267 | Environment, Health, and Society | 3 SH |
| SOCL 7287 | Social Movements in Health | 3 SH |
| CIVE 4538 | Urban Water Quality and Public Health | 4 SH |
| CIVE 4566 | Design for Sustainable Transportation: European and U.S. Perspectives | 4 SH |
| EEMB 5536 | Ocean and Coastal Sustainability | 3 SH |
| ENVR 5210 | Environmental Planning | 4 SH |
| ENVR 5250 | Geology and Land-Use Planning | 4 SH |
| ENVR 5XXX | (pending approval) | |
| LPSC 7312 | Cities, Sustainability, and Climate Change | 3 SH |
| PPUA 5260 | Ecological Economics | 3 SH |
| PPUA 5265 | Urban and Regional Policy in Developing Countries | 3 SH |
| PPUA 7230 | Housing Policy | 3 SH |
| SOCL 7235 | Urban Sociology | 3 SH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

36 total semester hours required

Minimum 3.000 GPA required

## Ecology, Evolution, and Marine Biology PhD Program

The PhD in Ecology, Evolution, and Marine Biology (EEMB) program provides students with advanced course work and training in ecology, evolution, and marine biology. For students entering with a bachelor's degree, EEMB program completion requires 30 semester hours of graduate-level course work, of which 20 semester hours must carry a letter grade. The remaining 10 semester hours must consist of colloquia, doctoral research, and approved graduate courses. Planned course work must be approved by the student's dissertation committee.

Students admitted with a master's degree must take two semesters of colloquium. Transcripts detailing their previous course work will be submitted upon arrival to their dissertation committee and the marine and environmental sciences graduate committee to determine whether additional course work is required. The dissertation committee may require the student to pursue additional course work as needed to provide the necessary background for their program of study. Additional course work may also be required depending on the student's performance on written qualifying and oral examinations.

Students must pass three examinations during the course of their graduate studies: (1) a written examination consisting of questions posed by the student's written examination committee; (2) an oral examination by the student's dissertation committee consisting of an oral presentation and defense of the student's dissertation proposal and including questions about the research areas that the student proposes to work in; and (3) a defense of their 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 one first-authored publication 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 (1) are admitted to the PhD program, (2) complete the course work component of the curriculum, and (3) prepare and defend a written thesis (as opposed to a more comprehensive dissertation) may, at the discretion of the graduate committee and their dissertation committee, be awarded a master's degree (Master of Science in Ecology, Evolution, and Marine Biology). The MS degree will only be awarded in rare instances where students and/or their dissertation committee, after communication with the graduate committee, determine that the PhD is untenable.

## PhD in Ecology, Evolution, and Marine Biology—Advanced Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

### MILESTONES

Qualifying exam
Annual review
Candidacy
Dissertation committee
Dissertation proposal
First author publication
Dissertation defense

### REQUIREMENTS

***Colloquium***

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| EEMB 7100 | Colloquium | 1 SH |

### EXAM AND DISSERTATION

***Exam***

| | | |
|---|---|---|
| EEMB 8960 | Exam Preparation—Doctoral | 0 SH |

***Dissertation***

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| EEMB 9990 | Dissertation | 0 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

2 total semester hours required
Minimum 3.000 GPA required

## PhD in Ecology, Evolution, and Marine Biology—Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

### MILESTONES

Qualifying exam
Annual review
Candidacy
Dissertation committee
Dissertation proposal
First author publication
Dissertation defense

### REQUIRED COURSE WORK

***Colloquium***

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| EEMB 7100 | Colloquium | 1 SH |

***Approved Graduate-Level Courses***

Complete 28 semester hours from the following courses; 20 of the 28 semester hours must carry a letter grade:

BIOL 5000 to BIOL 9000
ENVR 5000 to ENVR 9000

| | | |
|---|---|---|
| EEMB 8982 | Readings | 1 to 4 SH |
| EEMB 8984 | Research | 1 to 4 SH |

### EXAM AND DISSERTATION

***Exam Preparation***

| | | |
|---|---|---|
| EEMB 8960 | Exam Preparation—Doctoral | 0 SH |

***Dissertation***

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| EEMB 9990 | Dissertation | 0 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

30 total semester hours required
Minimum 3.000 GPA required

# MATHEMATICS

**www.math.neu.edu**

CHRISTOPHER K. KING, PHD
*Professor and Chair*

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*Graduate Programs Information*
www.math.neu.edu/graduate-programs

The graduate programs offer MS and PhD degrees in mathematics, as well as an MS degree in operations research and an MS degree in applied mathematics. The programs are designed to provide students with a broad overview of current mathematics and a strong command of an area of specialization.

## The Master of Science Degree

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.

### COURSE REQUIREMENTS

Eight 4-semester-hour graduate courses are required for the 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, students must obtain a minimum cumulative average of 3.000, equivalent to a grade of B.

## MS in Mathematics

Complete all courses and requirements listed below unless otherwise indicated.

### CORE REQUIREMENTS

***Algebra 1 and Analysis 1***

| | | |
|---|---|---|
| MATH 5101 | Analysis 1: Functions of One Variable | 4 SH |
| or MATH 5102 | Analysis 2: Functions of Several Variables | 4 SH |
| MATH 5111 | Algebra 1 | 4 SH |
| or MATH 5112 | Algebra 2 | 4 SH |

***Algebra 2 and Analysis 2***

| | | |
|---|---|---|
| MATH 5102 | Analysis 2: Functions of Several Variables | 4 SH |
| or MATH 7232 | Combinatorial Analysis | 4 SH |
| MATH 5112 | Algebra 2 | 4 SH |

or an elective chosen from the list below

### APPROVED MATHEMATICS ELECTIVES

Complete four of the following courses:

| | | |
|---|---|---|
| MATH 7201 | Ordinary Differential Equations | 4 SH |
| MATH 7202 | Partial Differential Equations 1 | 4 SH |
| MATH 7203 | Numerical Analysis 1 | 4 SH |
| MATH 7204 | Complex Analysis | 4 SH |
| MATH 7205 | Numerical Analysis 2 | 4 SH |
| MATH 7221 | Topology 2 | 4 SH |
| MATH 7232 | Combinatorial Analysis | 4 SH |
| MATH 7233 | Graph Theory | 4 SH |
| MATH 7234 | Optimization and Complexity | 4 SH |
| MATH 7235 | Discrete Geometry 1 | 4 SH |
| MATH 7241 | Probability 1 | 4 SH |
| MATH 7301 | Functional Analysis | 4 SH |
| MATH 7302 | Partial Differential Equations 2 | 4 SH |
| MATH 7314 | Algebraic Geometry 1 | 4 SH |
| MATH 7341 | Probability 2 | 4 SH |
| MATH 7342 | Mathematical Statistics | 4 SH |
| MATH 7343 | Applied Statistics | 4 SH |
| MATH 7344 | Regression, ANOVA, and Design | 4 SH |
| MATH 7349 | Stochastic Calculus and Introduction to No-Arbitrage Finance | 4 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

32 total semester hours required
Minimum 3.000 GPA required

## The Master of Science Degree in Applied Mathematics

Eight graduate courses (32 semester hours of credit) are required for the degree: three required courses and five elective courses. The required courses provide a basic training in mathematical methods, and the elective courses include a wide variety of advanced topics. In addition, the program allows up to two of the elective courses to be taken outside the Department of Mathematics. No course can be used to satisfy both a requirement and an elective.

## MS in Applied Mathematics

Complete all courses and requirements listed below unless otherwise indicated.

### CORE REQUIREMENTS

***Methods and Modeling***

| | | |
|---|---|---|
| MATH 5131 | Introduction to Mathematical Methods and Modeling | 4 SH |

***Algebra and Analysis***

| | | |
|---|---|---|
| MATH 5101 | Analysis 1: Functions of One Variable | 4 SH |
| or MATH 5111 | Algebra 1 | 4 SH |
| or MATH 7241 | Probability 1 | 4 SH |

***Statistics***

| | | |
|---|---|---|
| MATH 7342 | Mathematical Statistics | 4 SH |
| or MATH 7343 | Applied Statistics | 4 SH |

### APPROVED MATHEMATICS ELECTIVES

***Math Electives***

Complete three courses (12 semester hours) from the Department of Mathematics.

***Open Electives***

Complete two courses (8 semester hours). These courses may be chosen from outside the Department of Mathematics with faculty approval.

### PROGRAM CREDIT/GPA REQUIREMENTS

32 total semester hours required
Minimum 3.000 GPA required

## The Master of Science Degree in Operations Research

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 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 College of Computer and Information Systems.

## MSOR—Master of Science in Operations Research

Complete all courses and requirements listed below unless otherwise indicated.

### CORE REQUIREMENTS

***Probability***

| | | |
|---|---|---|
| MATH 7241 | Probability 1 | 4 SH |
| or MATH 7341 | Probability 2 | 4 SH |

***Statistics***

| | | |
|---|---|---|
| MATH 7342 | Mathematical Statistics | 4 SH |
| or MATH 7343 | Applied Statistics | 4 SH |

***Operations Research***

| | | |
|---|---|---|
| OR 6205 | Deterministics Operations Research | 4 SH |

***Optimization and Complexity***

| | | |
|---|---|---|
| MATH 7234 | Optimization and Complexity | 4 SH |

### APPROVED ELECTIVES

Complete four of the following courses:

| | | |
|---|---|---|
| CS 5200 | Database Management Systems | 4 SH |
| CS 5800 | Algorithms | 4 SH |
| EECE 7360 | Combinatorial Optimization | 4 SH |
| EMGT 5220 | Engineering Project Management | 4 SH |
| EMGT 6225 | Economic Decision Making | 4 SH |
| IE 7200 | Supply Chain Engineering | 4 SH |
| IE 7215 | Simulation Analysis | 4 SH |
| IE 7275 | Data Mining in Engineering | 4 SH |
| IE 7280 | Statistical Methods in Engineering | 4 SH |
| IE 7285 | Statistical Quality Control | 4 SH |
| IE 7290 | Reliability Analysis and Risk Assessment | 4 SH |
| IE 7315 | Human Factors Engineering | 4 SH |
| IE 7615 | Neural Networks in Engineering | 4 SH |
| MATH 7203 | Numerical Analysis 1 | 4 SH |
| MATH 7205 | Numerical Analysis 2 | 4 SH |
| MATH 7232 | Combinatorial Analysis | 4 SH |
| MATH 7233 | Graph Theory | 4 SH |
| MATH 7341 | Probability 2 | 4 SH |
| MATH 7342 | Mathematical Statistics | 4 SH |
| MATH 7343 | Applied Statistics | 4 SH |
| MATH 7344 | Regression, ANOVA, and Design | 4 SH |
| MATH 7349 | Stochastic Calculus and Introduction to No-Arbitrage Finance | 4 SH |
| OR 7240 | Integer and Nonlinear Optimization | 4 SH |
| OR 7245 | Network Analysis and Advanced Optimization | 4 SH |
| OR 7250 | Multi-Criteria Decision Making | 4 SH |
| OR 7260 | Constraint Programming | 4 SH |
| OR 7310 | Logistics, Warehousing, and Scheduling | 4 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

32 total semester hours required
Minimum 3.000 GPA required

## The Doctor of Philosophy Degree

### TRACKS

- Pure Mathematics
- Discrete Mathematics
- Probability/Statistics

### QUALIFYING EXAMS

Qualifying exam sessions are given once in spring and once in fall. Students will be required to pass four 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.

### 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; perform recitations and grading for the undergraduate course they are shadowing; and become a teacher of record for the undergraduate course they have been shadowing.

### RESIDENCE REQUIREMENT

The residence requirement is satisfied by one year of full-time graduate course work or two years of continuous registration for part-time work.

### COURSE REQUIREMENTS

Students entering with a bachelor's degree are required to take 64 credits 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 MATH 5111 Algebra 1 and MATH 5101 Analysis 1 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 GPA of 3.000 is required for degree conferral.

## PhD in Mathematics—Advanced Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

### MILESTONES

Four qualifying exams
Annual review
Dissertation committee
Teaching requirement
Doctoral candidacy
Progress report and presentation
Dissertation defense

### PREREQUISITES

***Algebra and Analysis***

Complete up to 8 semester hours from the following courses:

| | | |
|---|---|---|
| MATH 5101 | Analysis 1: Functions of One Variable | 4 SH |
| MATH 5111 | Algebra 1 | 4 SH |

### TRACK

Complete one of the following three tracks:

***Pure Track***

ANALYSIS

Complete up to 4 semester hours from the following courses:

| | | |
|---|---|---|
| MATH 5102 | Analysis 2: Functions of Several Variables | 4 SH |
| or MATH 7232 | Combinatorial Analysis | 4 SH |

ALGEBRA

Complete up to 4 semester hours from the following courses:

| | | |
|---|---|---|
| MATH 5112 | Algebra 2 | 4 SH |
| or MATH 7314 | Algebraic Geometry 1 | 4 SH |

FOUNDATIONAL COURSES

Complete up to 16 semester hours from the following courses:

| | | |
|---|---|---|
| MATH 5104 | Basics and Probability and Statistics | 4 SH |
| MATH 5105 | Basics of Statistics and Stochastic Processes | 3 SH |
| MATH 5106 | Basics of Complex Analysis | 3 SH |
| MATH 5107 | Basics of Number Theory | 3 SH |
| MATH 5108 | Methods for Teaching Math | 3 SH |
| MATH 5121 | Topology 1 | 4 SH |
| MATH 5122 | Geometry 1 | 4 SH |
| MATH 5976 | Directed Study | 1 to 4 SH |
| MATH 5978 | Independent Study | 1 to 4 SH |
| MATH 5984 | Research | 1 to 4 SH |
| MATH 7201 | Ordinary Differential Equations | 4 SH |
| MATH 7203 | Numerical Analysis 1 | 4 SH |
| MATH 7205 | Numerical Analysis 2 | 4 SH |
| MATH 7221 | Topology 2 | 4 SH |
| MATH 7222 | Geometry 2 | 4 SH |
| MATH 7232 | Combinatorial Analysis | 4 SH |
| MATH 7233 | Graph Theory | 4 SH |
| MATH 7235 | Discrete Geometry 1 | 4 SH |
| MATH 7241 | Probability 1 | 4 SH |
| MATH 7245 | Statistics for Health Sciences | 4 SH |
| MATH 7260 | History of Mathematics | 4 SH |

| | | |
|---|---|---|
| MATH 7314 | Algebraic Geometry 1 | 4 SH |
| MATH 7341 | Probability 2 | 4 SH |
| MATH 7342 | Mathematical Statistics | 4 SH |
| MATH 7343 | Applied Statistics | 4 SH |

ADVANCED COURSE WORK

Complete eight of the following courses (32 semester hours). Only two reading courses are allowed:

| | | |
|---|---|---|
| MATH 7204 | Complex Analysis | 4 SH |
| MATH 7213 | Algebra 3: Galois Theory | 4 SH |
| MATH 7234 | Optimization and Complexity | 4 SH |
| MATH 7301 | Functional Analysis | 4 SH |
| MATH 7302 | Partial Differential Equations 2 | 4 SH |
| MATH 7303 | Complex Manifolds | 4 SH |
| MATH 7311 | Commutative Algebra | 4 SH |
| MATH 7312 | Lie Theory | 4 SH |
| MATH 7313 | Representation Theory | 4 SH |
| MATH 7315 | Algebraic Number Theory | 4 SH |
| MATH 7316 | Lie Algebras | 4 SH |
| MATH 7321 | Topology 3 | 4 SH |
| MATH 7322 | Geometry 3 | 4 SH |
| MATH 7323 | Differential Geometry 1 | 4 SH |
| MATH 7324 | Differential Geometry 2 | 4 SH |
| MATH 7331 | Algebraic Combinatorics | 4 SH |
| MATH 7335 | Discrete Geometry 2 | 4 SH |
| MATH 7344 | Regression, ANOVA, and Design | 4 SH |
| MATH 7345 | Nonparametric Methods in Statistics | 4 SH |
| MATH 7346 to MATH 7392 | | |
| MATH 7976 to MATH 8986 | | |
| MATH 9948 | Modern Mathematical Research | 4 SH |
| MATH 9984 | Research | 1 to 4 SH |
| MATH 9986 | Research | 0 SH |
| MATH 7721 | Readings in Topology | 4 SH |
| MATH 7722 | Readings in Algebraic Topology | 4 SH |
| MATH 7723 | Readings in Geometric Topology | 4 SH |
| MATH 7725 | Readings in Singularities | 4 SH |
| MATH 7730 | Readings in Combinatorics | 4 SH |
| MATH 7731 | Readings in Combinatorics and Algebra | 4 SH |
| MATH 7732 | Readings in Combinatorial Geometry | 4 SH |
| MATH 7733 | Readings in Graph Theory | 4 SH |
| MATH 7734 | Readings in Algebra | 4 SH |
| MATH 7735 | Readings in Algebraic Geometry | 4 SH |
| MATH 7736 | Readings in Discrete Geometry | 4 SH |
| MATH 7737 | Readings in Commutative Algebra | 4 SH |
| MATH 7741 | Readings in Probability and Statistics | 4 SH |
| MATH 7751 | Readings: Analysis | 4 SH |
| MATH 7752 | Readings in Real Analysis | 4 SH |
| MATH 7753 | Readings in Geometric Analysis | 4 SH |
| MATH 7754 | Readings in Ordinary Differential Equations | 4 SH |
| MATH 7755 | Readings in Partial Differential Equations | 4 SH |
| MATH 7771 | Readings in Geometry | 4 SH |
| MATH 7772 | Readings in Coding Theory | 4 SH |

***Discrete Track***

ALGEBRA

Complete up to 4 semester hours from the following courses:

| | | |
|---|---|---|
| MATH 5112 | Algebra 2 | 4 SH |
| or MATH 7232 | Combinatorial Analysis | 4 SH |

PROBABILITY

Complete up to 4 semester hours in the following course:

| | | |
|---|---|---|
| MATH 7241 | Probability 1 | 4 SH |

FOUNDATIONAL COURSES

Complete up to 16 semester hours from the following courses:

| | | |
|---|---|---|
| MATH 5102 | Analysis 2: Functions of Several Variables | 4 SH |
| MATH 5104 | Basics and Probability and Statistics | 4 SH |
| MATH 5105 | Basics of Statistics and Stochastic Processes | 3 SH |
| MATH 5106 | Basics of Complex Analysis | 3 SH |
| MATH 5107 | Basics of Number Theory | 3 SH |
| MATH 5108 | Methods for Teaching Math | 3 SH |
| MATH 5111 | Algebra 1 | 4 SH |
| MATH 5112 | Algebra 2 | 4 SH |
| MATH 5121 | Topology 1 | 4 SH |
| MATH 5122 | Geometry 1 | 4 SH |
| MATH 5976 | Directed Study | 1 to 4 SH |
| MATH 5978 | Independent Study | 1 to 4 SH |
| MATH 5984 | Research | 1 to 4 SH |
| MATH 7201 | Ordinary Differential Equations | 4 SH |
| MATH 7203 | Numerical Analysis 1 | 4 SH |
| MATH 7205 | Numerical Analysis 2 | 4 SH |
| MATH 7221 | Topology 2 | 4 SH |
| MATH 7222 | Geometry 2 | 4 SH |
| MATH 7232 | Combinatorial Analysis | 4 SH |
| MATH 7233 | Graph Theory | 4 SH |
| MATH 7235 | Discrete Geometry 1 | 4 SH |
| MATH 7245 | Statistics for Health Sciences | 4 SH |
| MATH 7260 | History of Mathematics | 4 SH |
| MATH 7314 | Algebraic Geometry 1 | 4 SH |
| MATH 7341 | Probability 2 | 4 SH |
| MATH 7342 | Mathematical Statistics | 4 SH |
| MATH 7343 | Applied Statistics | 4 SH |

ADVANCED COURSE WORK

Complete eight of the following courses (32 semester hours). Only two reading courses are allowed:

| | | |
|---|---|---|
| MATH 7204 | Complex Analysis | 4 SH |
| MATH 7213 | Algebra 3: Galois Theory | 4 SH |
| MATH 7234 | Optimization and Complexity | 4 SH |
| MATH 7301 | Functional Analysis | 4 SH |
| MATH 7302 | Partial Differential Equations 2 | 4 SH |
| MATH 7303 | Complex Manifolds | 4 SH |
| MATH 7311 | Commutative Algebra | 4 SH |
| MATH 7312 | Lie Theory | 4 SH |
| MATH 7313 | Representation Theory | 4 SH |
| MATH 7315 | Algebraic Number Theory | 4 SH |
| MATH 7316 | Lie Algebras | 4 SH |

| | | |
|---|---|---|
| MATH 7321 | Topology 3 | 4 SH |
| MATH 7322 | Geometry 3 | 4 SH |
| MATH 7323 | Differential Geometry 1 | 4 SH |
| MATH 7324 | Differential Geometry 2 | 4 SH |
| MATH 7331 | Algebraic Combinatorics | 4 SH |
| MATH 7335 | Discrete Geometry 2 | 4 SH |
| MATH 7344 | Regression, ANOVA, and Design | 4 SH |
| MATH 7345 | Nonparametric Methods in Statistics | 4 SH |
| MATH 7346 to MATH 7392 | | |
| MATH 7976 to MATH 8986 | | |
| MATH 9948 | Modern Mathematical Research | 4 SH |
| MATH 9984 | Research | 1 to 4 SH |
| MATH 9986 | Research | 0 SH |
| MATH 7721 | Readings in Topology | 4 SH |
| MATH 7722 | Readings in Algebraic Topology | 4 SH |
| MATH 7723 | Readings in Geometric Topology | 4 SH |
| MATH 7725 | Readings in Singularities | 4 SH |
| MATH 7730 | Readings in Combinatorics | 4 SH |
| MATH 7731 | Readings in Combinatorics and Algebra | 4 SH |
| MATH 7732 | Readings in Combinatorial Geometry | 4 SH |
| MATH 7733 | Readings in Graph Theory | 4 SH |
| MATH 7734 | Readings in Algebra | 4 SH |
| MATH 7735 | Readings in Algebraic Geometry | 4 SH |
| MATH 7736 | Readings in Discrete Geometry | 4 SH |
| MATH 7737 | Readings in Commutative Algebra | 4 SH |
| MATH 7741 | Readings in Probability and Statistics | 4 SH |
| MATH 7751 | Readings: Analysis | 4 SH |
| MATH 7752 | Readings in Real Analysis | 4 SH |
| MATH 7753 | Readings in Geometric Analysis | 4 SH |
| MATH 7754 | Readings in Ordinary Differential Equations | 4 SH |
| MATH 7755 | Readings in Partial Differential Equations | 4 SH |
| MATH 7771 | Readings in Geometry | 4 SH |
| MATH 7772 | Readings in Coding Theory | 4 SH |

***Probability and Statistics Track***

ANALYSIS

Complete up to 4 semester hours from the following courses:

| | | |
|---|---|---|
| MATH 5102 | Analysis 2: Functions of Several Variables | 4 SH |
| or MATH 7203 | Numerical Analysis 1 | 4 SH |
| or MATH 7232 | Combinatorial Analysis | 4 SH |

PROBABILITY

Complete up to 4 semester hours from the following courses:

| | | |
|---|---|---|
| MATH 7241 | Probability 1 | 4 SH |
| or MATH 7342 | Mathematical Statistics | 4 SH |

FOUNDATIONAL COURSES

Complete up to 16 semester hours from the following courses:

| | | |
|---|---|---|
| MATH 5102 | Analysis 2: Functions of Several Variables | 4 SH |
| MATH 5104 | Basics and Probability and Statistics | 4 SH |
| MATH 5105 | Basics of Statistics and Stochastic Processes | 3 SH |
| MATH 5106 | Basics of Complex Analysis | 3 SH |
| MATH 5107 | Basics of Number Theory | 3 SH |
| MATH 5108 | Methods for Teaching Math | 3 SH |
| MATH 5112 | Algebra 2 | 4 SH |
| MATH 5121 | Topology 1 | 4 SH |
| MATH 5122 | Geometry 1 | 4 SH |
| MATH 5976 | Directed Study | 1 to 4 SH |
| MATH 5978 | Independent Study | 1 to 4 SH |
| MATH 5984 | Research | 1 to 4 SH |
| MATH 7201 | Ordinary Differential Equations | 4 SH |
| MATH 7203 | Numerical Analysis 1 | 4 SH |
| MATH 7205 | Numerical Analysis 2 | 4 SH |
| MATH 7221 | Topology 2 | 4 SH |
| MATH 7222 | Geometry 2 | 4 SH |
| MATH 7232 | Combinatorial Analysis | 4 SH |
| MATH 7233 | Graph Theory | 4 SH |
| MATH 7235 | Discrete Geometry 1 | 4 SH |
| MATH 7241 | Probability 1 | 4 SH |
| MATH 7245 | Statistics for Health Sciences | 4 SH |
| MATH 7260 | History of Mathematics | 4 SH |
| MATH 7314 | Algebraic Geometry 1 | 4 SH |
| MATH 7341 | Probability 2 | 4 SH |
| MATH 7342 | Mathematical Statistics | 4 SH |
| MATH 7343 | Applied Statistics | 4 SH |

ADVANCED COURSE WORK

Complete eight of the following courses (32 semester hours). Only two reading courses are allowed:

| | | |
|---|---|---|
| MATH 7204 | Complex Analysis | 4 SH |
| MATH 7213 | Algebra 3: Galois Theory | 4 SH |
| MATH 7234 | Optimization and Complexity | 4 SH |
| MATH 7301 | Functional Analysis | 4 SH |
| MATH 7302 | Partial Differential Equations 2 | 4 SH |
| MATH 7303 | Complex Manifolds | 4 SH |
| MATH 7311 | Commutative Algebra | 4 SH |
| MATH 7312 | Lie Theory | 4 SH |
| MATH 7313 | Representation Theory | 4 SH |
| MATH 7315 | Algebraic Number Theory | 4 SH |
| MATH 7316 | Lie Algebras | 4 SH |
| MATH 7321 | Topology 3 | 4 SH |
| MATH 7322 | Geometry 3 | 4 SH |
| MATH 7323 | Differential Geometry 1 | 4 SH |
| MATH 7324 | Differential Geometry 2 | 4 SH |
| MATH 7331 | Algebraic Combinatorics | 4 SH |
| MATH 7335 | Discrete Geometry 2 | 4 SH |
| MATH 7344 | Regression, ANOVA, and Design | 4 SH |
| MATH 7345 | Nonparametric Methods in Statistics | 4 SH |
| MATH 7346 to MATH 7392 | | |
| MATH 7976 to MATH 8986 | | |
| MATH 9948 | Modern Mathematical Research | 4 SH |
| MATH 9984 | Research | 1 to 4 SH |
| MATH 9986 | Research | 0 SH |
| MATH 7721 | Readings in Topology | 4 SH |

| | | |
|---|---|---|
| MATH 7722 | Readings in Algebraic Topology | 4 SH |
| MATH 7723 | Readings in Geometric Topology | 4 SH |
| MATH 7725 | Readings in Singularities | 4 SH |
| MATH 7730 | Readings in Combinatorics | 4 SH |
| MATH 7731 | Readings in Combinatorics and Algebra | 4 SH |
| MATH 7732 | Readings in Combinatorial Geometry | 4 SH |
| MATH 7733 | Readings in Graph Theory | 4 SH |
| MATH 7734 | Readings in Algebra | 4 SH |
| MATH 7735 | Readings in Algebraic Geometry | 4 SH |
| MATH 7736 | Readings in Discrete Geometry | 4 SH |
| MATH 7737 | Readings in Commutative Algebra | 4 SH |
| MATH 7741 | Readings in Probability and Statistics | 4 SH |
| MATH 7751 | Readings: Analysis | 4 SH |
| MATH 7752 | Readings in Real Analysis | 4 SH |
| MATH 7753 | Readings in Geometric Analysis | 4 SH |
| MATH 7754 | Readings in Ordinary Differential Equations | 4 SH |
| MATH 7755 | Readings in Partial Differential Equations | 4 SH |
| MATH 7771 | Readings in Geometry | 4 SH |
| MATH 7772 | Readings in Coding Theory | 4 SH |

### DISSERTATION

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| MATH 9990 | Dissertation | 0 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

32 total semester hours required
Minimum 3.000 GPA required

## PhD in Mathematics—Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

### MILESTONES

Four qualifying exams
Annual review
Dissertation committee
Teaching requirement
Doctoral candidacy
Progress report and presentation
Dissertation defense

### PREREQUISITES

***Algebra and Analysis***

Complete up to 8 semester hours from the following courses:

| | | |
|---|---|---|
| MATH 5101 | Analysis 1: Functions of One Variable | 4 SH |
| MATH 5111 | Algebra 1 | 4 SH |

### TRACK

Complete one of the following three tracks:

***Pure Track***

ANALYSIS

| | | |
|---|---|---|
| MATH 5102 | Analysis 2: Functions of Several Variables | 4 SH |
| or MATH 7232 | Combinatorial Analysis | 4 SH |

ALGEBRA

| | | |
|---|---|---|
| MATH 5112 | Algebra 2 | 4 SH |
| or MATH 7314 | Algebraic Geometry 1 | 4 SH |

FOUNDATIONAL COURSES

Complete four of the following courses (16 semester hours):

| | | |
|---|---|---|
| MATH 5104 | Basics and Probability and Statistics | 4 SH |
| MATH 5105 | Basics of Statistics and Stochastic Processes | 3 SH |
| MATH 5106 | Basics of Complex Analysis | 3 SH |
| MATH 5107 | Basics of Number Theory | 3 SH |
| MATH 5108 | Methods for Teaching Math | 3 SH |
| MATH 5121 | Topology 1 | 4 SH |
| MATH 5122 | Geometry 1 | 4 SH |
| MATH 5976 | Directed Study | 1 to 4 SH |
| MATH 5978 | Independent Study | 1 to 4 SH |
| MATH 5984 | Research | 1 to 4 SH |
| MATH 7201 | Ordinary Differential Equations | 4 SH |
| MATH 7203 | Numerical Analysis 1 | 4 SH |
| MATH 7205 | Numerical Analysis 2 | 4 SH |
| MATH 7221 | Topology 2 | 4 SH |
| MATH 7222 | Geometry 2 | 4 SH |
| MATH 7232 | Combinatorial Analysis | 4 SH |
| MATH 7233 | Graph Theory | 4 SH |
| MATH 7235 | Discrete Geometry 1 | 4 SH |
| MATH 7241 | Probability 1 | 4 SH |
| MATH 7245 | Statistics for Health Sciences | 4 SH |
| MATH 7260 | History of Mathematics | 4 SH |
| MATH 7314 | Algebraic Geometry 1 | 4 SH |
| MATH 7341 | Probability 2 | 4 SH |
| MATH 7342 | Mathematical Statistics | 4 SH |
| MATH 7343 | Applied Statistics | 4 SH |

ADVANCED COURSE WORK

Complete eight of the following courses (32 semester hours). Only two reading courses are allowed:

| | | |
|---|---|---|
| MATH 7204 | Complex Analysis | 4 SH |
| MATH 7213 | Algebra 3: Galois Theory | 4 SH |
| MATH 7234 | Optimization and Complexity | 4 SH |
| MATH 7301 | Functional Analysis | 4 SH |
| MATH 7302 | Partial Differential Equations 2 | 4 SH |
| MATH 7303 | Complex Manifolds | 4 SH |
| MATH 7311 | Commutative Algebra | 4 SH |
| MATH 7312 | Lie Theory | 4 SH |
| MATH 7313 | Representation Theory | 4 SH |
| MATH 7315 | Algebraic Number Theory | 4 SH |
| MATH 7316 | Lie Algebras | 4 SH |
| MATH 7321 | Topology 3 | 4 SH |
| MATH 7322 | Geometry 3 | 4 SH |
| MATH 7323 | Differential Geometry 1 | 4 SH |
| MATH 7324 | Differential Geometry 2 | 4 SH |
| MATH 7331 | Algebraic Combinatorics | 4 SH |
| MATH 7335 | Discrete Geometry 2 | 4 SH |
| MATH 7344 | Regression, ANOVA, and Design | 4 SH |
| MATH 7345 | Nonparametric Methods in Statistics | 4 SH |
| MATH 7346 to MATH 7392 | | |

| | | |
|---|---|---|
| MATH 7976 to MATH 8986 | | |
| MATH 9948 | Modern Mathematical Research | 4 SH |
| MATH 9984 | Research | 1 to 4 SH |
| MATH 9986 | Research | 0 SH |
| MATH 7721 | Readings in Topology | 4 SH |
| MATH 7722 | Readings in Algebraic Topology | 4 SH |
| MATH 7723 | Readings in Geometric Topology | 4 SH |
| MATH 7725 | Readings in Singularities | 4 SH |
| MATH 7730 | Readings in Combinatorics | 4 SH |
| MATH 7731 | Readings in Combinatorics and Algebra | 4 SH |
| MATH 7732 | Readings in Combinatorial Geometry | 4 SH |
| MATH 7733 | Readings in Graph Theory | 4 SH |
| MATH 7734 | Readings in Algebra | 4 SH |
| MATH 7735 | Readings in Algebraic Geometry | 4 SH |
| MATH 7736 | Readings in Discrete Geometry | 4 SH |
| MATH 7737 | Readings in Commutative Algebra | 4 SH |
| MATH 7741 | Readings in Probability and Statistics | 4 SH |
| MATH 7751 | Readings: Analysis | 4 SH |
| MATH 7752 | Readings in Real Analysis | 4 SH |
| MATH 7753 | Readings in Geometric Analysis | 4 SH |
| MATH 7754 | Readings in Ordinary Differential Equations | 4 SH |
| MATH 7755 | Readings in Partial Differential Equations | 4 SH |
| MATH 7771 | Readings in Geometry | 4 SH |
| MATH 7772 | Readings in Coding Theory | 4 SH |

***Discrete Track***

ALGEBRA

| | | |
|---|---|---|
| MATH 5112 | Algebra 2 | 4 SH |
| or MATH 7232 | Combinatorial Analysis | 4 SH |

PROBABILITY

| | | |
|---|---|---|
| MATH 7241 | Probability 1 | 4 SH |

FOUNDATIONAL COURSES

Complete four of the following courses (16 semester hours):

| | | |
|---|---|---|
| MATH 5102 | Analysis 2: Functions of Several Variables | 4 SH |
| MATH 5104 | Basics and Probability and Statistics | 4 SH |
| MATH 5105 | Basics of Statistics and Stochastic Processes | 3 SH |
| MATH 5106 | Basics of Complex Analysis | 3 SH |
| MATH 5107 | Basics of Number Theory | 3 SH |
| MATH 5108 | Methods for Teaching Math | 3 SH |
| MATH 5111 | Algebra 1 | 4 SH |
| MATH 5112 | Algebra 2 | 4 SH |
| MATH 5121 | Topology 1 | 4 SH |
| MATH 5122 | Geometry 1 | 4 SH |
| MATH 5976 | Directed Study | 1 to 4 SH |
| MATH 5978 | Independent Study | 1 to 4 SH |
| MATH 5984 | Research | 1 to 4 SH |
| MATH 7201 | Ordinary Differential Equations | 4 SH |
| MATH 7203 | Numerical Analysis 1 | 4 SH |
| MATH 7205 | Numerical Analysis 2 | 4 SH |
| MATH 7221 | Topology 2 | 4 SH |
| MATH 7222 | Geometry 2 | 4 SH |
| MATH 7232 | Combinatorial Analysis | 4 SH |
| MATH 7233 | Graph Theory | 4 SH |
| MATH 7235 | Discrete Geometry 1 | 4 SH |
| MATH 7245 | Statistics for Health Sciences | 4 SH |
| MATH 7260 | History of Mathematics | 4 SH |
| MATH 7314 | Algebraic Geometry 1 | 4 SH |
| MATH 7341 | Probability 2 | 4 SH |
| MATH 7342 | Mathematical Statistics | 4 SH |
| MATH 7343 | Applied Statistics | 4 SH |

ADVANCED COURSE WORK

Complete eight of the following courses (32 semester hours). Only two reading courses are allowed:

| | | |
|---|---|---|
| MATH 7204 | Complex Analysis | 4 SH |
| MATH 7213 | Algebra 3: Galois Theory | 4 SH |
| MATH 7234 | Optimization and Complexity | 4 SH |
| MATH 7301 | Functional Analysis | 4 SH |
| MATH 7302 | Partial Differential Equations 2 | 4 SH |
| MATH 7303 | Complex Manifolds | 4 SH |
| MATH 7311 | Commutative Algebra | 4 SH |
| MATH 7312 | Lie Theory | 4 SH |
| MATH 7313 | Representation Theory | 4 SH |
| MATH 7315 | Algebraic Number Theory | 4 SH |
| MATH 7316 | Lie Algebras | 4 SH |
| MATH 7321 | Topology 3 | 4 SH |
| MATH 7322 | Geometry 3 | 4 SH |
| MATH 7323 | Differential Geometry 1 | 4 SH |
| MATH 7324 | Differential Geometry 2 | 4 SH |
| MATH 7331 | Algebraic Combinatorics | 4 SH |
| MATH 7335 | Discrete Geometry 2 | 4 SH |
| MATH 7344 | Regression, ANOVA, and Design | 4 SH |
| MATH 7345 | Nonparametric Methods in Statistics | 4 SH |
| MATH 7346 to MATH 7392 | | |
| MATH 7976 to MATH 8986 | | |
| MATH 9948 | Modern Mathematical Research | 4 SH |
| MATH 9984 | Research | 1 to 4 SH |
| MATH 9986 | Research | 0 SH |
| MATH 7721 | Readings in Topology | 4 SH |
| MATH 7722 | Readings in Algebraic Topology | 4 SH |
| MATH 7723 | Readings in Geometric Topology | 4 SH |
| MATH 7725 | Readings in Singularities | 4 SH |
| MATH 7730 | Readings in Combinatorics | 4 SH |
| MATH 7731 | Readings in Combinatorics and Algebra | 4 SH |
| MATH 7732 | Readings in Combinatorial Geometry | 4 SH |
| MATH 7733 | Readings in Graph Theory | 4 SH |
| MATH 7734 | Readings in Algebra | 4 SH |
| MATH 7735 | Readings in Algebraic Geometry | 4 SH |
| MATH 7736 | Readings in Discrete Geometry | 4 SH |
| MATH 7737 | Readings in Commutative Algebra | 4 SH |
| MATH 7741 | Readings in Probability and Statistics | 4 SH |
| MATH 7751 | Readings: Analysis | 4 SH |
| MATH 7752 | Readings in Real Analysis | 4 SH |

| | | |
|---|---|---|
| MATH 7753 | Readings in Geometric Analysis | 4 SH |
| MATH 7754 | Readings in Ordinary Differential Equations | 4 SH |
| MATH 7755 | Readings in Partial Differential Equations | 4 SH |
| MATH 7771 | Readings in Geometry | 4 SH |
| MATH 7772 | Readings in Coding Theory | 4 SH |

***Probability and Statistics Track***

ANALYSIS

| | | |
|---|---|---|
| MATH 5102 | Analysis 2: Functions of Several Variables | 4 SH |
| or MATH 7203 | Numerical Analysis 1 | 4 SH |
| or MATH 7232 | Combinatorial Analysis | 4 SH |

PROBABILITY

| | | |
|---|---|---|
| MATH 7241 | Probability 1 | 4 SH |
| or MATH 7342 | Mathematical Statistics | 4 SH |

FOUNDATIONAL COURSES

Complete four of the following courses (16 semester hours):

| | | |
|---|---|---|
| MATH 5102 | Analysis 2: Functions of Several Variables | 4 SH |
| MATH 5104 | Basics and Probability and Statistics | 4 SH |
| MATH 5105 | Basics of Statistics and Stochastic Processes | 3 SH |
| MATH 5106 | Basics of Complex Analysis | 3 SH |
| MATH 5107 | Basics of Number Theory | 3 SH |
| MATH 5108 | Methods for Teaching Math | 3 SH |
| MATH 5112 | Algebra 2 | 4 SH |
| MATH 5121 | Topology 1 | 4 SH |
| MATH 5122 | Geometry 1 | 4 SH |
| MATH 5976 | Directed Study | 1 to 4 SH |
| MATH 5978 | Independent Study | 1 to 4 SH |
| MATH 5984 | Research | 1 to 4 SH |
| MATH 7201 | Ordinary Differential Equations | 4 SH |
| MATH 7203 | Numerical Analysis 1 | 4 SH |
| MATH 7205 | Numerical Analysis 2 | 4 SH |
| MATH 7221 | Topology 2 | 4 SH |
| MATH 7222 | Geometry 2 | 4 SH |
| MATH 7232 | Combinatorial Analysis | 4 SH |
| MATH 7233 | Graph Theory | 4 SH |
| MATH 7235 | Discrete Geometry 1 | 4 SH |
| MATH 7241 | Probability 1 | 4 SH |
| MATH 7245 | Statistics for Health Sciences | 4 SH |
| MATH 7260 | History of Mathematics | 4 SH |
| MATH 7314 | Algebraic Geometry 1 | 4 SH |
| MATH 7341 | Probability 2 | 4 SH |
| MATH 7342 | Mathematical Statistics | 4 SH |
| MATH 7343 | Applied Statistics | 4 SH |

ADVANCED COURSE WORK

Complete eight of the following courses (32 semester hours). Only two reading courses are allowed:

| | | |
|---|---|---|
| MATH 7204 | Complex Analysis | 4 SH |
| MATH 7213 | Algebra 3: Galois Theory | 4 SH |
| MATH 7234 | Optimization and Complexity | 4 SH |
| MATH 7301 | Functional Analysis | 4 SH |
| MATH 7302 | Partial Differential Equations 2 | 4 SH |
| MATH 7303 | Complex Manifolds | 4 SH |
| MATH 7311 | Commutative Algebra | 4 SH |
| MATH 7312 | Lie Theory | 4 SH |
| MATH 7313 | Representation Theory | 4 SH |
| MATH 7315 | Algebraic Number Theory | 4 SH |
| MATH 7316 | Lie Algebras | 4 SH |
| MATH 7321 | Topology 3 | 4 SH |
| MATH 7322 | Geometry 3 | 4 SH |
| MATH 7323 | Differential Geometry 1 | 4 SH |
| MATH 7324 | Differential Geometry 2 | 4 SH |
| MATH 7331 | Algebraic Combinatorics | 4 SH |
| MATH 7335 | Discrete Geometry 2 | 4 SH |
| MATH 7344 | Regression, ANOVA, and Design | 4 SH |
| MATH 7345 | Nonparametric Methods in Statistics | 4 SH |
| MATH 7346 to MATH 7392 | | |
| MATH 7976 to MATH 8986 | | |
| MATH 9948 | Modern Mathematical Research | 4 SH |
| MATH 9984 | Research | 1 to 4 SH |
| MATH 9986 | Research | 0 SH |
| MATH 7721 | Readings in Topology | 4 SH |
| MATH 7722 | Readings in Algebraic Topology | 4 SH |
| MATH 7723 | Readings in Geometric Topology | 4 SH |
| MATH 7725 | Readings in Singularities | 4 SH |
| MATH 7730 | Readings in Combinatorics | 4 SH |
| MATH 7731 | Readings in Combinatorics and Algebra | 4 SH |
| MATH 7732 | Readings in Combinatorial Geometry | 4 SH |
| MATH 7733 | Readings in Graph Theory | 4 SH |
| MATH 7734 | Readings in Algebra | 4 SH |
| MATH 7735 | Readings in Algebraic Geometry | 4 SH |
| MATH 7736 | Readings in Discrete Geometry | 4 SH |
| MATH 7737 | Readings in Commutative Algebra | 4 SH |
| MATH 7741 | Readings in Probability and Statistics | 4 SH |
| MATH 7751 | Readings: Analysis | 4 SH |
| MATH 7752 | Readings in Real Analysis | 4 SH |
| MATH 7753 | Readings in Geometric Analysis | 4 SH |
| MATH 7754 | Readings in Ordinary Differential Equations | 4 SH |
| MATH 7755 | Readings in Partial Differential Equations | 4 SH |
| MATH 7771 | Readings in Geometry | 4 SH |
| MATH 7772 | Readings in Coding Theory | 4 SH |

## DISSERTATION

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| MATH 9990 | Dissertation | 0 SH |

## PROGRAM CREDIT/GPA REQUIREMENTS

64 total semester hours required

Minimum 3.000 GPA required

## 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 one-page initial plan
- Completion of a three-page plan of research
- Completion of a ten-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.

# PHYSICS

**www.northeastern.edu/physics**

PAUL M. CHAMPION, PHD
*Professor and Chair*

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gradphysics@neu.edu

The Northeastern Department of Physics performs advanced research in condensed matter, fundamental particles and fields, biophysics, and complexity. Students are expected to have demonstrated a graduate-level understanding of basic physics concepts upon completion of the MS degree. 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.

## The Master of Science Degree

### 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 8 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, have been earned at an accredited U.S. institution, 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 complete the internal admission application.

### 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.

### MS DEGREE

Students may complete the physics MS with or without an MS thesis. The option without thesis permits a specialization (up to 12 semester hours of courses) in applied physics, engineering physics, biophysics, chemical physics, material physics, mathematical physics, and computational physics.

The program requires a minimum of 32 semester hours of graduate credit. The 32 semester hours may include up to 8 semester hours of transfer credit as approved by the Department of Physics's graduate committee and the college.

The MS degree options involve a common set of 24 semester hours of required graduate physics courses.

## MS in Physics

Complete all courses and requirements listed below unless otherwise indicated.

### CORE COURSE WORK

| | | |
|---|---|---|
| ***Fall Term 1*** | | |
| PHYS 7301 | Classical Mechanics/Math Methods | 4 SH |
| PHYS 7302 | Electromagnetic Theory | 4 SH |
| PHYS 7315 | Quantum Theory 1 | 4 SH |
| ***Spring Term 1*** | | |
| PHYS 7305 | Statistical Physics | 4 SH |
| PHYS 7316 | Quantum Theory 2 | 4 SH |
| ***Fall Term 2*** | | |
| PHYS 7321 | Computational Physics | 4 SH |

### COURSE WORK OPTION OR THESIS OPTION

***Course Work Option***

*Note:* In consultation with your faculty advisor, you may complete an area of specialization from physics, engineering, chemistry, biology, mathematics, psychology, or computer science.

Complete two courses (8 semester hours) in the following ranges:

PHYS 5111 to PHYS 5318

PHYS 7323 to PHYS 7741

***Thesis Option***

Complete 8 semester hours from the following list. PHYS 7990 is required:

| | | |
|---|---|---|
| PHYS 7990 | Thesis | 1 to 4 SH |
| PHYS 5111 to PHYS 5318 | | |
| PHYS 7323 to PHYS 7741 | | |

### PROGRAM CREDIT/GPA REQUIREMENTS

32 total semester hours required

Minimum 3.000 GPA required

## PhD in Physics

### 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. The qualifying exam may include both written and oral parts. Any new, entering student with a master's degree from a U.S. institution may take the qualifying exam upon arriving at Northeastern University. Failure of the exam at this time will not be used to limit the two opportunities to take the examination in the future.

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).

Students who enter with a Master of Science degree from a U.S. institution may take the exam at the first opportunity after entering the program. Students who successfully pass both Part 1 and Part 2 of the qualifying exam on entry are exempted from the first-year courses except for Principles of Experimental Physics (PHYS 5318), which all students must take.

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 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.

## 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 8 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 U.S. 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.

## 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, DISSERTATION, AND PRELIMINARY RESEARCH SEMINAR PROPOSAL

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 dissertation proposal. The dissertation committee must consist of a minimum of three full-time faculty members, including the advisor, and must be approved by the department's graduate committee. Often, the graduate committee will recommend that a dissertation committee have a membership of four individuals.

The student (with the aid and approval of his or her thesis advisor) will submit a PhD dissertation 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. 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 thesis committee have been approved, the student will make a public presentation of the material in the PhD proposal 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 presentation must take place no later than the semester after the preliminary 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 secretary 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.

### COURSE WORK

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.

## PhD in Physics—Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

### MILESTONES

Two qualifying exams
Annual review
Candidacy
Preliminary research seminar proposal
Dissertation committee
Dissertation proposal
Dissertation defense

### YEAR 1

***Fall Term***

| | | |
|---|---|---|
| PHYS 7210 | Introduction to Research in Physics | 0 SH |
| PHYS 7301 | Classical Mechanics/Math Methods | 4 SH |
| PHYS 7302 | Electromagnetic Theory | 4 SH |
| PHYS 7315 | Quantum Theory 1 | 4 SH |

***Spring Term***

| | | |
|---|---|---|
| PHYS 5318 | Principles of Experimental Physics | 4 SH |
| PHYS 7210 | Introduction to Research in Physics | 0 SH |
| PHYS 7305 | Statistical Physics | 4 SH |
| PHYS 7316 | Quantum Theory 2 | 4 SH |

### SPECIALIZATION OPTIONS

Students may elect to pursue one of the following areas of specialization: nanomedicine or network science. Students must have a faculty mentor and preapproval to enroll in the specialization courses. These courses are taken year 2.

### YEAR 2

***Specialization Options***

Complete one of the following three options:

GENERAL OPTION

Complete PHYS 7321, PHYS 9984, and one additional course from the following list:

| | | |
|---|---|---|
| PHYS 7321 | Computational Physics | 4 SH |
| PHYS 9984 | Advanced Research | 1 to 8 SH |
| PHYS 7733 | Topics: Elementary Particle Physics and Cosmology | 4 SH |
| PHYS 7734 | Topics: Condensed Matter Physics | 4 SH |
| PHYS 7741 | Biological Physics 2 | 4 SH |
| NANOMEDICINE OPTION | | |
| NNMD 5270 | Introduction to Nanomedicine Science and Technology | 3 SH |
| NNMD 5270 | Introduction to Nanomedicine Science and Technology | 3 SH |
| PHYS 9984 | Advanced Research | 1 to 8 SH |
| NETWORK SCIENCE OPTION | | |
| PHYS 5116 | Complex Networks and Applications | 4 SH |
| PHYS 7731 | Biological Physics 1 | 4 SH |
| PHYS 9984 | Advanced Research | 1 to 8 SH |

***Course Work***

Complete two of the following courses:

| | | |
|---|---|---|
| PHYS 7323 | Elementary Particle Physics | 4 SH |
| PHYS 7324 | Condensed Matter Physics | 4 SH |
| PHYS 7731 | Biological Physics 1 | 4 SH |

**DISSERTATION COURSES**

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| PHYS 9990 | Dissertation | 0 SH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

42 total semester hours required
Minimum 3.000 GPA required

## PhD Specialization Options

By approval of the graduate committee, a specialization in biological physics may take a graduate course in biology, physics, or chemistry from an approved course list, instead of PHYS 7741. Additional appropriate courses may also be substituted by approval of the physics graduate committee.

Students who take PHYS 7731 and PHYS 7741 or an approved BIOL or CHEM course will receive a PhD in physics with a biological physics specialization (if it is desired to list a specialization*).

Students who take PHYS 7323 and PHYS 7733 will receive a PhD in physics with a particle physics specialization (if it is desired to list a specialization*).

Students who take PHYS 7324 and PHYS 7734 will receive a PhD in physics with a condensed matter physics specialization (if it is desired to list a specialization*).

Students who take PHYS 5116 and PHYS 7331 will receive a PhD in physics with a network science specialization (if it is desired to list a specialization*).

Students who take NNMD 5270 and NNMD 7370 will receive a PhD in physics with a nanomedicine specialization (if it is desired to list a specialization*).

All other combinations that meet the criteria for graduation result in a general PhD in physics. 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.

# PSYCHOLOGY

**www.northeastern.edu/psychology**

JOANNE L. MILLER, PHD
*Matthews Distinguished University Professor and Chair*

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617.373.3076
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Rebecca Schachter, *Staff Assistant*, r.schachter@neu.edu

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 distinct 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-month-per-year program. Students earn their master's degree at the end of their second year and progress to PhD candidacy. There is no freestanding master's program.

For students who enter the program with a 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.

A typical program of study is as follows.

## PhD in Psychology

Complete all courses and requirements listed below unless otherwise indicated.

### MILESTONES

First-year proseminar paper
Master's proposal
Master's paper
Master's presentation
Annual review
Dissertation committee
Dissertation proposal
Dissertation
Dissertation defense
Two assigned courses as teaching assistant

### CORE COURSE WORK

A grade of S is required in each course.

***Methodologies and Ethics***

| | | |
|---|---|---|
| PSYC 5180 | Quantitative Methods 1 | 3 SH |
| PSYC 5181 | Quantitative Methods 2 | 3 SH |
| PSYC 7301 | Research Methodologies Psychology | 3 SH |
| PSYC 7302 | Ethics and Professional Issues | 3 SH |

***Proseminar***

| | | |
|---|---|---|
| PSYC 5100 | Proseminar in Psycholinguistics | 3 SH |
| or PSYC 5110 | Proseminar in Cognition | 3 SH |
| PSYC 5120 | Proseminar in Sensation | 3 SH |
| or PSYC 5130 | Proseminar in Perception | 3 SH |
| PSYC 5140 | Proseminar in Biology of Behavior | 3 SH |
| or PSYC 5150 | Proseminar in Clinical Neuroscience | 3 SH |
| PSYC 5160 | Proseminar in Personality | 3 SH |
| or PSYC 5170 | Proseminar in Social Psychology | 3 SH |

***Electives***

Requires 15 semester hours. At least three electives must be substantive courses.

*Note:* You may choose additional proseminar courses or an outside elective in consultation with your faculty advisor and the graduate coordinator.

PSYC 7200 to PSYC 7300

| | | |
|---|---|---|
| PSYC 5100 | Proseminar in Psycholinguistics | 3 SH |
| PSYC 5110 | Proseminar in Cognition | 3 SH |
| PSYC 5120 | Proseminar in Sensation | 3 SH |
| PSYC 5130 | Proseminar in Perception | 3 SH |
| PSYC 5140 | Proseminar in Biology of Behavior | 3 SH |
| PSYC 5150 | Proseminar in Clinical Neuroscience | 3 SH |
| PSYC 5160 | Proseminar in Personality | 3 SH |
| PSYC 5170 | Proseminar in Social Psychology | 3 SH |

### RESEARCH AND DISSERTATION

***Research***

Requires 12 semester hours. All courses except PSYC 7996 are repeatable:

| | | |
|---|---|---|
| PSYC 8401 | Research Project | 3 SH |
| PSYC 7990 | Thesis | 3 SH |

| | | |
|---|---|---|
| PSYC 7996 | Thesis Continuation | 0 SH |
| PSYC 9986 | Research | 0 SH |

***Dissertation***

Complete the repeatable PSYC 9990 twice, and complete PSYC 9996:

| | | |
|---|---|---|
| PSYC 9990 | Dissertation | 0 SH |
| PSYC 9996 | Dissertation Continuation | 0 SH |

## PROGRAM CREDIT/GPA REQUIREMENTS

50 total semester hours required
Minimum 3.000 GPA required

## INTERDISCIPLINARY

ALESSANDRO VESPIGNANI, PHD
*Sternberg Distinguished Professor*
*and Director for the Network Science Program*

*Network Science Program*
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The PhD program in network science aims at enhancing 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 Science, the College of Computer and Information Science, the College of Social Sciences and Humanities, Bouvé College of Health Sciences, the College of Engineering, and the College of Arts, Media and Design; 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 concentration courses.

Course work is dependent on a student's area of concentration and subject to prior approval by their faculty advisor. Required course work will include the following: three foundational courses in network science (Complex Networks and Applications, Network Science Data, and Dynamical Processes in Complex Networks); one of two approved courses (Social Network Analysis or Network Data Mining); 12 semester hours of elective course work defined by their specific track; and two research courses with core faculty of the program. A minimum of 32 credit hours of course work is required, though the graduate program committee may recommend additional course work 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 will be expected to maintain a cumulative GPA of 3.000 or better in all course work. Students will not be 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 will consist 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. The dissertation committee must be approved by the graduate program committee and constituted no later than the end of the spring semester of the first year of the program. Students may repeat the comprehensive examination once if they are unsuccessful.

## Qualifying Examination

The qualifying examination will consist of a two-part exam conducted by the Qualifying Examination and Dissertation Committee. The *technical component* of the exam is fulfilled when the student passes the comprehensive exam (see below), normally expected to be completed the spring semester of the second year. The *research core* of the qualifying exam is fulfilled with the acceptance of a high-quality paper to a strong peer-reviewed conference or journal. This might happen anytime during the PhD program but at least one year prior to the dissertation defense. Students who fail to complete the two-part qualifying examination but who have completed all the PhD program's required course work 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.

## Degree Candidacy

A student is considered a PhD degree candidate upon completion of required course work with a minimum GPA of 3.000 overall on all courses and satisfactory completion of the two-part qualifying examination.

## Comprehensive Examination

Students must submit a written dissertation proposal to the Qualifying Examination and Dissertation Committee. The proposal should identify the research problem, the research plan, and the 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 Qualifying Examination and Dissertation Committee. 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 the College of Science policies.

A typical program of study is as follows:

## PhD in Network Science

Complete all courses and requirements listed below unless otherwise indicated.

### MILESTONES

Annual review
Dissertation committee
First author publication
Dissertation proposal
Dissertation defense

### CORE COURSE WORK

***Networks***

| | | |
|---|---|---|
| CS 6220 | Data Mining Techniques | 4 SH |
| or POLS 7334 | Social Networks | 3 SH |
| PHYS 5116 | Complex Networks and Applications | 4 SH |
| PHYS 7331 | Network Science Data | 4 SH |
| PHYS 7335 | Dynamical Processes in Complex Networks | 4 SH |

***Research***

Complete the following (repeatable) course twice (total of 4 semester hours required):

| | | |
|---|---|---|
| NETS 8984 | Research | 1 to 4 SH |

### SPECIALIZATION

Complete 12 semester hours of course work. Areas of specialization include:

***Computer Science***

| | | |
|---|---|---|
| CS 6140 | Machine Learning | 4 SH |
| CS 6220 | Data Mining Techniques | 4 SH |
| CS 6240 | Parallel Data Processing in MapReduce | 4 SH |
| CS 7800 | Advanced Algorithms | 4 SH |

***Political Science***

| | | |
|---|---|---|
| POLS 7200 | Perspectives on Social Science Inquiry | 3 SH |
| POLS 7201 | Research Design | 3 SH |
| POLS 7202 | Quantitative Techniques | 3 SH |

Additional courses TBA.

***Epidemiology***

| | | |
|---|---|---|
| PHTH 5202 | Epidemiology | 3 or 4 SH |
| PHTH 5224 | Social Epidemiology | 3 SH |
| PHTH 5240 | Evaluating Scientific Evidence | 3 SH |

Additional courses TBA.

***Engineering***

| | | |
|---|---|---|
| EECE 7200 | Linear Systems Analysis | 4 SH |
| EECE 7204 | Applied Probability and Stochastic Processes | 4 SH |
| EECE 7323 | Numerical Optimization Methods | 4 SH |
| EECE 7374 | Fundamentals of Computer Networks | 4 SH |

***Physics***

| | | |
|---|---|---|
| PHYS 7305 | Statistical Physics | 4 SH |
| PHYS 5318 | Principles of Experimental Physics | 4 SH |
| PHYS 7321 | Computational Physics | 4 SH |
| PHYS 7731 | Biological Physics 1 | 4 SH |

***Mathematics***

| | | |
|---|---|---|
| MATH 7241 | Probability 1 | 4 SH |
| MATH 7233 | Graph Theory | 4 SH |
| MATH 7375 | Topics in Topology | 4 SH |
| MATH 7733 | Readings in Graph Theory | 4 SH |

## PROGRAM CREDIT/GPA REQUIREMENTS

32 total semester hours required
Minimum 3.000 GPA required

# College of Social Sciences and Humanities

www.northeastern.edu/cssh/graduate

**UTA G. POIGER, PHD,** *Dean*

**Jack McDevitt, PhD,** *Associate Dean, Research and Graduate Studies*
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Amber Crowe, BA, *Administrative Coordinator, Graduate Admissions and Student Services*

Graduate education at Northeastern integrates the highest level of scholarship across disciplinary boundaries with significant research and experiential learning opportunities. This multidimensional learning environment seeks to develop students' critical thinking and creative problem-solving skills while introducing them to new perspectives in their fields. Our doctoral, master's, and professional degree programs seek to produce graduates who are well prepared for the diverse demands of careers in academia, industry, and the professions.

The following are sample curricula that are valid for full-time students matriculating in fall 2015.

## SCHOOL OF CRIMINOLOGY AND CRIMINAL JUSTICE

**www.northeastern.edu/cssh/sccj**

JAMES ALAN FOX, PHD
*Lipman Family Professor and Interim Director*
NATASHA A. FROST, PHD
*Associate Professor and Associate Dean, Academic Programs*

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*Graduate Programs Contact*
Laurie Mastone, *Assistant to the Dean*

*Graduate Programs Booklet*
www.northeastern.edu/cssh/sccj/graduate

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 school offers a Master of Science degree in criminology and criminal justice and a PhD degree in criminology and justice policy.

### Doctoral Degree Candidacy

A student achieves candidacy when he or she has successfully completed all course work, passed all required qualifying examinations, and deposited the final version of their dissertation proposal (approved by their full committee) with the school's graduate program office.

### Graduate Certificate in Global Criminology

Complete all courses and requirements listed below unless otherwise indicated.

#### GENERAL REQUIREMENTS

***Required Courses***

| | | |
|---|---|---|
| CRIM 7201 | Global Criminology | 3 SH |
| CRIM 7332 | International Law and Justice | 3 SH |

***Electives***

Complete two of the following courses:

| | | |
|---|---|---|
| CRIM 7242 | Terrorism and International Crime | 3 SH |
| CRIM 7258 | Comparative Criminology | 3 SH |
| CRIM 7266 | Crimes Against Humanity | 3 SH |
| CRIM 7268 | Human Trafficking | 3 SH |
| CRIM 7334 | Transnational Crime | 3 SH |
| SOCL 7272 | Globalization: Social and Political Theoretical Debates | 3 SH |
| SOCL 7232 | Political Economy of Global Capitalism | 3 SH |
| SOCL 7268 | Globalization and the City | 3 SH |
| POLS 7369 | International Security | 3 SH |
| POLS 7341 | Security and Resilience Policy | 3 SH |
| POLS 7364 | Terrorism, Violence, and Politics | 3 SH |
| POLS 7366 | Genocide in a Comparative Perspective | 3 SH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

12 total semester hours required
Minimum 3.000 GPA required

## MSCJ—Master of Science in Criminal Justice

Complete all courses and requirements listed below unless otherwise indicated.

**MAJOR REQUIREMENTS**

***Criminology and Criminal Justice***

| | | |
|---|---|---|
| CRIM 7200 | Criminology | 3 SH |
| CRIM 7202 | The Criminal Justice Process | 3 SH |

***Research and Methods Courses***

| | | |
|---|---|---|
| CRIM 7204 | Research and Evaluation Methods | 3 SH |
| with CRIM 7205 | Lab for CRIM 7204 | 1 SH |
| CRIM 7206 | Statistical Analysis | 3 SH |
| with CRIM 7207 | Lab for CRIM 7206 | 1 SH |

**COURSE WORK OPTION OR THESIS OPTION**

Complete either the course work option or the thesis option.

***Course Work Option***

CAPSTONE

| | | |
|---|---|---|
| CRIM 7400 | Graduate Criminal Justice Capstone | 3 SH |

ADDITIONAL COURSES

Complete five courses in the following range:
CRIM 5000 to CRIM 7989

***Thesis Option***

THESIS

| | | |
|---|---|---|
| CRIM 7990 | Thesis | 6 SH |

ADDITIONAL COURSES

Complete four courses in the following range:
CRIM 5000 to CRIM 7989

**PROGRAM CREDIT/GPA REQUIREMENTS**

32 total semester hours required
Minimum 3.000 GPA required

## PhD in Criminology and Justice Policy—Advanced Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

**MILESTONES**

Two qualifying exams—foundations and area
Annual review
Dissertation proposal
Dissertation defense

**CORE REQUIREMENTS**

***Policy Courses***

| | | |
|---|---|---|
| CRIM 7710 | Criminology and Public Policy 1 | 3 SH |
| CRIM 7711 | Criminology and Public Policy 2 | 3 SH |

***Advanced Analysis and Methods Courses***

| | | |
|---|---|---|
| CRIM 7713 | Advanced Research and Evaluation Methods | 3 SH |
| CRIM 7715 | Multivariate Analysis 1 | 3 SH |
| CRIM 7716 | Multivariate Analysis 2 | 3 SH |

***Practicum in Writing***

| | | |
|---|---|---|
| CRIM 7706 | Practicum in Writing and Publishing | 2 SH |

**ELECTIVES**

Complete four courses (12 semester hours) in the following range:
CRIM 7200 to CRIM 7989

**EXAM AND DISSERTATION**

***Exam Preparation***

| | | |
|---|---|---|
| CRIM 8960 | Exam Preparation—Doctoral | 0 SH |

***Dissertation***

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| CRIM 9990 | Dissertation | 0 SH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

32 total semester hours required
Minimum 3.000 GPA required

## PhD in Criminology and Justice Policy—Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

**MILESTONES**

Two qualifying exams—foundations and area
Annual review
Dissertation proposal
Dissertation defense

**CORE REQUIREMENTS**

***Criminal Justice Process***

| | | |
|---|---|---|
| CRIM 7202 | The Criminal Justice Process | 3 SH |

***Policy Courses***

| | | |
|---|---|---|
| CRIM 7710 | Criminology and Public Policy 1 | 3 SH |
| CRIM 7711 | Criminology and Public Policy 2 | 3 SH |

***Advanced Analysis and Methods Courses***

| | | |
|---|---|---|
| CRIM 7713 | Advanced Research and Evaluation Methods | 3 SH |
| CRIM 7715 | Multivariate Analysis 1 | 3 SH |
| CRIM 7716 | Multivariate Analysis 2 | 3 SH |

***Practicum in Writing***

| | | |
|---|---|---|
| CRIM 7706 | Practicum in Writing and Publishing | 2 SH |

### ELECTIVES

Complete ten courses (30 semester hours) in the following range:
CRIM 7200 to CRIM 7989

### EXAM AND DISSERTATION

***Exam Preparation***

| | | |
|---|---|---|
| CRIM 8960 | Exam Preparation—Doctoral | 0 SH |

***Dissertation***

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| CRIM 9990 | Dissertation | 0 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

50 total semester hours required
Minimum 3.000 GPA required

## ECONOMICS

**www.northeastern.edu/cssh/economics**

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*University Distinguished Professor and Chair*
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*Graduate Programs Contact*
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*Graduate Programs Booklet*
www.northeastern.edu/cssh/economics/graduate

The most distinctive feature of Northeastern University's graduate programs in economics is an 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 twenty-first century.

## Doctoral Degree Candidacy

For students entering with a master's degree in economics, degree candidacy is attained when (1) the PhD core curriculum (five required courses and one elective—24 semester hours) is completed; (2) the microeconomics and macroeconomics qualifying examinations are passed; and (3) the field and econometrics comprehensive examination is passed. For students entering without a master's degree, degree candidacy is attained when (1) the above three requirements are completed and (2) six additional courses are completed (four MA core courses plus two elective courses—an additional 24 semester hours for a total of 48 semester hours).

## MA in Economics

Complete all courses and requirements listed below unless otherwise indicated.

### GENERAL REQUIREMENTS

***Math and Statistics for Economists***

| | | |
|---|---|---|
| ECON 5105 | Math and Statistics for Economists | 4 SH |

***Theory Courses***

| | | |
|---|---|---|
| ECON 5110 | Microeconomic Theory | 4 SH |
| ECON 5120 | Macroeconomic Theory | 4 SH |

***Applied Econometrics***

| | | |
|---|---|---|
| ECON 5140 | Applied Econometrics | 4 SH |

**ELECTIVES**

Complete four courses (16 semester hours) in the following range:
ECON 5200 to ECON 7772

**PROGRAM CREDIT/GPA REQUIREMENTS**

32 total semester hours required
Minimum 3.000 GPA required

## PhD in Economics—Advanced Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

**MILESTONES**

Two qualifying exams—microeconomics and macroeconomics
Field comprehensive exam
Annual review
Dissertation committee
Dissertation proposal
Dissertation defense
Field lunch participation
Practical experience
Seminar series participation

**CORE REQUIREMENTS**

***Econometrics***

| | | |
|---|---|---|
| ECON 7740 | Applied Econometrics 2 | 4 SH |

***Theory Courses***

| | | |
|---|---|---|
| ECON 7710 | Microeconomic Theory 2 | 4 SH |
| ECON 7720 | Macroeconomic Theory 2 | 4 SH |

***Analysis and Methods***

| | | |
|---|---|---|
| ECON 7763 | Labor Market Analysis | 4 SH |
| or ECON 7771 | Framework of Industrial Organization | 4 SH |

***Topics***

| | | |
|---|---|---|
| ECON 7764 | Topics in Labor Economics | 4 SH |
| or ECON 7772 | Public Policy Toward Business | 4 SH |

***Elective***

Complete one of the following courses (4 semester hours):
ECON 7200 to ECON 7299

| | | |
|---|---|---|
| ECON 7976 | Directed Study | 1 to 4 SH |
| ECON 8982 | Readings | 1 to 4 SH |

***Research***

| | | |
|---|---|---|
| ECON 8960 | Exam Preparation—Doctoral | 0 SH |

**EXAM AND DISSERTATION**

***Exam Preparation***

| | | |
|---|---|---|
| ECON 8960 | Exam Preparation—Doctoral | 0 SH |

***Dissertation***

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| ECON 9990 | Dissertation | 0 SH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

24 total semester hours required
Minimum 3.000 GPA required

## PhD in Economics—Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

**MILESTONES**

Two qualifying exams—microeconomics and macroeconomics
Field comprehensive exam
Annual review
Dissertation committee
Dissertation proposal
Dissertation defense
Field lunch participation
Practical experience
Seminar series participation

**CORE REQUIREMENTS**

***Math and Statistics for Economists***

| | | |
|---|---|---|
| ECON 5105 | Math and Statistics for Economists | 4 SH |

***Econometrics***

| | | |
|---|---|---|
| ECON 5140 | Applied Econometrics | 4 SH |
| ECON 7740 | Applied Econometrics 2 | 4 SH |

***Theory Courses***

| | | |
|---|---|---|
| ECON 5110 | Microeconomic Theory | 4 SH |
| ECON 5120 | Macroeconomic Theory | 4 SH |
| ECON 7710 | Microeconomic Theory 2 | 4 SH |
| ECON 7720 | Macroeconomic Theory 2 | 4 SH |

***Analysis and Methods***

| | | |
|---|---|---|
| ECON 7763 | Labor Market Analysis | 4 SH |
| or ECON 7771 | Framework of Industrial Organization | 4 SH |

***Topics***

| | | |
|---|---|---|
| ECON 7764 | Topics in Labor Economics | 4 SH |
| or ECON 7772 | Public Policy Toward Business | 4 SH |

***Research***

| | | |
|---|---|---|
| ECON 8960 | Exam Preparation—Doctoral | 0 SH |

**ELECTIVES**

Complete three of the following courses (12 semester hours):
ECON 7200 to ECON 7299

| | | |
|---|---|---|
| ECON 7976 | Directed Study | 1 to 4 SH |
| ECON 8982 | Readings | 1 to 4 SH |

**EXAM AND DISSERTATION**

***Exam Preparation***

| | | |
|---|---|---|
| ECON 8960 | Exam Preparation—Doctoral | 0 SH |

***Dissertation***

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| ECON 9990 | Dissertation | 0 SH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

48 total semester hours required
Minimum 3.000 GPA required

# ENGLISH

**www.northeastern.edu/cssh/english**

ELIZABETH DILLON, PHD
*Professor and Chair*
STUART S. PETERFREUND, PHD
*Professor and Graduate Program Director*

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617.373.3640 (fax)
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*Graduate Programs Contact*
Melissa Daigle, *Administrative Assistant*

*Graduate Programs Booklet*
www.northeastern.edu/cssh/english/graduate/current-student-resources

The graduate program in English encompasses the digital and textual study of British and American literature, literary history and theory, and rhetoric and composition, as well as linguistics. At Northeastern University, graduate study in English takes full advantage of the opportunities that the greater Boston area affords as the site of rich cultural and educational resources.

## Academic Standing/Progress

- Master's students: must maintain a 3.000 minimum cumulative grade-point average. See the university's policy on academic standing on page 25 ("Minimum Cumulative Grade-Point Average").
- PhD students: must maintain a 3.500 minimum cumulative grade-point average.

## Doctoral Degree Candidacy

Students entering with a relevant BA must complete 42 semester hours; students entering with an MA must complete 21 semester hours. The PhD comprehensive examinations must be passed.

## MA in English

Complete all courses and requirements listed below unless otherwise indicated.

### MAJOR REQUIREMENTS

***Proseminar***

| | | |
|---|---|---|
| ENGL 5103 | Proseminar | 3 SH |

***Rhetoric/Composition***

| | | |
|---|---|---|
| ENGL 5101 | Critical Issues | 3 SH |
| ENGL 7303 | Creative Writing Workshop | 3 SH |
| ENGL 7395 | Topics in Writing (selected topics only) | 3 SH |
| ENGL 7360 | Topics in Rhetoric (selected topics only) | 3 SH |

***Theory/Methods***

Complete two of the following courses:

| | | |
|---|---|---|
| ENGL 5101 | Critical Issues | 3 SH |
| ENGL 7111 | Rhetorical Theory | 3 SH |
| ENGL 7112 | Rhetorical Criticism | 3 SH |
| ENGL 7341 | Contemporary Critical Theory | 3 SH |
| ENGL 7342 | Topics in Criticism | 3 SH |

### ELECTIVES

***Required Electives***

Complete one course from each group:

MEDIEVAL/RENAISSANCE

| | | |
|---|---|---|
| ENGL 7261 | Medieval Literature | 3 SH |
| ENGL 7262 | Renaissance Literature | 3 SH |
| ENGL 7271 | Chaucer | 3 SH |
| ENGL 7272 | Shakespeare's Tragedies | 3 SH |
| ENGL 7273 | Shakespeare's Comedies | 3 SH |
| ENGL 7274 | Topics in Shakespeare | 3 SH |
| ENGL 7275 | Milton | 3 SH |
| ENGL 7281 | Topics in Medieval Literature | 3 SH |
| ENGL 7282 | Topics in Renaissance Literature | 3 SH |

SEVENTEENTH–EIGHTEENTH CENTURY

| | | |
|---|---|---|
| ENGL 7202 | African-American Literature | 3 SH |
| ENGL 7206 | American Literature and Culture 1 | 3 SH |
| ENGL 7207 | American Literature and Culture 2 | 3 SH |
| ENGL 7263 | Seventeenth-Century Literature | 3 SH |
| ENGL 7264 | Restoration and Early Eighteenth-Century Literature | 3 SH |
| ENGL 7266 | Victorian Literature | 3 SH |
| ENGL 7283 | Topics in Seventeenth-Century Literature | 3 SH |
| ENGL 7284 | Topics in Eighteenth-Century Literature | 3 SH |
| ENGL 7286 | Topics in Victorian Literature | 3 SH |
| ENGL 7291 | Eighteenth-Century Novel | 3 SH |
| ENGL 7293 | Victorian Poetry | 3 SH |
| ENGL 7294 | Victorian Novel | 3 SH |

NINETEENTH–TWENTIETH CENTURY

| | | |
|---|---|---|
| ENGL 7214 | Topics in Nineteenth-Century American Literature | 3 SH |
| ENGL 7215 | Topics in Twentieth-Century American Literature | 3 SH |
| ENGL 7223 | Major American Poet | 3 SH |
| ENGL 7222 | Major American Playwright | 3 SH |
| ENGL 7223 | Major American Poet | 3 SH |
| ENGL 7226 | Individual Modern American Novelist | 3 SH |
| ENGL 7231 | Nineteenth-Century American Prose, 1820–1865 | 3 SH |
| ENGL 7232 | Nineteenth-Century American Prose, 1865–1900 | 3 SH |
| ENGL 7233 | Nineteenth-Century American Poetry | 3 SH |

| | | |
|---|---|---|
| ENGL 7241 | Modern American Prose | 3 SH |
| ENGL 7243 | Modern American Drama | 3 SH |
| ENGL 7251 | Contemporary American Fiction | 3 SH |
| ENGL 7286 | Topics in Victorian Literature | 3 SH |
| ENGL 7287 | Topics in Twentieth-Century British Literature | 3 SH |
| ENGL 7295 | Twentieth-Century British Drama | 3 SH |
| ENGL 7296 | Twentieth-Century British Fiction | 3 SH |

***Open Electives***

Complete two ENGL courses (6 semester hours).

**EXAM AND THESIS**

***Exam Preparation***

| | | |
|---|---|---|
| ENGL 6960 | Exam Preparation—Master's | 0 SH |

***Thesis***

| | | |
|---|---|---|
| ENGL 7990 | Thesis | 3 SH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

30 total semester hours required
Minimum 3.000 GPA required

## PhD in English—Advanced Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

**MILESTONES**

Comprehensive exam
Annual review
Two languages
Dissertation committee
Dissertation prospectus
Dissertation defense

**MAJOR REQUIREMENTS**

Minimum 3.500 GPA required

***Proseminar***

| | | |
|---|---|---|
| ENGL 5103 | Proseminar | 3 SH |

***Writing and Teaching Writing***

| | | |
|---|---|---|
| ENGL 7392 | Writing and the Teaching of Writing | 3 SH |

***Open Electives***

Complete five ENGL courses (15 semester hours).

**EXAM AND DISSERTATION**

***Exam Preparation***

| | | |
|---|---|---|
| ENGL 8960 | Exam Preparation—Doctoral | 0 SH |

***Research***

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| ENGL 9986 | Research | 0 SH |

***Dissertation***

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| ENGL 9990 | Dissertation | 0 SH |

**PROGRAM CREDIT/GPA REQUIREMENTS**

21 total semester hours required
Minimum 3.500 GPA required

## PhD in English—Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

**MILESTONES**

Comprehensive exam
Annual review
Two languages
Dissertation committee
Dissertation prospectus
Dissertation defense

**MAJOR REQUIREMENTS**

Minimum 3.500 GPA required

***Proseminar***

| | | |
|---|---|---|
| ENGL 5103 | Proseminar | 3 SH |

***Rhetoric/Composition***

Complete one of the following courses:

| | | |
|---|---|---|
| ENGL 5101 | Critical Issues | 3 SH |
| ENGL 7303 | Creative Writing Workshop | 3 SH |
| ENGL 7395 | Topics in Writing *(selected topics only)* | 3 SH |
| ENGL 7360 | Topics in Rhetoric *(selected topics only)* | 3 SH |

***Theory/Methods***

Complete two of the following courses:

| | | |
|---|---|---|
| ENGL 5101 | Critical Issues | 3 SH |
| ENGL 7111 | Rhetorical Theory | 3 SH |
| ENGL 7112 | Rhetorical Criticism | 3 SH |
| ENGL 7341 | Contemporary Critical Theory | 3 SH |
| ENGL 7342 | Topics in Criticism | 3 SH |

***Writing and Teaching Writing***

| | | |
|---|---|---|
| ENGL 7392 | Writing and the Teaching of Writing | 3 SH |

**ELECTIVES**

Minimum 3.500 GPA required

***Required Electives***

Complete one course from each of the following groups:

MEDIEVAL/RENAISSANCE LITERATURE

| | | |
|---|---|---|
| ENGL 7261 | Medieval Literature | 3 SH |
| ENGL 7262 | Renaissance Literature | 3 SH |
| ENGL 7271 | Chaucer | 3 SH |
| ENGL 7272 | Shakespeare's Tragedies | 3 SH |
| ENGL 7273 | Shakespeare's Comedies | 3 SH |
| ENGL 7274 | Topics in Shakespeare | 3 SH |
| ENGL 7275 | Milton | 3 SH |
| ENGL 7281 | Topics in Medieval Literature | 3 SH |
| ENGL 7282 | Topics in Renaissance Literature | 3 SH |

SEVENTEENTH/EIGHTEENTH-CENTURY LITERATURE

| | | |
|---|---|---|
| ENGL 7202 | African-American Literature | 3 SH |
| ENGL 7206 | American Literature and Culture 1 | 3 SH |
| ENGL 7207 | American Literature and Culture 2 | 3 SH |
| ENGL 7263 | Seventeenth-Century Literature | 3 SH |

| | | |
|---|---|---|
| ENGL 7264 | Restoration and Early Eighteenth-Century Literature | 3 SH |
| ENGL 7266 | Victorian Literature | 3 SH |
| ENGL 7283 | Topics in Seventeenth-Century Literature | 3 SH |
| ENGL 7284 | Topics in Eighteenth-Century Literature | 3 SH |
| ENGL 7286 | Topics in Victorian Literature | 3 SH |
| ENGL 7291 | Eighteenth-Century Novel | 3 SH |
| ENGL 7293 | Victorian Poetry | 3 SH |
| ENGL 7294 | Victorian Novel | 3 SH |

NINETEENTH/TWENTIETH-CENTURY LITERATURE

| | | |
|---|---|---|
| ENGL 7214 | Topics in Nineteenth-Century American Literature | 3 SH |
| ENGL 7215 | Topics in Twentieth-Century American Literature | 3 SH |
| ENGL 7223 | Major American Poet | 3 SH |
| ENGL 7222 | Major American Playwright | 3 SH |
| ENGL 7223 | Major American Poet | 3 SH |
| ENGL 7226 | Individual Modern American Novelist | 3 SH |
| ENGL 7231 | Nineteenth-Century American Prose, 1820–1865 | 3 SH |
| ENGL 7232 | Nineteenth-Century American Prose, 1865–1900 | 3 SH |
| ENGL 7233 | Nineteenth-Century American Poetry | 3 SH |
| ENGL 7241 | Modern American Prose | 3 SH |
| ENGL 7243 | Modern American Drama | 3 SH |
| ENGL 7251 | Contemporary American Fiction | 3 SH |
| ENGL 7286 | Topics in Victorian Literature | 3 SH |
| ENGL 7287 | Topics in Twentieth-Century British Literature | 3 SH |
| ENGL 7295 | Twentieth-Century British Drama | 3 SH |
| ENGL 7296 | Twentieth-Century British Fiction | 3 SH |

***Open Electives***

Complete six ENGL courses (18 semester hours).

## EXAM AND DISSERTATION

***Exam Preparation***

| | | |
|---|---|---|
| ENGL 8960 | Exam Preparation—Doctoral | 0 SH |

***Research***

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| ENGL 9986 | Research | 0 SH |

***Dissertation***

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| ENGL 9990 | Dissertation | 0 SH |

## PROGRAM CREDIT/GPA REQUIREMENTS

42 total semester hours required

Minimum 3.500 GPA required

# HISTORY

**www.northeastern.edu/cssh/history**

HEATHER STREETS-SALTER, PHD
*Associate Professor and Chair*
TIMOTHY S. BROWN, PHD
*Professor and Graduate Program Director*

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*Graduate Programs Contact*
Bonne Knipfer, *Administrative Coordinator*

*Graduate Programs Booklet*
www.northeastern.edu/cssh/history/current-student-resources

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.

## Academic Standing/Progress

Master's students are expected to maintain a 3.000 GPA. Should the GPA drop below 3.000, the student will be placed on academic probation and will be allowed one more semester to bring his or her GPA to the 3.000 level. If the student is not able to bring his or her GPA to the 3.000 level by the end of the following semester, the student may be asked to leave the program.

PhD 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 37 semester hours; students with an MA in history from outside Northeastern must complete 31 semester hours. Students must pass the qualifying examination by the end of the first semester of the third year in the program.

## MA in History

Complete all courses and requirements listed below unless otherwise indicated.

*Note:* The MA in history requires a concentration (world history or public history). Consult your college administrator.

### MAJOR REQUIREMENTS FOR CONCENTRATION IN WORLD HISTORY

***Theory and Methodology***

A grade of B or higher is required:

| | | |
|---|---|---|
| HIST 5101 | Theory and Methodology 1 | 3 SH |
| HIST 5102 | Theory and Methodology 2 | 3 SH |

***History Concentration***

Complete one course (3 semester hours) in the following range:
HIST 7300 to HIST 7700

***Professionalization and Pedagogy***

Complete the following (repeatable) course three times:

| | | |
|---|---|---|
| HIST 7550 | Professionalization and Pedagogy for Historians | 1 SH |

***Electives***

Complete six HIST courses (18 semester hours).

### MAJOR REQUIREMENTS FOR CONCENTRATION IN PUBLIC HISTORY

***Theory and Methodology***

A grade of B or higher is required:

| | | |
|---|---|---|
| HIST 5101 | Theory and Methodology 1 | 3 SH |

***Digital History***

| | | |
|---|---|---|
| HIST 7370 | Texts, Maps, and Networks: Readings and Methods for Digital History | 3 SH |

***Public History***

| | | |
|---|---|---|
| HIST 5237 | Issues/Problems in Public History | 3 SH |

***Professionalization and Pedagogy***

Complete the following (repeatable) course three times:

| | | |
|---|---|---|
| HIST 7550 | Professionalization and Pedagogy for Historians | 1 SH |

***History***

GROUP 1

Complete two of the following courses:

| | | |
|---|---|---|
| HIST 5240 | Historical Societies and Archives | 3 SH |
| HIST 5241 to HIST 5295 | | |
| HIST 7216 to HIST 7223 | | |
| HIST 7231 to HIST 7238 | | |
| HIST 7250 | Topics in Public History | 3 SH |

GROUP 2
Complete one course in the following range:
HIST 7301 to HIST 7700

***Fieldwork***

| | | |
|---|---|---|
| HIST 8410 | Fieldwork in History 1 | 3 SH |

***Electives***
Complete two HIST courses (6 semester hours).

**PROGRAM CREDIT/GPA REQUIREMENTS**
30 total semester hours required
Minimum 3.000 GPA required

## PhD in History—Advanced Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

**MILESTONES**
Qualifying exam
Annual review
Language
Dissertation committee
Dissertation proposal
Dissertation defense

**MAJOR REQUIREMENTS**

***Theory and Methodology***
A grade of B or higher is required:

| | | |
|---|---|---|
| HIST 5101 | Theory and Methodology 1 | 3 SH |
| HIST 5102 | Theory and Methodology 2 | 3 SH |

***Digital History***

| | | |
|---|---|---|
| HIST 7370 | Texts, Maps, and Networks: Readings and Methods for Digital History | 3 SH |

***Readings or Directed Study***
Complete readings or directed study:

READINGS
Complete 12 semester hours from the following (repeatable) course:

| | | |
|---|---|---|
| HIST 8982 | Readings | 1 to 4 SH |

DIRECTED STUDY
Complete 12 semester hours from the following (repeatable) course:

| | | |
|---|---|---|
| HIST 7976 | Directed Study | 1 to 4 SH |

***Research Seminar***

| | | |
|---|---|---|
| HIST 7314 | Research Seminar in World History | 3 SH |

***Teaching Practicum***

| | | |
|---|---|---|
| HIST 8409 | Practicum in Teaching | 1 SH |

**ELECTIVES**
Complete two courses (6 semester hours) in the following range:
HIST 7200 to HIST 7702

**EXAM AND DISSERTATION**

***Exam Preparation***

| | | |
|---|---|---|
| HIST 8960 | Exam Preparation—Doctoral | 0 SH |

***Dissertation***
Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| HIST 9990 | Dissertation | 0 SH |

**PROGRAM CREDIT/GPA REQUIREMENTS**
31 total semester hours required
Minimum 3.000 GPA required

## PhD in History—Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

**MILESTONES**
Qualifying exam
Annual review
Language
Dissertation committee
Dissertation proposal
Dissertation defense

**MAJOR REQUIREMENTS**

***Theory and Methodology***
A grade of B or higher is required:

| | | |
|---|---|---|
| HIST 5101 | Theory and Methodology 1 | 3 SH |
| HIST 5102 | Theory and Methodology 2 | 3 SH |

***Digital History***

| | | |
|---|---|---|
| HIST 7370 | Texts, Maps, and Networks: Readings and Methods for Digital History | 3 SH |

***Readings or Directed Study***
Complete readings or directed study:

READINGS
Complete 18 semester hours of the following (repeatable) course:

| | | |
|---|---|---|
| HIST 8982 | Readings | 1 to 4 SH |

DIRECTED STUDY
Complete 18 semester hours of the following (repeatable) course:

| | | |
|---|---|---|
| HIST 7976 | Directed Study | 1 to 4 SH |

***Research Seminar***

| | | |
|---|---|---|
| HIST 7314 | Research Seminar in World History | 3 SH |

***Teaching Practicum***

| | | |
|---|---|---|
| HIST 8409 | Practicum in Teaching | 1 SH |

**ELECTIVES**
Complete two courses (6 semester hours) in the following range:
HIST 7200 to HIST 7702

**EXAM AND DISSERTATION**

***Exam Preparation***

| | | |
|---|---|---|
| HIST 8960 | Exam Preparation—Doctoral | 0 SH |

***Dissertation***
Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| HIST 9990 | Dissertation | 0 SH |

**PROGRAM CREDIT/GPA REQUIREMENTS**
37 total semester hours required
Minimum 3.000 GPA required

# POLITICAL SCIENCE

**www.northeastern.edu/cssh/polisci**

JOHN PORTZ, PHD
*Professor and Chair*

*Graduate Program Directors*
JOHN H. PORTZ, PHD
*PhD Program*
DENIS J. SULLIVAN, PHD
*MA Program*
STEPHEN E. FLYNN, PHD
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*Graduate Programs Contact*
Logan Wangsgard, *Administrative Coordinator*

*Graduate Programs Booklet*
www.northeastern.edu/cssh/polisci/graduate

Graduate training in political science and public administration seeks to prepare students to analyze the most important issues in world affairs and prepares students for a wide array of careers—from government and academia to the nonprofit and private sectors. Graduate programs in political science, public administration, security and resilience studies, and international affairs at Northeastern explore the theory and the 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 and public administration. Core areas of inquiry within our department include national and international security, international public policy, U.S. public policy and administration, network science, European studies, Middle East studies, and democratization and development.

## Academic Standing/Progress

Satisfactory progress is defined as complying with the various procedures and requirements of the respective graduate programs. Among these requirements is grade-point average and, for the PhD program, timely progress in sitting for the comprehensive examination, completing an approved dissertation proposal, and submitting a dissertation. 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.

As noted, satisfactory progress includes maintaining a specified grade-point average. All master's-level students must maintain an overall cumulative grade-point average of 3.000. All doctoral students must maintain an overall cumulative grade-point average of 3.500. In addition, students are expected to successfully complete a minimum of two-thirds of attempted semester hours. Any student who falls below the applicable standard in one academic semester will be placed on academic probation and must consult with his or her academic advisor. Any student who falls below any applicable standard for two consecutive semesters is 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 incompletes risk no longer being eligible for financial aid awards.

## Doctoral Degree Candidacy

Students entering with a bachelor's degree must complete 48 semester hours. Students entering with a master's degree from outside Northeastern must complete a minimum of 30 semester hours. Students entering with a Northeastern MA in political science must complete a minimum of 18 semester hours. Students entering with a Northeastern MPA degree must complete a minimum of 6 semester hours. Students currently in the MA or MPA program and accepted to the PhD before completing the MA or MPA must complete 48 semester hours. A 3.500 GPA is required. Students also must pass written and oral comprehensive examinations.

## MA in Political Science

Complete all courses and requirements listed below unless otherwise indicated.

### GENERAL REQUIREMENTS

***Quantitative Techniques***

| | | |
|---|---|---|
| POLS 7202 | Quantitative Techniques | 3 SH |

### CONCENTRATION

Complete one of the concentrations below:

***Concentration in American Government***

SEMINAR

| | | |
|---|---|---|
| POLS 7205 | Seminar in American Government and Politics | 3 SH |

AMERICAN GOVERNMENT COURSES

Complete three of the following courses:

| | | |
|---|---|---|
| POLS 7250 | American Political Institutions and Processes | 3 SH |
| POLS 7251 | Congress and Policy | 3 SH |
| POLS 7252 | The American Presidency | 3 SH |
| POLS 7253 | American Constitutional History and Theory | 3 SH |
| POLS 7254 | Campaigns and Elections | 3 SH |
| POLS 7255 | American Political Parties and Elections | 3 SH |

| | | |
|---|---|---|
| POLS 7257 | The U.S. Judicial Process | 3 SH |
| POLS 7258 | Interest Groups and Social Movements | 3 SH |
| POLS 7283 | Trends in American Political Thought | 3 SH |
| PPUA 6505 | Public Budgeting and Financial Management | 3 SH |
| PPUA 6502 | Economic Institutions and Analysis | 3 SH |
| PPUA 6521 | Administrative Law and Politics | 3 SH |
| POLS 7312 | Intergovernmental Relations | 3 SH |
| POLS 7313 | State Government | 3 SH |
| POLS 7314 | Urban Government and Politics | 3 SH |
| PPUA 6530 | State and Local Public Finance | 3 SH |
| POLS 7319 | Business/Government Relations | 3 SH |
| PPUA 7240 | Health Policy and Politics | 3 SH |
| PPUA 7245 | Education Policy in the United States | 3 SH |
| POLS 7331 | Environmental Policy and Politics | 3 SH |
| POLS 7332 | Gender and Politics | 3 SH |
| POLS 7341 | Security and Resilience Policy | 3 SH |
| POLS 7361 | U.S. National Security Policy | 3 SH |
| POLS 7367 | U.S. Foreign Policy | 3 SH |

***Concentration in International Relations***

SEMINAR

| | | |
|---|---|---|
| POLS 7207 | Seminar in International Relations | 3 SH |

INTERNATIONAL RELATIONS COURSES

Complete three of the following courses:

| | | |
|---|---|---|
| POLS 7325 | Contemporary Issues in Third World Development | 3 SH |
| PPUA 7243 | International Development Administration and Planning | 3 SH |
| PPUA 7244 | Comparative Public Policy and Administration | 3 SH |
| POLS 7331 | Environmental Policy and Politics | 3 SH |
| POLS 7332 | Gender and Politics | 3 SH |
| POLS 7341 | Security and Resilience Policy | 3 SH |
| POLS 7351 | Democratization and Governance | 3 SH |
| POLS 7357 | International Political Economy | 3 SH |
| POLS 7359 | International Law | 3 SH |
| POLS 7360 | Ethnic Political Conflict | 3 SH |
| POLS 7367 | U.S. Foreign Policy | 3 SH |
| POLS 7369 | International Security | 3 SH |
| POLS 7376 | Government and Politics of the Middle East | 3 SH |
| POLS 7377 | Arab-Israeli Conflict | 3 SH |
| POLS 7379 | Chinese Politics and Foreign Policy | 3 SH |
| POLS 7381 | U.S.-East Asia Relations | 3 SH |
| POLS 7382 | Politics of Developing Nations | 3 SH |
| POLS 7385 | Transatlantic Relations | 3 SH |
| POLS 7394 | Topical Seminar in International Relations | 3 SH |

***Concentration in Comparative Politics***

SEMINAR

| | | |
|---|---|---|
| POLS 7206 | Seminar in Comparative Politics | 3 SH |

COMPARATIVE POLITICS COURSES

Complete three of the following courses:

| | | |
|---|---|---|
| POLS 7258 | Interest Groups and Social Movements | 3 SH |
| POLS 7325 | Contemporary Issues in Third World Development | 3 SH |
| PPUA 7244 | Comparative Public Policy and Administration | 3 SH |
| POLS 7332 | Gender and Politics | 3 SH |
| POLS 7333 | Science, Technology, and Public Policy | 3 SH |
| POLS 7351 | Democratization and Governance | 3 SH |
| POLS 7352 | Democratization: Basic Approaches | 3 SH |
| POLS 7353 | Comparative Democracies | 3 SH |
| POLS 7354 | Comparative Political Parties and Electoral Systems | 3 SH |
| POLS 7355 | Comparative Constitutionalism | 3 SH |
| POLS 7356 | Comparative Political Economy | 3 SH |
| POLS 7357 | International Political Economy | 3 SH |
| POLS 7360 | Ethnic Political Conflict | 3 SH |
| POLS 7362 | Nationalism | 3 SH |
| POLS 7363 | Politics of Revolution and Change | 3 SH |
| POLS 7364 | Terrorism, Violence, and Politics | 3 SH |
| POLS 7365 | Totalitarianism and Oppressive Government | 3 SH |
| POLS 7366 | Genocide in a Comparative Perspective | 3 SH |
| POLS 7370 | Europe and European Union Governance | 3 SH |
| POLS 7377 | Arab-Israeli Conflict | 3 SH |
| POLS 7381 | U.S.-East Asia Relations | 3 SH |
| POLS 7382 | Politics of Developing Nations | 3 SH |
| POLS 7393 | Topical Seminar in Comparative Politics | 3 SH |

***Concentration in Public Policy***

SEMINAR

| | | |
|---|---|---|
| POLS 7204 | Seminar in Public Policy | 3 SH |

PUBLIC POLICY COURSES

Complete three of the following courses:

| | | |
|---|---|---|
| PPUA 6506 | Techniques of Policy Analysis | 3 SH |
| POLS 7250 | American Political Institutions and Processes | 3 SH |
| POLS 7251 | Congress and Policy | 3 SH |
| POLS 7252 | The American Presidency | 3 SH |
| POLS 7255 | American Political Parties and Elections | 3 SH |
| POLS 7283 | Trends in American Political Thought | 3 SH |
| PPUA 6507 | Institutional Leadership and the Public Manager | 3 SH |
| PPUA 6552 | The Nonprofit Sector in Civil Society and Public Affairs | 3 SH |
| PPUA 6521 | Administrative Law and Politics | 3 SH |
| PPUA 6509 | Techniques of Program Evaluation | 3 SH |
| POLS 7319 | Business/Government Relations | 3 SH |

| | | |
|---|---|---|
| PPUA 7240 | Health Policy and Politics | 3 SH |
| PPUA 7239 | Problems in Metropolitan Policymaking | 3 SH |
| PPUA 7244 | Comparative Public Policy and Administration | 3 SH |
| PPUA 6524 | Case Studies in Policy Analysis | 3 SH |
| PPUA 7245 | Education Policy in the United States | 3 SH |
| POLS 7331 | Environmental Policy and Politics | 3 SH |
| POLS 7332 | Gender and Politics | 3 SH |
| POLS 7333 | Science, Technology, and Public Policy | 3 SH |
| POLS 7341 | Security and Resilience Policy | 3 SH |
| POLS 7361 | U.S. National Security Policy | 3 SH |
| POLS 7362 | Nationalism | 3 SH |
| POLS 7363 | Politics of Revolution and Change | 3 SH |
| POLS 7364 | Terrorism, Violence, and Politics | 3 SH |
| POLS 7365 | Totalitarianism and Oppressive Government | 3 SH |
| POLS 7367 | U.S. Foreign Policy | 3 SH |
| POLS 7379 | Chinese Politics and Foreign Policy | 3 SH |
| POLS 7392 | Topical Seminar in Public Policy and Administration | 3 SH |

***Concentration in Security Studies***

SEMINAR

| | | |
|---|---|---|
| POLS 7207 | Seminar in International Relations | 3 SH |

SECURITY STUDIES COURSES

Complete POLS 7341 and two additional courses from the following list:

| | | |
|---|---|---|
| POLS 7341 | Security and Resilience Policy | 3 SH |
| POLS 7343 to POLS 7349 | | |
| POLS 7361 | U.S. National Security Policy | 3 SH |
| POLS 7364 | Terrorism, Violence, and Politics | 3 SH |
| POLS 7369 | International Security | 3 SH |

## ELECTIVES

Complete five courses (15 semester hours) in the following range:

POLS 5100 to POLS 7978

## PROGRAM CREDIT/GPA REQUIREMENTS

30 total semester hours required

Minimum 3.000 GPA required

# MPA—Master of Public Administration

Complete all courses and requirements listed below unless otherwise indicated.

## GENERAL REQUIREMENTS

***Quantitative Techniques***

| | | |
|---|---|---|
| POLS 7202 | Quantitative Techniques | 3 SH |

***Analysis***

| | | |
|---|---|---|
| PPUA 6506 | Techniques of Policy Analysis | 3 SH |
| PPUA 6502 | Economic Institutions and Analysis | 3 SH |

***Administration and Management***

| | | |
|---|---|---|
| PPUA 6500 | Principles of Public Administration | 3 SH |
| PPUA 6503 | Public Personnel Administration | 3 SH |
| PPUA 6504 | Organizational Theory and Management | 3 SH |
| PPUA 6505 | Public Budgeting and Financial Management | 3 SH |
| PPUA 6507 | Institutional Leadership and the Public Manager | 3 SH |

***Capstone***

| | | |
|---|---|---|
| PPUA 6508 | Capstone Seminar in Public Policy and Public Management | 3 SH |

## OPTIONS

Complete one of the following options:

***Electives Option***

Complete five courses (15 semester hours) in the following ranges:

POLS 5000 to POLS 7999
CRIM 5000 to CRIM 7999
ECON 5000 to ECON 7999
ENGL 5000 to ENGL 7999
HIST 5000 to HIST 7999
LPSC 5000 to LPSC 7999
PPUA 5000 to PPUA 7999
SOCL 5000 to SOCL799

***Internship/Electives Option***

INTERNSHIP

Requires 3 semester hours:

| | | |
|---|---|---|
| POLS 7407 | Internship in Politics and Public Administration | 1 to 6 SH |

ELECTIVES

Complete four courses (12 semester hours) in the following ranges:

POLS 5000 to POLS 7999
CRIM 5000 to CRIM 7999
ECON 5000 to ECON 7999
ENGL 5000 to ENGL 7999
HIST 5000 to HIST 7999
LPSC 5000 to LPSC 7999
PPUA 5000 to PPUA 7999
SOCL 5000 to SOCL799

## PROGRAM CREDIT/GPA REQUIREMENTS

42 total semester hours required

Minimum 3.000 GPA required

## MS in Security and Resilience Studies

Complete all courses and requirements listed below unless otherwise indicated.

### GENERAL REQUIREMENTS

***Security and Resilience Policy***

| | | |
|---|---|---|
| POLS 7341 | Security and Resilience Policy | 3 SH |
| POLS 7342 | Security and Resilience Studies Toolkit | 1 SH |

***Security***

| | | |
|---|---|---|
| POLS 7347 | Controversial Issues in Security Studies | 1 SH |
| POLS 7369 | International Security | 3 SH |

***Critical Infrastructure***

| | | |
|---|---|---|
| POLS 7704 | Critical Infrastructure Resilience | 4 SH |

### SPECIALIZATION

Complete one of the following specializations:

***Specialization in Administration, Management, and Policy***

Complete four of the following courses:

| | | |
|---|---|---|
| POLS 7202 | Quantitative Techniques | 3 SH |
| PPUA 6506 | Techniques of Policy Analysis | 3 SH |
| PPUA 6503 | Public Personnel Administration | 3 SH |
| PPUA 6504 | Organizational Theory and Management | 3 SH |
| PPUA 6505 | Public Budgeting and Financial Management | 3 SH |
| PPUA 6502 | Economic Institutions and Analysis | 3 SH |
| PPUA 6507 | Institutional Leadership and the Public Manager | 3 SH |

***Specialization in Counterterrorism and Conflict Studies***

Complete four of the following courses:

| | | |
|---|---|---|
| CRIM 7242 | Terrorism and International Crime | 3 SH |
| SOCL 7231 | Sociology of Prejudice and Violence | 3 SH |
| POLS 7343 | Counterterrorism | 3 SH |
| POLS 7344 | Hard Power, Soft Power, and Smart Power | 3 SH |
| POLS 7360 | Ethnic Political Conflict | 3 SH |
| POLS 7361 | U.S. National Security Policy | 3 SH |
| POLS 7363 | Politics of Revolution and Change | 3 SH |
| POLS 7364 | Terrorism, Violence, and Politics | 3 SH |
| POLS 7365 | Totalitarianism and Oppressive Government | 3 SH |
| POLS 7366 | Genocide in a Comparative Perspective | 3 SH |

***Specialization in Cybersecurity Policy***

Complete three of the following courses (12 semester hours):

| | | |
|---|---|---|
| IA 5001 | Cyberspace Technology and Applications | 3 SH |
| IA 5010 | Foundations of Information Assurance | 4 SH |
| IA 5200 | Security Risk Management and Assessment | 4 SH |
| IA 5210 | Information System Forensics | 4 SH |
| IA 5240 | Cyberlaw: Privacy, Ethics, and Digital Rights | 4 SH |
| IA 5250 | Decision Making for Critical Infrastructure | 4 SH |

***Specialization in Resilient Cities***

Complete four of the following courses (12 semester hours):

| | | |
|---|---|---|
| PPUA 5261 | Dynamic Modeling for Environmental Decision Making | 3 SH |
| PPUA 5262 | Big Data for Cities | 3 SH |
| PPUA 5263 | Geographic Information Systems for Urban and Regional Policy | 3 SH |
| PPUA 5265 | Urban and Regional Policy in Developing Countries | 3 SH |
| PPUA 5266 | Urban Theory and Science | 3 SH |
| PPUA 6201 | The Twenty-First Century City: Urban Opportunities and Challenges in a Global Context | 3 SH |
| PPUA 6205 | Research Design and Methodology in Urban and Regional Policy | 3 SH |
| PPUA 6206 | Research Toolkit for Urban and Regional Policy: Geographic Information Systems | 1 SH |
| PPUA 7237 | Advanced Spatial Analysis of Urban Systems | 3 SH |
| PPUA 7238 | Climate Change and Urbanization in Developing Countries | 3 SH |
| LPSC 7312 | Cities, Sustainability, and Climate Change | 3 SH |

### CAPSTONE

Requires 6 semester hours:

| | | |
|---|---|---|
| POLS 7980 | Capstone Project | 3 to 6 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

30 total semester hours required
Minimum 3.000 GPA required

## PhD in Political Science

Complete all courses and requirements listed below unless otherwise indicated.

### MILESTONES

Comprehensive exam
Annual review
Dissertation proposal
Language
Dissertation committee
Dissertation defense

### MAJOR REQUIREMENTS

***Inquiry and Design***

| | | |
|---|---|---|
| POLS 7200 | Perspectives on Social Science Inquiry | 3 SH |
| POLS 7201 | Research Design | 3 SH |

***Quantitative Techniques***

| | | |
|---|---|---|
| POLS 7202 | Quantitative Techniques | 3 SH |
| POLS 7215 | Advanced Quantitative Techniques | 3 SH |
| or LPSC 7215 | Advanced Quantitative Techniques | 3 SH |

***Seminars***

| | | |
|---|---|---|
| POLS 7204 | Seminar in Public Policy | 3 SH |
| POLS 7205 | Seminar in American Government and Politics | 3 SH |
| POLS 7206 | Seminar in Comparative Politics | 3 SH |
| POLS 7207 | Seminar in International Relations | 3 SH |

### ELECTIVES

*Note:* Courses from other disciplines may be chosen in consultation with your faculty advisor.

Complete eight courses (24 semester hours) in the following range:

POLS 7200 to POLS 7978

| | | |
|---|---|---|
| POLS 8982 | Readings | 1 to 4 SH |

### EXAM AND DISSERTATION

***Exam Preparation***

| | | |
|---|---|---|
| POLS 8960 | Exam Preparation—Doctoral | 0 SH |

***Dissertation***

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| POLS 9990 | Dissertation | 0 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

48 total semester hours required
Minimum 3.500 GPA required

## Graduate Certificate in Security and Resilience Studies

Complete all courses and requirements listed below unless otherwise indicated.

### GENERAL REQUIREMENTS

***Required Courses***

| | | |
|---|---|---|
| POLS 7341 | Security and Resilience Policy | 3 SH |
| POLS 7343 | Counterterrorism | 3 SH |
| POLS 7441 | Cyberconflict in the International System | 3 SH |

***Elective***

Complete one of the following courses (3 semester hours):

| | | |
|---|---|---|
| POLS 7369 | International Security | 3 SH |
| POLS 74XX | (pending approval) | |

### PROGRAM CREDIT/GPA REQUIREMENTS

12 total semester hours required
Minimum 3.000 GPA required

## SCHOOL OF PUBLIC POLICY AND URBAN AFFAIRS

**www.northeastern.edu/cssh/policyschool**

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*Graduate Program Directors*
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The School of Public Policy and Urban Affairs at Northeastern University offers programs that prepare students to use sophisticated analytical skills to understand the policy-making process. The master's degree programs provide experiential learning opportunities through internships and capstone projects. The interdisciplinary Law and Public Policy program offers the PhD and JD/MS degrees. It seeks to prepare students for careers in academia, research, government, nonprofit, or legal institutions. LPP examines law, legal institutions, and public policy from an interdisciplinary social science perspective using both quantitative and qualitative research methodologies. Students have an opportunity to engage in policy analysis and applied research in several fields, including sustainability, climate change, and environmental policy; health policyi; and urban policy.

The Master of Arts degree in international affairs will launch in fall 2015. This new program delivers a cutting-edge and interdisciplinary program. Its mission is to train students in global policy and advocacy issues; the major conceptual frameworks and sociocultural understandings that inform those processes and concerns; the role of international organizations in global governance; and alternative networks, movements, and organizations. Two tracks are offered—international public policy

and development and globalization and social justice. Each of these tracks builds on a curriculum of core theory courses, skills-based courses, and global and regional electives.

The Master of Public Administration (MPA) degree is an accredited graduate program in public administration that explores the theory and the practice of politics, public policy, and public management in the United States and other countries. The degree prepares students for a wide array of careers, from those in government to those in the nonprofit and private sectors.

The school also offers an interdisciplinary Master of Science in Urban and Regional Policy (MURP) that has students combine sophisticated analytical skills with a thorough understanding of how cities and regions work. Students prepare for careers in research and policy-making positions in an array of urban-focused public, nonprofit, and private-sector institutions. This program seeks to produce graduates who will be leaders with the ability to analyze global economic, technological, and social trends; develop policy responses designed to enable their respective cities and regions to adapt to those trends; and move those policies toward implementation.

The Master of Science in Urban Informatics program builds on Northeastern's extensive resources in data analytics and its reputation for experiential education and real-world problem solving. Students have an opportunity to gain state-of-the-art skills in quantitative analysis, data mining, machine learning, and data visualization. These skills are applied to contemporary challenges faced by cities throughout the globe.

Four graduate certificates are also available. The Graduate Certificate in Public Policy Analysis provides students with the tools necessary to analyze and shape public policy at the local, state, and national levels. The Graduate Certificate in Urban Informatics trains students with the practical and theoretical knowledge necessary to understand the complexity of interconnected urban systems and to analyze how these systems work together to create sustainable, resilient, and just cities. The Graduate Certificate in Nonprofit Sector, Philanthropy, and Social Change enables social change professionals in all sectors to respond more effectively and distinguishes itself from other nonprofit certificate programs by focusing on the relationship between social program implementation and funding. The Graduate Certificate in Urban Studies provides a core foundation in urban and regional policy theory and research methods and culminates in an applied capstone project.

## Academic Standing/Progress for Master's Students

Students in the master's and graduate certificate programs 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 warned 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. See the university's policy on academic standing on page 25 ("Minimum Cumulative Grade-Point Average") for details on probation and dismissal.

## Academic Standing/Progress for LPP PhD Students

A 3.333 grade-point average (GPA) or better in all core courses (LPSC 7305, LPSC 7308, LPSC 7310, LPSC 7311) and maintain an overall 3.333 average.

## Doctoral Degree Candidacy for LPP PhD Students

Complete all required course work with a minimum 3.500 GPA in the core courses and pass the comprehensive exams. Students entering with a bachelor's degree must complete 42 semester hours, and students entering with a JD or master's degree must complete 36 semester hours.

## MPA—Master of Public Administration

Complete all courses and requirements listed below unless otherwise indicated.

### GENERAL REQUIREMENTS

***Quantitative Techniques***

| | | |
|---|---|---|
| POLS 7202 | Quantitative Techniques | 3 SH |

***Analysis***

| | | |
|---|---|---|
| PPUA 6506 | Techniques of Policy Analysis | 3 SH |
| PPUA 6502 | Economic Institutions and Analysis | 3 SH |

***Administration and Management***

| | | |
|---|---|---|
| PPUA 6500 | Principles of Public Administration | 3 SH |
| PPUA 6503 | Public Personnel Administration | 3 SH |
| PPUA 6504 | Organizational Theory and Management | 3 SH |
| PPUA 6505 | Public Budgeting and Financial Management | 3 SH |
| PPUA 6507 | Institutional Leadership and the Public Manager | 3 SH |

***Capstone***

| | | |
|---|---|---|
| PPUA 6508 | Capstone Seminar in Public Policy and Public Management | 3 SH |

### OPTIONS

Complete one of the following options:

***Electives Option***

Complete five courses (15 semester hours) in the following ranges:

POLS 5000 to POLS 7999
CRIM 5000 to CRIM 7999
ECON 5000 to ECON 7999
ENGL 5000 to ENGL 7999
HIST 5000 to HIST 7999
LPSC 5000 to LPSC 7999
PPUA 5000 to PPUA 7999
SOCL 5000 to SOCL7999

***Internship/Electives Option***

INTERNSHIP

Requires 3 semester hours:

| | | |
|---|---|---|
| POLS 7407 | Internship in Politics and Public Administration | 1 to 6 SH |

ELECTIVES
Complete four courses (12 semester hours) in the following ranges:
POLS 5000 to POLS 7999
CRIM 5000 to CRIM 7999
ECON 5000 to ECON 7999
ENGL 5000 to ENGL 7999
HIST 5000 to HIST 7999
LPSC 5000 to LPSC 7999
PPUA 5000 to PPUA 7999
SOCL 5000 to SOCL7999

### PROGRAM CREDIT/GPA REQUIREMENTS

42 total semester hours required
Minimum 3.000 GPA required

## MS in Urban Informatics

Complete all courses and requirements listed below unless otherwise indicated.

### GENERAL REQUIREMENTS

***Data Science Courses***

| | | |
|---|---|---|
| DSSH 6301 | Introduction to Computational Statistics | 4 SH |
| DSSH 6302 | Information Design and Visual Analytics | 4 SH |
| DSCS 6020 | Collecting, Storing, and Retrieving Data | 4 SH |
| DSCS 6030 | Introduction to Data Mining/Machine Learning | 4 SH |

***Required Course Work***

| | | |
|---|---|---|
| PPUA 5262 | Big Data for Cities | 3 SH |
| PPUA 5263 | Geographic Information Systems for Urban and Regional Policy | 3 SH |
| PPUA 5266 | Urban Theory and Science | 3 SH |

***Analysis***

| | | |
|---|---|---|
| PPUA 7237 | Advanced Spatial Analysis of Urban Systems | 3 SH |
| or PPUA 5261 | Dynamic Modeling for Environmental Decision Making | 3 SH |

***Research or Capstone***

Complete one of the following courses (3 semester hours):

| | | |
|---|---|---|
| PPUA 6966 | Practicum | 1 to 4 SH |
| PPUA 7673 | Capstone in Public Policy and Urban Affairs | 3 SH |

***Portfolio***

Complete the urban portfolio course (pending approval).

### PROGRAM CREDIT/GPA REQUIREMENTS

32 total semester hours required
Minimum 3.000 GPA required

## MS in Urban and Regional Policy

Complete all courses and requirements listed below unless otherwise indicated.

### GENERAL REQUIREMENTS

***Quantitative Techniques***

| | | |
|---|---|---|
| POLS 7202 | Quantitative Techniques | 3 SH |

***Policy***

| | | |
|---|---|---|
| LPSC 6313 | Economic Analysis for Law, Policy, and Planning | 3 SH |
| LPSC 7311 | Strategizing Public Policy | 3 SH |
| PPUA 6204 | Urban Development and Politics | 3 SH |
| PPUA 6201 | The Twenty-First Century City: Urban Opportunities and Challenges in a Global Context | 3 SH |

***Evaluation and Research***

Complete PPUA 6509, PPUA 6205, and three additional courses in the following range:

| | | |
|---|---|---|
| PPUA 6509 | Techniques of Program Evaluation | 3 SH |
| PPUA 6205 | Research Design and Methodology in Urban and Regional Policy | 3 SH |

PPUA 6206 to PPUA 6213

***Capstone***

| | | |
|---|---|---|
| PPUA 7673 | Capstone in Public Policy and Urban Affairs | 3 SH |

### ELECTIVES/INTERNSHIP

Complete option A or option B.

***Option A—Electives***

Complete five courses (15 semester hours) in the following ranges. Course work outside the College of Social Science and Humanities will be considered with permission of faculty advisor:
POLS 5000 to POLS 7999
CRIM 5000 to CRIM 7999
ECON 5000 to ECON 7999
ENGL 5000 to ENGL 7999
HIST 5000 to HIST 7999
LPSC 5000 to LPSC 7999
PPUA 5000 to PPUA 7999
SOCL 5000 to SOCL7999

***Option B—Internship and Electives***

INTERNSHIP

| | | |
|---|---|---|
| PPUA 6407 | Internship in Urban and Regional Policy | 3 SH |

ELECTIVES
Complete four courses (12 semester hours) in the following ranges. Course work outside the College of Social Science and Humanities will be considered with permission of faculty advisor:
POLS 5000 to POLS 7999
CRIM 5000 to CRIM 7999
ECON 5000 to ECON 7999
ENGL 5000 to ENGL 7999

HIST 5000 to HIST 7999
LPSC 5000 to LPSC 7999
PPUA 5000 to PPUA 7999
SOCL 5000 to SOCL7999

### PROGRAM CREDIT/GPA REQUIREMENTS

42 total semester hours required
Minimum 3.000 GPA required

## MPP—Master of Public Policy

Complete all courses and requirements listed below unless otherwise indicated.

### MAJOR REQUIREMENTS

***Methods, Statistics, and Applications Core***

| | | |
|---|---|---|
| LPSC 7305 | Research and Statistical Methods | 3 SH |
| PPUA 6509 | Techniques of Program Evaluation | 3 SH |
| PPUA 6205 | Research Design and Methodology in Urban and Regional Policy | 3 SH |

***Policy Frameworks and Practice Core***

| | | |
|---|---|---|
| LPSC 6313 | Economic Analysis for Law, Policy, and Planning | 3 SH |
| LPSC 7311 | Strategizing Public Policy | 3 SH |
| PPUA 6506 | Techniques of Policy Analysis | 3 SH |
| PPUA XXXX | (pending approval) | |
| PPUA XXXX | (pending approval) | |

***Methods and Statistics Elective***

Complete one of the following courses:

| | | |
|---|---|---|
| LPSC 7215 | Advanced Quantitative Techniques | 3 SH |
| POLS 7216 | Applied Cases in Advanced Quantitative Methodology | 3 SH |
| PPUA 5261 | Dynamic Modeling for Environmental Decision Making | 3 SH |
| PPUA 5262 | Big Data for Cities | 3 SH |
| PPUA 5263 | Geographic Information Systems for Urban and Regional Policy | 3 SH |

### INTERNSHIP

Students entering the program with less than two years of relevant professional experience must complete a semester-length, professionally relevant internship (225 minimum hours). Academic credit is given for the internship. This requirement can be waived if the student is currently employed full-time in a professionally relevant position.

### ELECTIVES/SPECIALIZATION

No specialization is required—you may complete four courses (12 semester hours) from the following course lists. If you wish to pursue a specialization, complete four courses (12 semester hours) in one of the following specializations:

***Specialization in Policy Analytics and Statistics***

| | | |
|---|---|---|
| CRIM 7320 | Advanced Quantitative Models | 3 SH |
| CRIM 7715 | Multivariate Analysis 1 | 3 SH |
| LPSC 7215 | Advanced Quantitative Techniques | 3 SH |
| POLS 7216 | Applied Cases in Advanced Quantitative Methodology | 3 SH |
| PPUA 5261 | Dynamic Modeling for Environmental Decision Making | 3 SH |
| PPUA 5262 | Big Data for Cities | 3 SH |
| PPUA 5263 | Geographic Information Systems for Urban and Regional Policy | 3 SH |
| PPUA 7237 | Advanced Spatial Analysis of Urban Systems | 3 SH |

***Specialization in Sustainability and Climate Change***

| | | |
|---|---|---|
| LPSC 7312 | Cities, Sustainability, and Climate Change | 3 SH |
| LW 7329 | Environmental Law | 2 SH |
| POLS 7331 | Environmental Policy and Politics | 3 SH |
| PPUA 5260 | Ecological Economics | 3 SH |
| PPUA 5270 | Food Systems and Public Policy | 3 SH |

***Specialization in Urban Informatics***

| | | |
|---|---|---|
| PPUA 5261 | Dynamic Modeling for Environmental Decision Making | 3 SH |
| PPUA 5262 | Big Data for Cities | 3 SH |
| PPUA 5263 | Geographic Information Systems for Urban and Regional Policy | 3 SH |
| PPUA 5266 | Urban Theory and Science | 3 SH |
| PPUA 7237 | Advanced Spatial Analysis of Urban Systems | 3 SH |

***Specialization in Law and Policy***

| | | |
|---|---|---|
| CRIM 7208 | Law and Society | 3 SH |
| CRIM 7710 | Criminology and Public Policy 1 | 3 SH |
| LPSC 7308 | Law and Legal Reasoning | 3 SH |
| LW 7305 | Civil Advocacy | 2 SH |
| LW 7358 | Social Welfare Law | 2 SH |
| POLS 7257 | The U.S. Judicial Process | 3 SH |

***Specialization in Health Policy***

| | | |
|---|---|---|
| LW 7335 | Health Law | 2 SH |
| PPUA 7240 | Health Policy and Politics | 3 SH |
| PPUA 7241 | Issues in Health Policy and Administration | 3 SH |
| PPUA 7242 | Mental Health Policy Analysis and Administration | 3 SH |
| PHTH 5210 | Biostatistics in Public Health | 3 SH |
| PHTH 5212 | Public Health Administration and Policy | 3 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

39 total semester hours required
Minimum 3.000 GPA required

## MA in International Affairs

Complete all courses and requirements listed below unless otherwise indicated.

### GENERAL REQUIREMENTS

***Political Economy***

| | | |
|---|---|---|
| INTL 5200 | Political Economy: Interdisciplinary Perspectives | 3 SH |

***Social Science Methods***

Complete one of the following courses:

| | | |
|---|---|---|
| ECON 5110 | Microeconomic Theory | 4 SH |
| ECON 5120 | Macroeconomic Theory | 4 SH |
| ECON 7251 | International Finance | 4 SH |
| POLS 7201 | Research Design | 3 SH |
| POLS 7202 | Quantitative Techniques | 3 SH |
| SOCL 7210 | Statistical Methods of Sociology | 3 SH |
| SOCL 7211 | Research Methods | 3 SH |
| SOCL 7220 | Seminar in Qualitative Analysis | 3 SH |

***Public Policy***

Complete one of the following courses:

| | | |
|---|---|---|
| PPUA 6506 | Techniques of Policy Analysis | 3 SH |
| PPUA 6502 | Economic Institutions and Analysis | 3 SH |
| PPUA 6507 | Institutional Leadership and the Public Manager | 3 SH |
| PPUA 6551 | Nonprofit Organizations and Social Change | 3 SH |
| PPUA 6509 | Techniques of Program Evaluation | 3 SH |
| PPUA 6553 | Nonprofit Financial Resource Development | 3 SH |

***Geographic Information Systems or Approved Elective***

Complete the following course or an approved elective:

| | | |
|---|---|---|
| PPUA 6215 | Geographic Information Systems for Urban and Regional Policy | 3 SH |

### INTERNATIONAL AFFAIRS REQUIRED ELECTIVES

***Global Issues Elective***

Complete one of the following courses:

| | | |
|---|---|---|
| CRIM 7201 | Global Criminology | 3 SH |
| CRIM 7336 | Globalization of Crime and Justice | 3 SH |
| HIST 7237 | Legal History around the World | 3 SH |
| HIST 7239 | Space and Place | 3 SH |
| HIST 7316 | Research Seminar in Global Environmental History | 3 SH |
| PPUA 7243 | International Development Administration and Planning | 3 SH |
| POLS 7362 | Nationalism | 3 SH |
| POLS 7366 | Genocide in a Comparative Perspective | 3 SH |
| PHIL 5003 | Ethics, Justice, and Global Climate Change | 4 SH |
| PPUA 5260 | Ecological Economics | 3 SH |
| PPUA 5265 | Urban and Regional Policy in Developing Countries | 3 SH |
| PPUA 7238 | Climate Change and Urbanization in Developing Countries | 3 SH |
| RELS 5001 | Comparative Religious Ethics | 4 SH |
| SOCL 7230 | Political Ecology of Global Capitalism | 3 SH |

***Regional Elective***

Complete one of the following courses:

| | | |
|---|---|---|
| HIST 7227 | Twentieth-Century China: Revolutionary Change in a Global Context | 3 SH |
| HIST 7238 | Colonialism in Contemporary Africa | 3 SH |
| HIST 7252 | Topics in Middle Eastern History | 3 SH |
| POLS 7370 | Europe and European Union Governance | 3 SH |
| POLS 7376 | Government and Politics of the Middle East | 3 SH |
| POLS 7379 | Chinese Politics and Foreign Policy | 3 SH |
| POLS 7383 | Government and Politics of Latin America | 3 SH |
| POLS 7384 | Government and Politics of Africa | 3 SH |
| POLS 7385 | Transatlantic Relations | 3 SH |

### TRACKS

Complete one of the following tracks:

***International Public Policy Track***

GLOBAL GOVERNANCE

| | | |
|---|---|---|
| POLS 7387 | Global Governance | 3 SH |

PUBLIC POLICY ELECTIVES

Complete two of the following courses:

| | | |
|---|---|---|
| CRIM 7242 | Terrorism and International Crime | 3 SH |
| POLS 7207 | Seminar in International Relations | 3 SH |
| POLS 7282 | Contemporary Political Thought | 3 SH |
| PPUA 7244 | Comparative Public Policy and Administration | 3 SH |
| POLS 7333 | Science, Technology, and Public Policy | 3 SH |
| POLS 7351 | Democratization and Governance | 3 SH |
| POLS 7356 | Comparative Political Economy | 3 SH |
| POLS 7359 | International Law | 3 SH |
| POLS 7357 | International Political Economy | 3 SH |
| POLS 7369 | International Security | 3 SH |
| POLS 7XXX | (Pending Approval) | |

ADDITIONAL ELECTIVE

Complete one of the following courses:

| | | |
|---|---|---|
| CRIM 7242 | Terrorism and International Crime | 3 SH |
| POLS 7207 | Seminar in International Relations | 3 SH |
| POLS 7282 | Contemporary Political Thought | 3 SH |
| PPUA 7244 | Comparative Public Policy and Administration | 3 SH |
| POLS 7333 | Science, Technology, and Public Policy | 3 SH |
| POLS 7351 | Democratization and Governance | 3 SH |
| POLS 7356 | Comparative Political Economy | 3 SH |
| POLS 7359 | International Law | 3 SH |
| POLS 7357 | International Political Economy | 3 SH |

| | | |
|---|---|---|
| POLS 7369 | International Security | 3 SH |
| POLS 7XXX | (Pending Approval) | |
| CRIM 7201 | Global Criminology | 3 SH |
| CRIM 7336 | Globalization of Crime and Justice | 3 SH |
| HIST 7237 | Legal History around the World | 3 SH |
| HIST 7239 | Space and Place | 3 SH |
| HIST 7316 | Research Seminar in Global Environmental History | 3 SH |
| PPUA 7243 | International Development Administration and Planning | 3 SH |
| POLS 7362 | Nationalism | 3 SH |
| POLS 7366 | Genocide in a Comparative Perspective | 3 SH |
| PHIL 5003 | Ethics, Justice, and Global Climate Change | 4 SH |
| PPUA 5260 | Ecological Economics | 3 SH |
| PPUA 5265 | Urban and Regional Policy in Developing Countries | 3 SH |
| PPUA 7238 | Climate Change and Urbanization in Developing Countries | 3 SH |
| RELS 5001 | Comparative Religious Ethics | 4 SH |
| SOCL 7230 | Political Ecology of Global Capitalism | 3 SH |
| HIST 7227 | Twentieth-Century China: Revolutionary Change in a Global Context | 3 SH |
| HIST 7238 | Colonialism in Contemporary Africa | 3 SH |
| HIST 7252 | Topics in Middle Eastern History | 3 SH |
| POLS 7370 | Europe and European Union Governance | 3 SH |
| POLS 7376 | Government and Politics of the Middle East | 3 SH |
| POLS 7379 | Chinese Politics and Foreign Policy | 3 SH |
| POLS 7383 | Government and Politics of Latin America | 3 SH |
| POLS 7384 | Government and Politics of Africa | 3 SH |
| POLS 7385 | Transatlantic Relations | 3 SH |

***Development, Globalization, and Social Justice Track***

DEVELOPMENT, GLOBALIZATION, AND SOCIAL JUSTICE

| | | |
|---|---|---|
| SOCL 7221 | Globalization, Development, and Social Justice | 3 SH |

DEVELOPMENT, GLOBALIZATION, AND SOCIAL JUSTICE ELECTIVES

Complete two of the following courses:

| | | |
|---|---|---|
| HIST 7323 | Seminar: Modern Colonialism | 3 SH |
| INTL 7XXX | (Pending Approval) | |
| PHIL 5001 | Global Justice | 4 SH |
| POLS 7325 | Contemporary Issues in Third World Development | 3 SH |
| POLS 7351 | Democratization and Governance | 3 SH |
| SOCL 7100 | Queer Theory: Sexualities, Genders, Politics | 3 SH |
| SOCL 7221 | Globalization, Development, and Social Justice | 3 SH |
| SOCL 7222 | Gender and Globalization | 3 SH |
| SOCL 7225 | Gender and Social Movements | 3 SH |
| SOCL 7268 | Globalization and the City | 3 SH |

ADDITIONAL ELECTIVE

Complete one of the following courses:

| | | |
|---|---|---|
| HIST 7323 | Seminar: Modern Colonialism | 3 SH |
| INTL 7XXX | (Pending Approval) | |
| PHIL 5001 | Global Justice | 4 SH |
| POLS 7325 | Contemporary Issues in Third World Development | 3 SH |
| POLS 7351 | Democratization and Governance | 3 SH |
| SOCL 7100 | Queer Theory: Sexualities, Genders, Politics | 3 SH |
| SOCL 7221 | Globalization, Development, and Social Justice | 3 SH |
| SOCL 7222 | Gender and Globalization | 3 SH |
| SOCL 7225 | Gender and Social Movements | 3 SH |
| SOCL 7268 | Globalization and the City | 3 SH |
| CRIM 7201 | Global Criminology | 3 SH |
| CRIM 7336 | Globalization of Crime and Justice | 3 SH |
| HIST 7237 | Legal History around the World | 3 SH |
| HIST 7239 | Space and Place | 3 SH |
| HIST 7316 | Research Seminar in Global Environmental History | 3 SH |
| PPUA 7243 | International Development Administration and Planning | 3 SH |
| POLS 7362 | Nationalism | 3 SH |
| POLS 7366 | Genocide in a Comparative Perspective | 3 SH |
| PHIL 5003 | Ethics, Justice, and Global Climate Change | 4 SH |
| PPUA 5260 | Ecological Economics | 3 SH |
| PPUA 5265 | Urban and Regional Policy in Developing Countries | 3 SH |
| PPUA 7238 | Climate Change and Urbanization in Developing Countries | 3 SH |
| RELS 5001 | Comparative Religious Ethics | 4 SH |
| SOCL 7230 | Political Ecology of Global Capitalism | 3 SH |
| HIST 7227 | Twentieth-Century China: Revolutionary Change in a Global Context | 3 SH |
| HIST 7238 | Colonialism in Contemporary Africa | 3 SH |
| HIST 7252 | Topics in Middle Eastern History | 3 SH |
| POLS 7370 | Europe and European Union Governance | 3 SH |
| POLS 7376 | Government and Politics of the Middle East | 3 SH |
| POLS 7379 | Chinese Politics and Foreign Policy | 3 SH |
| POLS 7383 | Government and Politics of Latin America | 3 SH |
| POLS 7384 | Government and Politics of Africa | 3 SH |
| POLS 7385 | Transatlantic Relations | 3 SH |

## PROGRAM CREDIT/GPA REQUIREMENTS

30 total semester hours required

Minimum 3.000 GPA required

## JD/MS in Law and Public Policy

Complete all courses and requirements listed below unless otherwise indicated.

### LAW AND PUBLIC POLICY REQUIREMENTS

***Analysis and Statistical Methods***

| | | |
|---|---|---|
| LPSC 6313 | Economic Analysis for Law, Policy, and Planning | 3 SH |
| LPSC 7305 | Research and Statistical Methods | 3 SH |

***Law and Legal Reasoning***

| | | |
|---|---|---|
| LPSC 7308 | Law and Legal Reasoning | 3 SH |

***Policy Courses***

| | | |
|---|---|---|
| LPSC 7311 | Strategizing Public Policy | 3 SH |
| PPUA 7673 | Capstone in Public Policy and Urban Affairs | 3 SH |

***Evaluation and Research***

Complete four of the following courses (6 semester hours):

| | | |
|---|---|---|
| PPUA 6509 | Techniques of Program Evaluation | 3 SH |

PPUA 6206 to PPUA 6214

***Electives***

Complete 7 semester hours in the following ranges:
POLS 5000 to POLS 7999
CRIM 5000 to CRIM 7999
ECON 5000 to ECON 7999
ENGL 5000 to ENGL 7999
HIST 5000 to HIST 7999
LPSC 5000 to LPSC 7999
PPUA 5000 to PPUA 7999
SOCL 5000 to SOCL 7999
or any LW courses

### LAW REQUIREMENTS

***Law Requirements***

Complete 9 semester hours of courses in the LW or LAW subject areas.

### PROGRAM CREDIT/GPA REQUIREMENTS

37 total semester hours required
Minimum 3.000 GPA required

## PhD in Law and Public Policy

Complete all courses and requirements listed below unless otherwise indicated.

### MILESTONES

Comprehensive exam
Seminars
Annual review
Dissertation committee
Dissertation proposal
Dissertation defense

### MAJOR REQUIREMENTS

A GPA of 3.500 or higher is required.
A grade of B+ or higher is required in LPSC 7305, LPSC 7308, LPSC 7310, and LPSC 7311.

***Research and Statistical Methods***

| | | |
|---|---|---|
| LPSC 7305 | Research and Statistical Methods | 3 SH |
| or POLS 7202 | Quantitative Techniques | 3 SH |

***Law and Legal Reasoning***

| | | |
|---|---|---|
| ECON 7270 | Economics of Law and Regulation | 4 SH |
| LPSC 7308 | Law and Legal Reasoning | 3 SH |

***Policy Course***

| | | |
|---|---|---|
| LPSC 7311 | Strategizing Public Policy | 3 SH |

***Research Design***

| | | |
|---|---|---|
| LPSC 7310 | Research Design and Analysis | 3 SH |
| or PPUA 6205 | Research Design and Methodology in Urban and Regional Policy | 3 SH |

### ELECTIVES

***Public Policy Elective***

Complete one PPUA 6000-series course or any 6000-series course with program approval. Requires 3 semester hours.

***Methodology Elective***

Complete one of the following courses or any 6000-series course with program approval. Requires 3 semester hours:

| | | |
|---|---|---|
| LPSC 7215 | Advanced Quantitative Techniques | 3 SH |
| CRIM 7316 | Advanced Topics in Methods | 3 SH |
| PHTH 6320 | Qualitative Methods in Health and Illness | 3 SH |

***Law Elective***

Complete one LW course. Requires 2 semester hours.

***Economics Elective***

Complete one ECON 6000-series course or any 6000-series course with program approval. Requires 3 semester hours.

***Open Electives***

Complete three 6000-series courses in the following subject areas or any 6000-series courses with program approval.
Requires 9 semester hours:
LPSC, ECON, PPUA, POLS

### EXAM AND DISSERTATION

***Exam Prep***

| | | |
|---|---|---|
| LPSC 8960 | Exam Preparation—Doctoral | 0 SH |

***Dissertation***

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| LPSC 9990 | Dissertation | 0 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

36 total semester hours required
Minimum 3.500 GPA required

## Graduate Certificate in Public Policy Analysis

Complete all courses and requirements listed below unless otherwise indicated.

***Policy***

| | | |
|---|---|---|
| LPSC 6313 | Economic Analysis for Law, Policy, and Planning | 3 SH |
| LPSC 7311 | Strategizing Public Policy | 3 SH |
| or PPUA 6506 | Techniques of Policy Analysis | 3 SH |

***Methodology and Evaluation***

| | | |
|---|---|---|
| LPSC 7305 | Research and Statistical Methods | 3 SH |
| PPUA 6509 | Techniques of Program Evaluation | 3 SH |
| or PPUA 6205 | Research Design and Methodology in Urban and Regional Policy | 3 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

12 total semester hours required
Minimum 3.000 GPA required

## Graduate Certificate in Nonprofit Sector, Philanthropy, and Social Change

Complete all courses and requirements listed below unless otherwise indicated.

### GENERAL REQUIREMENTS

***Required Courses***

| | | |
|---|---|---|
| PPUA 6551 | Nonprofit Organizations and Social Change | 3 SH |
| PPUA 6552 | The Nonprofit Sector in Civil Society and Public Affairs | 3 SH |

***Electives***

Complete two of the following courses:

| | | |
|---|---|---|
| HUSV 5200 | Strategic Communications for Nonprofit Organizations | 3 SH |
| PPUA 5275 | Philanthropy and Civil Society | 3 SH |
| PPUA 6509 | Techniques of Program Evaluation | 3 SH |
| PPUA 6520 | Managing Information Technologies | 3 SH |
| PPUA 6522 | Administrative Ethics and Public Management | 3 SH |
| PPUA 6523 | Accountability, Performance Measurement, and Contracting in the Public Sector | 3 SH |
| PPUA 6553 | Nonprofit Financial Resource Development | 3 SH |
| PPUA 7243 | International Development Administration and Planning | 3 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

12 total semester hours required
Minimum 3.000 GPA required

## Graduate Certificate in Urban Informatics

Complete all courses and requirements listed below unless otherwise indicated.

### GENERAL REQUIREMENTS

***Required Courses***

| | | |
|---|---|---|
| PPUA 5262 | Big Data for Cities | 3 SH |
| PPUA 5263 | Geographic Information Systems for Urban and Regional Policy | 3 SH |
| PPUA 5266 | Urban Theory and Science | 3 SH |

***Elective***

Complete one of the following courses (3 semester hours):

| | | |
|---|---|---|
| PPUA 5261 | Dynamic Modeling for Environmental Decision Making | 3 SH |
| PPUA 6966 | Practicum | 1 to 4 SH |
| PPUA 7237 | Advanced Spatial Analysis of Urban Systems | 3 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

12 total semester hours required
Minimum 3.000 GPA required

## Graduate Certificate in Urban Studies

Complete all courses and requirements listed below unless otherwise indicated.

### GENERAL REQUIREMENTS

***Required Courses***

| | | |
|---|---|---|
| PPUA 6201 | The Twenty-First Century City: Urban Opportunities and Challenges in a Global Context | 3 SH |
| PPUA 6205 | Research Design and Methodology in Urban and Regional Policy | 3 SH |

or three toolkit courses in the following range:
PPUA 6206 to PPUA 6214

| | | |
|---|---|---|
| PPUA 7673 | Capstone in Public Policy and Urban Affairs | 3 SH |

***Elective***

Complete one course in the following range:
PPUA 5200 to PPUA 6407

### PROGRAM CREDIT/GPA REQUIREMENTS

12 total semester hours required
Minimum 3.000 GPA required

## SOCIOLOGY

**www.northeastern.edu/cssh/socant**

MATTHEW HUNT, PHD
*Professor and Chair*
LINDA M. BLUM, PHD
*Associate Professor and Graduate Program Director*

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Joan Collins, *Administrative Coordinator*

*Graduate Programs Booklet*
www.northeastern.edu/cssh/socant/graduate

The Department of Sociology and Anthropology at Northeastern University offers MA and PhD degrees in sociology within a flexible program attractive to students interested in both academic and nonacademic careers. The MA program has two tracks—one academic (sample curriculum displayed below) and one applied (in which the student substitutes an additional research methods course for one of the required courses in social theory). Students pursuing the PhD earn the MA degree (academic version) 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 concentration 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.

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 the Law and Public Policy program.

### Academic Standing/Progress

Evaluation of student progress is an essential feature of our graduate program. The fundamental purpose of the evaluation is to ensure that students complete the program in the most rewarding and successful way possible, by achieving the highest standards of excellence in their development as scholars. Such evaluation offers students substantive guidance about their projects and reminders to be timely in the completion of their work. In short, faculty members are committed to periodic evaluation as a constructive process.

The primary instrument for periodic evaluation is the annual Graduate Student Academic Progress (GSAP) process, which occurs annually at the end of the spring semester. The GSAP process considers the student's entire record—especially GPA, the quality of written work, and performance in core courses. After the GSAP meeting, the Committee on Graduate Studies (COGS) will either approve a graduate student's progress or, in rare cases when the record supports it, make a recommendation that the student be withdrawn from the program (see below).

Students are advised to periodically meet with their advisor to discuss their progress, accomplishments, and goals and plans for the next year.

The following specific criteria are used for evaluation:

1. Course grades. Attention is given to both the student's distribution of grades and the overall GPA.
2. Performance (and progress) on qualifying exam, comprehensive exams, and on the dissertation. The department will consider the quality of these aspects of the student's work and the timeliness with which they are completed.
3. Incompletes. Carrying Incompletes, and/or a recurrent failure to complete course work on time, will be considered a cause for concern.
4. Other factors. The faculty may also consider additional factors, including: a student's performance in core seminars, his or her ability to respond thoughtfully to faculty commentary on written work, the breadth of a student's course of study, and compliance with the university's code of ethics.

Ideally, the faculty will reach a consensus evaluation of each student and, particularly, of those who are having difficulties. The faculty may vote to initiate a set of procedures designed to steer a student who is having problems back toward satisfactory progress and/or toward a clear assessment of his or her fit with the program. If, after a careful review, the student's progress is deemed unsatisfactory, COGS may be compelled to recommend that he or she be withdrawn from the graduate program. See also the university's policy on academic standing on page 25 ("Minimum Cumulative Grade-Point Average").

### Doctoral Degree Candidacy

Students must have an MA degree either outside Northeastern or at Northeastern; completion of 24 semester hours of required course work beyond the MA, including two Advanced Research Methods courses (or equivalent as determined by the graduate committee); and pass (or have been waived out of) the qualifying examination (taken by the end of the first year in the program) and pass the candidacy examination (two field statements with the first defended by the close of the second year and the second in the

final year of course work). Students admitted with an MA degree from another institution may be required to do foundational course work in theory and methods, depending on the scope and quality of previous course work.

## MA in Sociology

Complete all courses and requirements listed below unless otherwise indicated.

### MILESTONE

MA paper

### MAJOR REQUIREMENTS

***Foundations***

| | | |
|---|---|---|
| SOCL 7200 | Foundations of Social Theory 1 | 3 SH |
| SOCL 7201 | Foundations of Social Theory 2 | 3 SH |

***Research Methods***

| | | |
|---|---|---|
| SOCL 7211 | Research Methods | 3 SH |

***Statistical Methods***

| | | |
|---|---|---|
| SOCL 7210 | Statistical Methods of Sociology | 3 SH |

### ELECTIVES

Complete six SOCL courses (18 semester hours).

### PROGRAM CREDIT/GPA REQUIREMENTS

30 total semester hours required
Minimum 3.000 GPA required

## PhD in Sociology—Advanced Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

### MILESTONES

Qualifying exam or waiver
Annual review
Two field comprehensive exams
Dissertation committee
Dissertation proposal
Dissertation defense

### MAJOR REQUIREMENTS

***Advanced Methods***

Complete two of the following courses:

| | | |
|---|---|---|
| SOCL 7212 | Feminist Methodologies | 3 SH |
| SOCL 7213 | Advanced Research Methods | 3 SH |
| SOCL 7215 | Advanced Quantitative Techniques | 3 SH |
| SOCL 7220 | Seminar in Qualitative Analysis | 3 SH |
| POLS 7215 | Advanced Quantitative Techniques | 3 SH |
| PPUA 6509 | Techniques of Program Evaluation | 3 SH |
| CRIM 7316 | Advanced Topics in Methods | 3 SH |
| CRIM 7715 | Multivariate Analysis 1 | 3 SH |
| PHTH 6320 | Qualitative Methods in Health and Illness | 3 SH |
| PPUA 6215 | Geographic Information Systems for Urban and Regional Policy | 3 SH |

### ELECTIVES

Complete six SOCL courses (18 semester hours).

### EXAM AND DISSERTATION

***Exam Preparation***

| | | |
|---|---|---|
| SOCL 8960 | Exam Preparation—Doctoral | 0 SH |

***Dissertation***

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| SOCL 9990 | Dissertation | 0 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

24 total semester hours required
Minimum 3.000 GPA required

## PhD in Sociology—Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

### MILESTONES

Qualifying exam
Annual review
Two field comprehensive exams
Dissertation committee
Dissertation proposal
Dissertation defense

### MAJOR REQUIREMENTS

***Required Course Work***

| | | |
|---|---|---|
| SOCL 7200 | Foundations of Social Theory 1 | 3 SH |
| SOCL 7201 | Foundations of Social Theory 2 | 3 SH |
| SOCL 7210 | Statistical Methods of Sociology | 3 SH |
| SOCL 7211 | Research Methods | 3 SH |

***Additional Courses***

Complete two additional courses (6 semester hours) chosen in consultation with your faculty advisor.

### ELECTIVES

Complete twelve SOCL courses (36 semester hours).

### EXAM AND DISSERTATION

***Exam Preparation***

| | | |
|---|---|---|
| SOCL 8960 | Exam Preparation—Doctoral | 0 SH |

***Dissertation***

Complete the following (repeatable) course twice:

| | | |
|---|---|---|
| SOCL 9990 | Dissertation | 0 SH |

### PROGRAM CREDIT/GPA REQUIREMENTS

54 total semester hours required
Minimum 3.000 GPA required

## INTERDISCIPLINARY

### PhD in Network Science

For information on the PhD in Network Science, refer to the College of Science's interdisciplinary section on page 306 or the network science program website at www.northeastern.edu/networkscience

### Graduate Certificate in Data Science

For more information on the certificate, refer to the program's website: www.northeastern.edu/datascience.

Complete all courses and requirements listed below unless otherwise indicated.

#### REQUIRED COURSE WORK

| | | |
|---|---|---|
| DSCS 6020 | Collecting, Storing, and Retrieving Data | 4 SH |
| DSCS 6030 | Introduction to Data Mining/Machine Learning | 4 SH |
| DSSH 6301 | Introduction to Computational Statistics | 4 SH |
| DSSH 6302 | Information Design and Visual Analytics | 4 SH |

#### PROGRAM CREDIT/GPA REQUIREMENTS

16 total semester hours required
Minimum 3.000 GPA required

### Graduate Certificate in Digital Humanities

Complete all courses and requirements listed below unless otherwise indicated.

#### GENERAL REQUIREMENTS

***Required Courses***

Requires five courses (9 semester hours):

TOPICS/READINGS/METHODS

| | | |
|---|---|---|
| ENGL 7370 | Topics in Digital Humanities | 3 SH |
| or HIST 7370 | Texts, Maps, and Networks: Readings and Methods for Digital History | 3 SH |

LAB PROJECT SEMINAR

| | | |
|---|---|---|
| ENGL XXXX | (pending approval) | |
| ENGL XXXX | (pending approval) | |
| ENGL XXXX | (pending approval) | |

FINAL PROJECT

| | | |
|---|---|---|
| ENGL XXXX | (pending approval) | |

***Elective***

Complete one of the following courses:

| | | |
|---|---|---|
| ARTG 5100 | Information Design Studio 1—Principles | 4 SH |
| CS 6120 | Natural Language Processing | 4 SH |
| DSSH 6301 | Introduction to Computational Statistics | 4 SH |
| ENGL 7370 | Topics in Digital Humanities | 3 SH |
| HIST 7219 | Topics in Cultural History | 3 SH |
| POLS 7344 | Hard Power, Soft Power, and Smart Power | 3 SH |

#### PROGRAM CREDIT/GPA REQUIREMENTS

12 total semester hours required
Minimum 3.000 GPA required

### Graduate Certificate in Women's, Gender, and Sexuality Studies

Complete all courses and requirements listed below unless otherwise indicated.

#### GENERAL REQUIREMENTS

***Required Course Work***

| | | |
|---|---|---|
| WMNS 6100 | Theorizing Gender and Sexuality | 3 SH |

***Electives***

Complete three of the following courses (9 semester hours):

| | | |
|---|---|---|
| CAEP 6380 | Seminar in Feminist Psychology | 3 SH |
| CRIM 7210 | Gender, Crime, and Justice | 3 SH |
| HIST 7290 | Race and Gender Frontiers: U.S. Encounters with Empire | 3 SH |
| HIST 7304 | Research Seminar in Gender and Society in the Modern World | 3 SH |
| SOCL 7100 | Queer Theory: Sexualities, Genders, Politics | 3 SH |
| SOCL 7202 | Feminist Theory | 3 SH |
| SOCL 7212 | Feminist Methodologies | 3 SH |
| SOCL 7222 | Gender and Globalization | 3 SH |
| SOCL 7225 | Gender and Social Movements | 3 SH |
| SOCL 7236 | The Family | 3 SH |
| SOCL 7237 | Women, Men, and Social Change | 3 SH |
| SOCL 7242 | Family Violence | 3 SH |
| SOCL 7248 | Race, Gender, Class: Feminist View | 3 SH |
| SOCL 7265 | Sociology of Gender | 3 SH |
| SOCL 7273 | Gender and Social Policy | 3 SH |
| WMNS 7100 | Queer Theory: Sexualities, Genders, Politics | 3 SH |
| WMNS 7615 | Feminist Inquiry | 3 SH |
| WMNS 7642 | Gender, Race, and the Complexities of Science and Technology | 3 SH |
| WMNS 7976 | Directed Study | 1 to 4 SH |
| WMNS 7900 | Special Topics in Women's, Gender, and Sexuality Studies | 3 SH |

#### PROGRAM CREDIT/GPA REQUIREMENTS

12 total semester hours required
Minimum 3.000 GPA required

# *Appendix*

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# Statements of Accreditation

## ACCREDITATION

Northeastern University has maintained its status as a member in good standing of the New England Association of Schools and Colleges (NEASC) Commission on Institutions of Higher Education (CIHE) since it was awarded its initial accreditation in 1940. The university was last reviewed by NEASC in 2008 and will be reviewed again in fall 2018.

Northeastern University possesses degree-granting authority in Massachusetts, under the auspices of the Massachusetts Board of Higher Education.

| Program | Accrediting Agency |
|---|---|
| Northeastern University | New England Association of Schools and Colleges (NEASC) |
| **Bouvé College of Health Sciences** | |
| BS in Athletic Training | Commission on Accreditation of Athletic Training Education (CAATE) |
| MS in Speech-Language Pathology and Audiology | Council on Academic Accreditation in Audiology and Speech-Language Pathology (CAA) of the American Speech-Language-Hearing Association (ASHA), Massachusetts Board of Education* |
| BS in Nursing | Commission on Collegiate Nursing Education (CCNE) and Massachusetts Board of Registration in Nursing** |
| MS in Physician Assistant Studies | Accreditation Review Commission on Education for the Physician Assistant, Inc. (ARC-PA) |
| MS in Nursing | Commission on Collegiate Nursing Education (CCNE) and Massachusetts Board of Registration in Nursing** |
| MS in Nursing in Anesthesia | Council on Accreditation of Nurse Anesthesia Educational Programs (COA); Commission on Collegiate Nursing Education (CCNE) and Massachusetts Board of Registration in Nursing** |
| Registered Nurse/BSN*** | Commission on Collegiate Nursing Education (CCNE) and Massachusetts Board of Registration in Nursing** |
| Post BS Doctor of Nursing Practice US Army Program in Anesthesia Nursing (USAGPAN) | Council on Accreditation of Nurse Anesthesia Educational Programs (COA) |
| DPT in Physical Therapy | Commission on Accreditation of Physical Therapy Education (CAPTE) |
| MS/MBA (two-year program) | Commission on Collegiate Nursing Education (CCNE) and Massachusetts Board of Registration in Nursing**; Commission on Collegiate Nursing Education (CCNE) and the Association to Advance Collegiate Schools of Business (AACSB International) |
| MS and CAGS in Applied Educational Psychology—School Psychology | Massachusetts Department of Education (DOE) and National Association of School Psychologists (NASP) |
| MS in Applied Educational Psychology—School Counseling | Massachusetts Department of Education (DOE) |
| AuD in Audiology | Council on Academic Accreditation in Audiology and Speech-Language Pathology (CAA) of the American Speech-Language- Hearing Association (ASHA), Massachusetts Board of Education* |
| MPH Master of Public Health in Urban Health | Council on Education for Public Health |
| PharmD | Accreditation Council for Pharmacy Education (ACPE) |
| PhD in Counseling and School Psychology | American Psychology Association (APA) |
| **College of Arts, Media and Design** | |
| Master of Architecture (Urban Architecture) | National Architectural Accreditation Board (NAAB) |

| Program | Accrediting Agency |
|---|---|
| **D'Amore-McKim School of Business** | |
| BS in Business Administration | AACSB International—The Association to Advance Collegiate Schools of Business |
| BS and MS in International Business | AACSB International—The Association to Advance Collegiate Schools of Business |
| MBA | AACSB International—The Association to Advance Collegiate Schools of Business |
| MS in Finance | AACSB International—The Association to Advance Collegiate Schools of Business |
| MS in Taxation | AACSB International—The Association to Advance Collegiate Schools of Business |
| MS in Accounting | AACSB International—The Association to Advance Collegiate Schools of Business |
| MS in Accounting/MBA | AACSB International—The Association to Advance Collegiate Schools of Business |
| MS in Finance/MBA | AACSB International—The Association to Advance Collegiate Schools of Business |
| MS in Technological Entrepreneurship | AACSB International—The Association to Advance Collegiate Schools of Business |
| **College of Computer and Information Science** | |
| BS in Computer Science | Computing Accreditation Commission of ABET (Accreditation Board for Engineering & Technology) |
| **College of Engineering** | |
| BS in Computer Engineering | Engineering Accreditation Commission of ABET |
| BS in Chemical Engineering | Engineering Accreditation Commission of ABET |
| BS in Civil Engineering | Engineering Accreditation Commission of ABET |
| BS in Electrical Engineering | Engineering Accreditation Commission of ABET |
| BS in Industrial Engineering | Engineering Accreditation Commission of ABET |
| BS in Mechanical Engineering | Engineering Accreditation Commission of ABET |

| Program | Accrediting Agency |
|---|---|
| **College of Professional Studies** | |
| AS and Certificate in Paramedic Technology | Massachusetts Department of Public Health, Office of Emergency Medical Services |
| BS in Finance and Accounting Management*** | AACSB International—The Association to Advance Collegiate Schools of Business |
| BS in Management*** | AACSB International—The Association to Advance Collegiate Schools of Business |
| BS and AS in Computer Engineering Technology | Accredited by the Technology Accreditation Commission of ABET, 111 Market Place Suite 1050 Baltimore, MD 21202-4012 Telephone: 410.347.7700 |
| BS and AS in Electrical Engineering Technology | Accredited by the Technology Accreditation Commission of ABET, 111 Market Place Suite 1050 Baltimore, MD 21202-4012 Telephone: 410.347.7700 |
| BS and AS in Mechanical Engineering Technology | Accredited by the Technology Accreditation Commission of ABET, 111 Market Place Suite 1050 Baltimore, MD 21202-4012 Telephone: 410.347.7700 |
| Education Programs in: | |
| 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 Science, 5–8, 8–12 | Massachusetts Department of Elementary and Secondary Education |
| Teacher of Mathematics, 5–8, 8–12 | Massachusetts Department of Elementary and Secondary Education |
| Teacher of Physics, 8–12 | Massachusetts Department of Elementary and Secondary Education |
| Elementary Education, 1–6 | Massachusetts Department of Elementary and Secondary Education |
| Teacher of English, 8–12 | Massachusetts Department of Elementary and Secondary Education |

| Program | Accrediting Agency |
|---|---|
| Teacher of Foreign Language: Spanish, 5–12 | Massachusetts Department of Elementary and Secondary Education |
| Teacher of History, 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 Students with Moderate Disabilities Pre-K–8, 5–12 | Massachusetts Department of Elementary and Secondary Education |
| MS in Leadership with Project Management | Project Management Institute's Global-Accreditation-Center |
| MS in Technology Commercialization | AACSB International—The Association to Advance Collegiate Schools |
| **College of Social Sciences and Humanities** | |
| BS in Criminal Justice | Massachusetts Board of Education* |
| MS in Criminal Justice | Massachusetts Board of Education* |
| PhD in Criminal Justice | Massachusetts Board of Education* |
| Master of Public Administration | National Association of Schools of Public Affairs and Administration |
| **School of Law** | |
| JD | American Bar Association<br>Association of American Law Schools**** |

*The Massachusetts Board of Education approves (not accredits) programs.

**The Massachusetts Board of Registration in Nursing approves (not accredits) programs.

***Accredited under the aegis of the "sponsoring" full-time college.

****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. See the corresponding addendum at www.northeastern.edu/online/about-northeastern-online/state-agreements.php for up-to-date, state-prescribed regulatory information.

# *Institutional Calendars and Online Resources*

The online resources listed below supplement this catalog.

## INSTITUTIONAL CALENDARS

**University events:**
www.curry.neu.edu

**Academic calendars:**
www.northeastern.edu/registrar/calendars.html

## OTHER ONLINE RESOURCES

**Course descriptions:**
www.northeastern.edu/registrar/banner-catalog.html

**Class schedules:**
www.northeastern.edu/registrar/banner-schedule.html

**Campus maps:**
www.northeastern.edu/campusmap

The *Northeastern University Graduate Catalog* contains the university's primary statements about these academic programs and degree requirements, as authorized by the president or the Board of Trustees. 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 the *Cooperative Education Student Handbook*, *Faculty Handbook*, and related procedural guides, as appropriate.

*Accreditation.* Northeastern University is accredited by the New England Association of Schools and Colleges, 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.

The *Northeastern University Graduate 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.

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.

*Tuition Default Policy.* In cases where the student defaults on his/her tuition, the student shall be liable for the outstanding tuition and all reasonable associated collection costs incurred by the university, including attorneys' fees.

*Emergency Closing of the University.* Northeastern University posts emergency announcements, including news of weather-related closings, on its homepage, at www.northeastern.edu, and notifies members of the community individually through the NU ALERT system. In addition, the university has made arrangements to notify students, faculty, and staff by radio and television when it becomes necessary to cancel classes because of extremely inclement weather. AM stations WBZ (1030), WILD (1090), and WRKO (680), and FM station WBUR (90.9) are the radio stations authorized to announce the university's decision to close. Television stations WBZ-TV4, WCVB-TV5, and WHDH-TV7 will also report cancellations. Since instructional television courses originate from live or broadcast facilities at the university, neither the classes nor the courier service operates when the university is closed. Please listen to the radio or television to determine whether the university will be closed.

If a storm occurs at night, the announcement of university closing is given to the radio stations at approximately 6 a.m. Classes are generally canceled for that entire day and evening at all campus locations unless stated otherwise. When a storm begins late in the day, cancellations of evening classes may be announced. This announcement is usually made between 2 and 3 p.m.

*Equal Opportunity Policy.* Northeastern University does not discriminate on the basis of race, color, religion, sex, sexual orientation, age, national origin, disability, or veteran status in admission to, access to, treatment in, or employment in its programs and activities. In addition, Northeastern University will not condone any form of sexual harassment. Handbooks containing the university's nondiscrimination policies and its grievance procedures are available in the Office of Institutional Diversity and Inclusion, 125 Richards Hall. Inquiries regarding the university's nondiscrimination policies may be directed to:

Office of Institutional Diversity and Inclusion
125 Richards Hall
Northeastern University
Boston, Massachusetts 02115
617.373.2133

Inquiries concerning the application of nondiscrimination policies may also be referred to the Regional Director, Office for Civil Rights, U.S. Department of Education, 8th Floor, 5 Post Office Square, Boston, MA 02109-3921.

*Disability Resource Center.* The Disability Resource Center provides a variety of disability-related services and accommodations to Northeastern University's students and employees 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.

*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 printed in the *Undergraduate Student Handbook* and *Graduate Student Handbook* and are distributed annually at registration for the university's colleges and graduate schools.

*Cleary 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 upon request from the Northeastern University Director of Public Safety, 360 Huntington Avenue, Boston, MA 02115, or by calling 617.373.2696.

*Mission Statement:*
To educate students for a life of fulfillment and accomplishment.
To create and translate knowledge to meet global and societal needs.

NU 10.29.15