

# Table of Contents

Graduate .....	9	Graduate Schools Academic Policies .....	27
General Admission and Transfer Credit .....	10	Academic Calendars .....	28
Regulations Applying to All Degree Programs .....	10	Student Records, Transcripts, and Related Policies .....	29
General Regulations and Requirements for Graduate Certificate Programs .....	11	Course Credit Guidelines .....	32
General Regulations and Requirements for the Master's Degree .....	11	Cooperative Education .....	32
General Regulations and Requirements for Professional Doctorate Degree Programs .....	11	Final Examinations and Related Policies on Other Exams .....	33
General Regulations and Requirements for the Certificate of Advanced Graduate Study .....	12	Graduation Requirements .....	33
Regulations Applying only to Doctor of Philosophy (PhD) Programs .....	12	Family Educational Rights and Privacy Act (FERPA) .....	33
General Regulations and Requirements for Interdisciplinary Graduate Degrees .....	13	Student Right-to-Know Act .....	34
Information for Entering Students .....	15	Code of Student Conduct .....	34
Living in Boston .....	15	Academic Appeals Policies and Procedures .....	34
Information for International Students .....	15	General Regulations .....	36
Academic Resources .....	16	Students' Bill of Academic Rights and Responsibilities .....	42
Libraries .....	16	PhD Programs .....	44
Office of the Registrar .....	17	Experiential PhD Leadership, Graduate Certificate .....	45
Information Technology Services .....	17	College of Arts, Media and Design .....	46
Campus Resources .....	18	Academic Policies and Procedures .....	46
Campus Recreation .....	18	General Information .....	46
Center for Advancing Teaching and Learning Through Research .....	18	Master's Degree Policies .....	46
Disability Resource Center .....	19	Graduate Student Classification .....	47
Employer Engagement and Career Design .....	19	School of Architecture .....	47
Graduate Student Government .....	19	Master of Architecture—One-Year Program .....	48
Husky Card Services .....	19	Master of Architecture—Two-Year Program .....	49
John A. and Marcia E. Curry Student Center .....	20	Master of Architecture—Three-Year Program .....	50
Northeastern University Bookstore .....	20	Master of Architecture—Three-Year Program—Advanced Degree Entrance .....	51
Parking .....	20	Master of Design for Sustainable Urban Environments—One-Year Program .....	52
Public Safety .....	20	Master of Design for Sustainable Urban Environments—Two-Year Program .....	52
University Health and Counseling Services .....	21	Art + Design .....	53
We Care .....	21	Experience Design, MFA .....	54
College Expenses .....	22	Information Design and Visualization, MFA .....	55
Tuition and Fees .....	22	Experience Design, MS .....	56
Student Refunds .....	23	Information Design and Visualization, MS .....	56
Financial Aid Assistance .....	23	Game Science and Design, MS .....	57
Bill Payment .....	25	Experience Design, Graduate Certificate .....	58
University-Wide Academic Policies and Procedures .....	27	Game Analytics, Graduate Certificate .....	59
		Information Design and Visualization, Graduate Certificate .....	59
		School of Journalism .....	60

Journalism, MA .....	60	Healthcare Administration and Policy, Graduate Certificate .....	89
Media Advocacy, MS .....	61	Innovation Management, Graduate Certificate .....	90
Interdisciplinary Programs .....	62	International Business, Graduate Certificate .....	90
Arts Administration and Cultural Entrepreneurship, MS .....	62	International Business—Online Program, Graduate Certificate .....	91
Creative Practice Leadership, MS .....	63	Investments, Graduate Certificate .....	91
Urban Planning and Policy, MS .....	64	Leadership and Human Capital, Graduate Certificate .....	92
Arts Administration, Graduate Certificate .....	66	Marketing, Graduate Certificate .....	92
Cultural Entrepreneurship, Graduate Certificate .....	67	Marketing—Online Program, Graduate Certificate .....	92
D'Amore-McKim School of Business .....	68	Mutual Fund Management, Graduate Certificate .....	93
Master of Science .....	68	Supply Chain Management, Graduate Certificate .....	93
Business Analytics, MS .....	68	Supply Chain Management—Online Program, Graduate Certificate .....	94
Innovation, MS .....	69	Technological Entrepreneurship, Graduate Certificate .....	94
International Management, MS .....	69	Khoury College of Computer Sciences .....	95
Technological Entrepreneurship, MS .....	70	Academic Policies and Procedures .....	95
Accounting, MSA .....	70	Absenteeism .....	95
Finance, MSF .....	71	Academic Integrity .....	95
Finance—Evening/Part-Time Program, MSF .....	71	Academic Probation and Dismissal .....	96
Finance—Online Program, MSF .....	72	Transfer of Credit .....	96
Quantitative Finance, MSF .....	72	Computer Science .....	96
International Business, MSIB .....	73	Computer Science, PhD .....	97
Taxation, MST .....	73	Computer Science, PhD—Advanced Entry .....	100
Taxation—Online Program, MST .....	74	Artificial Intelligence, MS .....	101
Master of Business Administration .....	74	Data Science, MS .....	101
MBA—Full-Time Program .....	74	Health Data Analytics, MS .....	102
MBA—Part-Time Program .....	77	Robotics, MS .....	103
MBA—Online Program .....	80	MSCS—Master of Science in Computer Science .....	103
Dual Degrees .....	82	MSCS—Master of Science in Computer Science—ALIGN Program .....	105
MSA/MBA—Accounting and Business Administration .....	82	Computer Science, Graduate Certificate .....	106
MSF/MBA—Finance and Business Administration—Part-Time .....	83	Data Analytics, Graduate Certificate .....	106
MSF/MBA—Finance and Business Administration—Online .....	84	Cybersecurity .....	106
Certificate Programs .....	85	Cybersecurity, PhD .....	107
Accounting and Financial Decision Making, Graduate Certificate .....	85	Cybersecurity, PhD—Advanced Entry .....	108
Accounting and Financial Decision Making—Online Program, Graduate Certificate .....	86	Cybersecurity, MS .....	109
Business Administration, Graduate Certificate .....	86	Cybersecurity, Graduate Certificate .....	110
Business Administration—Online Program, Graduate Certificate .....	87	Health Informatics .....	110
Corporate Finance, Graduate Certificate .....	88	Personal Health Informatics, PhD .....	111
Corporate Finance—Online Program, Graduate Certificate .....	88	Health Data Analytics, MS .....	102
Corporate Renewal, Graduate Certificate .....	89	Health Informatics, MS .....	114
Corporate Renewal—Online Program, Graduate Certificate .....	89	Interdisciplinary .....	115
		Data Science, MS .....	101

Game Science and Design, MS .....	57	Electrical and Computer Engineering with Concentration in Communications, Control, and Signal Processing, MSECE ....	160
Health Data Analytics, MS .....	102	Electrical and Computer Engineering with Concentration in Computer Systems and Software, MSECE .....	162
Robotics, MS .....	118	Electrical and Computer Engineering with Concentration in Computer Networks and Security, MSECE .....	165
Data Analytics, Graduate Certificate .....	106	Electrical and Computer Engineering with Concentration in Computer Vision, Machine Learning, and Algorithms, MSECE .....	167
College of Engineering .....	121	Electrical and Computer Engineering with Concentration in Electromagnetics, Plasma, and Optics, MSECE .....	169
Academic Policies and Procedures .....	121	Electrical and Computer Engineering with Concentration in Microsystems, Materials, and Devices, MSECE .....	172
Course Registration .....	121	Electrical and Computer Engineering with Concentration in Power Systems, MSECE .....	174
Academic Standards and Degree Requirements .....	122	Electrical and Computer Engineering Leadership, MSECEL ...	176
Reenrollment Policy for Full-time Students .....	123	Mechanical and Industrial Engineering .....	177
Bioengineering .....	124	Industrial Engineering, PhD .....	178
Bioengineering, PhD .....	125	Industrial Engineering, PhD—Advanced Entry .....	180
Bioengineering, PhD—Advanced Entry .....	128	Mechanical Engineering, PhD .....	183
Bioengineering, MSBioE .....	129	Mechanical Engineering, PhD—Advanced Entry .....	185
Chemical Engineering .....	131	Data Analytics Engineering, MS .....	188
Chemical Engineering, PhD .....	132	Human Factors, MS .....	191
Chemical Engineering, PhD—Advanced Entry .....	133	Robotics, MS .....	118
Chemical Engineering, MSCHE .....	135	Industrial Engineering, MSIE .....	194
Process Safety Engineering, Graduate Certificate .....	137	Engineering Management, MSEM .....	196
Civil and Environmental Engineering .....	137	Energy Systems, MSENES .....	199
Civil Engineering, PhD .....	138	Energy Systems, MSENES-Academic Link Program .....	201
Civil Engineering, PhD—Advanced Entry .....	139	Mechanical Engineering with Concentration in General Mechanical Engineering, MSME .....	202
Engineering and Public Policy with Concentration in Energy & Environment, MS .....	140	Mechanical Engineering with Concentration in Materials Science, MSME .....	203
Engineering and Public Policy with Concentration in Infrastructure Resilience, MS .....	142	Mechanical Engineering with Concentration in Mechanics and Design, MSME .....	205
Civil Engineering with Concentration in Water, Environmental, and Coastal Systems, MSCivE .....	143	Mechanical Engineering with Concentration in Mechatronics, MSME .....	207
Civil Engineering with Concentration in Construction Management, MSCivE .....	144	Mechanical Engineering with Concentration in Thermofluids, MSME .....	208
Civil Engineering with Concentration in Geotechnical/ Geoenvironmental Engineering, MSCivE .....	146	Operations Research, MSOR .....	210
Civil Engineering with Concentration in Structures Engineering, MSCivE .....	147	Data Analytics Engineering, Graduate Certificate .....	212
Civil Engineering with Concentration in Transportation, MSCivE .....	148	Energy Systems, Graduate Certificate .....	213
Environmental Engineering, MSENVE .....	149	Energy Systems Management, Graduate Certificate .....	213
Sustainable Building Systems, MSSBS .....	150	Engineering Business, Graduate Certificate .....	213
Electrical and Computer Engineering .....	151	Engineering Economic Decision Making, Graduate Certificate .....	214
Computer Engineering, PhD .....	152	Engineering Management, Graduate Certificate .....	214
Computer Engineering, PhD—Advanced Entry .....	153	Lean Six Sigma, Graduate Certificate .....	215
Electrical Engineering, PhD .....	154		
Electrical Engineering, PhD—Advanced Entry .....	155		
Applied Physics and Engineering, MS .....	156		
Data Science, MS .....	101		
Robotics, MS .....	118		

Renewable Energy, Graduate Certificate .....	215	Health Informatics, MS .....	114
Sustainable Energy Systems, Graduate Certificate .....	215	Law and Public Health, JD/MPH .....	241
Supply Chain Engineering Management, Graduate Certificate .....	216	Physician Assistant Studies and Health Informatics, MS/MS .....	242
Technology Systems Management, Graduate Certificate .....	216	Public Health and Health Informatics, MPH/MS .....	243
Multidisciplinary Programs .....	216	Biopharmaceutical Analytical Sciences, Graduate Certificate .....	244
Computer Systems Engineering with Concentration in Software Design Engineering, MSCSE .....	217	Early Intervention, Graduate Certificate .....	244
Information Systems, MSIS .....	218	Health Informatics Management and Exchange, Graduate Certificate .....	244
Cyber-Physical Systems, MS .....	219	Health Informatics Privacy and Security, Graduate Certificate .....	245
Data Architecture and Management, MS .....	220	Health Informatics Software Engineering, Graduate Certificate .....	245
Telecommunication Networks, MS .....	221	Applied Psychology .....	245
Blockchain and Smart Contract Engineering, Graduate Certificate .....	222	Counseling Psychology, PhD .....	246
Broadband Wireless Systems, Graduate Certificate .....	223	School Psychology, PhD .....	247
Computer Systems Engineering, Graduate Certificate .....	223	Applied Behavior Analysis, CAGS .....	248
IP Telephony Systems, Graduate Certificate .....	223	Counseling Psychology, CAGS .....	248
Gordon Institute of Engineering Leadership .....	224	Applied Behavior Analysis, MS .....	249
Engineering Leadership, Graduate Certificate .....	225	Counseling Psychology, MSCP .....	249
Interdisciplinary PhD Programs .....	226	School Psychology, MS/CAGS .....	250
Interdisciplinary Engineering, PhD .....	226	Applied Behavior Analysis, Graduate Certificate .....	251
Network Science, PhD .....	227	Communication Sciences and Disorders .....	251
Population Health, PhD .....	229	Speech-Language Pathology, MS .....	252
Graduate School of Engineering Certificates .....	230	Early Intervention, Graduate Certificate .....	244
Bouvé College of Health Sciences .....	231	Health Sciences .....	253
Academic Policies and Procedures .....	231	Population Health, PhD .....	229
Health Certification .....	231	Public Health, MPH .....	255
Requirements for Clinical, Internships, and Practicum Courses .....	231	Exercise Science with Concentration in Physical Activity and Public Health, MS .....	256
Background Checks .....	232	Health Data Analytics, MS .....	102
Liability Insurance .....	233	Health Informatics, MS .....	114
Advising .....	233	Pharmacy and Public Health, PharmD/MPH .....	258
Transfer of Credit .....	233	Physician Assistant Studies and Public Health, MS/MPH .....	259
Course Substitution .....	233	Public Health and Exercise Science with Concentration in Physical Activity and Public Health, MPH/MS .....	260
Academic Progression .....	233	Public Health and Health Informatics, MPH/MS .....	243
Student's Academic Standing .....	234	Exercise Science for Clinicians, Graduate Certificate .....	262
Academic Probation Policy .....	234	Health Informatics Management and Exchange, Graduate Certificate .....	244
Academic Affairs Appeals Process .....	234	Health Informatics Privacy and Security, Graduate Certificate .....	245
Financial Awards .....	236	Health Informatics Software Engineering, Graduate Certificate .....	245
Graduation Policies .....	236	School of Nursing .....	263
Academic Dismissal .....	236		
Interdisciplinary .....	237		
Personal Health Informatics, PhD .....	111		
Health Data Analytics, MS .....	102		

Nursing, PhD (Post-BSN) .....	264	Physician Assistant Studies, MS .....	292
Nursing, PhD—Advanced Entry (Post-MSN) .....	265	Physician Assistant Studies and Health Informatics, MS/MS .....	242
Nursing Practice, DNP (Post-Masters) .....	266	Physician Assistant Studies and Public Health, MS/MPH .....	259
Nursing Practice with Concentration in Nurse Anesthesia, DNP .....	266	Physician Assistant and Nurse Practitioner Leadership and Management, Graduate Certificate .....	295
Adult-Gerontology Nurse Practitioner, Acute Care, CAGS .....	267	School of Law .....	296
Adult-Gerontology Nurse Practitioner, Primary Care, CAGS .....	267	Legal Studies, MLS—Online .....	296
Psychiatric Mental Health Nurse Practitioner, CAGS .....	268	Media Advocacy, MS .....	61
Neonatal Nurse Practitioner, CAGS .....	268	Business Law, Graduate Certificate .....	298
Pediatric Nurse Practitioner, Acute Care, CAGS .....	268	Health Law, Graduate Certificate .....	299
Pediatric Nurse Practitioner, Acute and Primary Care, CAGS .....	269	Healthcare Compliance, Graduate Certificate .....	300
Pediatric Nurse Practitioner, Primary Care, CAGS .....	269	Human Resources Law, Graduate Certificate .....	300
Adult-Gerontology Nurse Practitioner, Acute Care, MS .....	270	Intellectual Property Law, Graduate Certificate .....	301
Adult-Gerontology Nurse Practitioner, Primary Care, MS .....	270	College of Professional Studies .....	303
Family Nurse Practitioner, Primary Care, MS .....	271	Academic Policies and Procedures .....	303
Neonatal Nurse Practitioner, MS .....	271	Master's Degree Admission Requirements .....	303
Pediatric Nurse Practitioner, Acute and Primary Care, MS .....	272	Transfer Credit Policies .....	303
Pediatric Nurse Practitioner, Primary Care, MS .....	272	Special Student Status .....	304
Psychiatric Mental Health Nurse Practitioner, MS .....	273	Personal Professional Enrichment (PPE) .....	304
Nursing—Direct Entry, MS .....	273	New Student Orientation (On-Ground and Online) .....	304
Nursing Informatics, Graduate Certificate .....	276	Academic Resources .....	304
School of Pharmacy .....	277	Attendance Requirements .....	304
Biomedical Sciences, PhD .....	277	Attendance Verification .....	305
Biomedical Sciences, PhD—Advanced Entry .....	278	Reentry to Program .....	305
Medicinal Chemistry, PhD .....	278	Readmission to Program .....	306
Medicinal Chemistry, PhD—Advanced Entry .....	279	Full-Time Status .....	306
Pharmaceutical Sciences, PhD .....	279	Active-Duty Military Personnel .....	307
Pharmaceutical Sciences, PhD—Advanced Entry .....	280	Registration and Taking Courses .....	307
Pharmacology, PhD .....	280	Student Evaluation of Courses (EvaluationKit) .....	308
Pharmacology, PhD—Advanced Entry .....	281	Academic Progression Standards .....	308
Pharmacy, PharmD .....	281	Reinstatement after Academic Dismissal .....	309
Pharmacy, PharmD—Direct Entry .....	281	Completing Degree Requirements .....	309
Biomedical Sciences, MS .....	285	Degrees, Majors, and Concentrations .....	309
Medicinal Chemistry, MS .....	286	Seeking more than One Certificate or Degree .....	309
Pharmaceutical Sciences, MS .....	286	Graduation Requirements .....	310
Pharmacology, MS .....	287	Global Partnership Programs .....	310
Pharmacy and Public Health, PharmD/MPH .....	258	Accommodations for Students with Disabilities .....	310
Physical Therapy, Movement, and Rehabilitation Sciences .....	289	Personal Information .....	311
Physical Therapy—Postbaccalaureate Entry .....	289	Graduate Campus .....	311
Human Movement and Rehabilitation Sciences, PhD .....	291	Doctoral Degree Programs .....	311
Occupational Ergonomics and Health, Graduate Certificate .....	292	Education, EDD .....	311
Physician Assistant .....	292	Law and Policy, DLP .....	314

Physical Therapy, DPT .....	315	Graduate Certificate Programs .....	358
Physical Therapy, DPT—Direct Entry .....	315	3-D Animation, Graduate Certificate .....	358
Master’s Degree Programs .....	316	Adult And Organizational Learning, Graduate Certificate .....	359
Homeland Security, MA .....	317	Advanced Study in Orthopedics, Graduate Certificate .....	359
Strategic Intelligence and Analysis, MA .....	318	Agile Project Management, Graduate Certificate .....	359
Teaching, Elementary Licensure, MAT .....	319	Cloud Computing Application and Management, Graduate Certificate .....	360
Teaching, Secondary Licensure, MAT .....	320	Collegiate Athletics Administration, Graduate Certificate .....	360
Education, MEd .....	321	Computer Industry Writing, Graduate Certificate .....	361
Higher Education Administration, MEd .....	323	Construction Management, Graduate Certificate .....	361
Analytics, MPS .....	323	Cross-Cultural Communication, Graduate Certificate .....	361
Digital Media, MPS .....	324	Digital Media Management, Graduate Certificate .....	362
Digital Media, MPS—Connect .....	326	Digital Video, Graduate Certificate .....	362
Enterprise Intelligence, MPS .....	328	Domestic Biopharmaceutical Regulatory Affairs, Graduate Certificate .....	362
Geospatial Services, MPS .....	329	eLearning and Instructional Design, Graduate Certificate .....	363
Informatics, MPS .....	330	Emergency Management, Graduate Certificate .....	363
Applied Nutrition, MS .....	331	Experiential Teaching and Learning, Graduate Certificate .....	363
Commerce and Economic Development, MS .....	332	Financial Markets And Institutions, Graduate Certificate .....	364
Corporate and Organizational Communication, MS .....	333	Forensic Accounting, Graduate Certificate .....	364
Criminal Justice, MS .....	335	Game Design, Graduate Certificate .....	364
Human Resources Management, MS .....	336	Geographic Information Systems, Graduate Certificate .....	365
Global Studies and International Relations, MS .....	338	Global Student Mobility, Graduate Certificate .....	365
Leadership, MS .....	339	Global Studies And International Relations, Graduate Certificate .....	365
Nonprofit Management, MS .....	341	Health Management, Graduate Certificate .....	366
Program and Portfolio Project Management, MS .....	342	Higher Education Administration, Graduate Certificate .....	366
Project Management, MS .....	343	Human-Centered Informatics, Graduate Certificate .....	367
Regulatory Affairs for Drugs, Biologics, and Medical Devices with Concentration in Clinical Research Regulatory Affairs, MS .....	346	Human Resources Management, Graduate Certificate .....	367
Regulatory Affairs for Drugs, Biologics, and Medical Devices with Concentration in General Regulatory Affairs, MS .....	347	Information Security Management, Graduate Certificate .....	367
Regulatory Affairs for Drugs, Biologics, and Medical Devices with Concentration in International Regulatory Affairs, MS .....	348	Interactive Design, Graduate Certificate .....	368
Regulatory Affairs for Drugs, Biologics, and Medical Devices with Concentration in Medical Devices, MS .....	349	Interdisciplinary Professional Studies, Graduate Certificate .....	368
Regulatory Affairs for Drugs, Biologics, and Medical Devices with Concentration in Non-Clinical Biomedical Product Regulation, MS .....	350	International Biopharmaceutical Regulatory Affairs, Graduate Certificate .....	369
Regulatory Affairs for Drugs, Biologics, and Medical Devices with Concentration in Operational Regulatory Affairs, MS .....	351	Leadership, Graduate Certificate .....	370
Regulatory Affairs for Drugs, Biologics, and Medical Devices with Concentration in Quality Assurance and Compliance, MS .....	352	Leading and Managing Technical Projects, Graduate Certificate .....	370
Regulatory Affairs for Drugs, Biologics, and Medical Devices with Concentration in Strategic Regulatory Affairs, MS .....	353	Learning Analytics, Graduate Certificate .....	371
Regulatory Affairs of Food and Food Industries, MS .....	354	Medical Devices Regulatory Affairs, Graduate Certificate .....	371
Respiratory Care Leadership, MS .....	355	Nonclinical Biomedical Product Regulation, Graduate Certificate .....	372
Technical Communication, MS .....	356	Nonprofit Management, Graduate Certificate .....	372
Sports Leadership, MSLD .....	357	Organizational Communication, Graduate Certificate .....	373
		Port Security, Graduate Certificate .....	373

Professional Sports Administration, Graduate Certificate .....	373	Molecular Biotechnology, Graduate Certificate .....	394
Program And Portfolio Management, Graduate Certificate ....	374	Pharmaceutical Technologies, Graduate Certificate .....	394
Project Business Analysis, Graduate Certificate .....	374	Process Science, Graduate Certificate .....	395
Project Management, Graduate Certificate .....	374	Regulatory Science, Graduate Certificate .....	395
Public and Media Relations, Graduate Certificate .....	375	Marine and Environmental Sciences .....	396
Quality Assurance in Biomedical Product Regulation, Graduate Certificate .....	375	Marine and Environmental Sciences, PhD .....	396
Remote Sensing, Graduate Certificate .....	376	Marine and Environmental Sciences, PhD—Advanced Entry .....	398
Respiratory Specialty Practice, Graduate Certificate .....	376	Environmental Science and Policy, MS .....	399
Social Media And Online Communities, Graduate Certificate .....	377	Marine Biology, MS—Three Seas Program .....	401
Teaching English To Speakers Of Other Languages, Graduate Certificate .....	377	Mathematics .....	401
Usability, Graduate Certificate .....	377	Mathematics, PhD .....	402
College of Science .....	379	Mathematics, PhD—Advanced Entry .....	404
Academic Policies and Procedures .....	379	Applied Mathematics, MS .....	406
Academic Appeals Procedures .....	379	Mathematics, MS .....	407
Grading Policies .....	381	Operations Research, MSOR .....	407
Cooperative Education Policies .....	381	Physics .....	408
Course Registration .....	382	Physics, PhD .....	408
Transfer Credit .....	382	Physics, PhD—Advanced Entry .....	411
Awards .....	382	Physics, MS .....	413
Satisfactory Progress .....	382	Nanomedicine, Graduate Certificate .....	414
Time Limitation .....	382	Psychology .....	415
Changes in Requirements .....	383	Psychology, PhD .....	415
The Doctor of Philosophy Degree (PhD) .....	383	Psychology, PhD—Advanced Entry .....	416
The Master’s Degree Academic Requirements .....	383	Interdisciplinary .....	417
Biology .....	384	Network Science, PhD .....	227
Biology, PhD .....	384	Applied Physics and Engineering, MS .....	156
Biology, PhD—Advanced Entry .....	385	Graduate Certificate Programs .....	420
Bioinformatics, MS .....	385	College of Social Sciences and Humanities .....	422
Bioinformatics, Graduate Certificate .....	387	School of Criminology and Criminal Justice .....	422
Chemistry and Chemical Biology .....	388	Criminology and Justice Policy, PhD .....	423
Chemistry, PhD .....	389	Criminology and Justice Policy, PhD—Advanced Entry .....	423
Chemistry, PhD—Advanced Entry .....	389	Criminology and Criminal Justice, MS .....	424
Biotechnology, MS .....	390	Law, Criminology and Justice Policy, JD/PhD .....	425
Chemistry, MS .....	392	Law, Criminology and Justice Policy, JD/PhD—Advanced Entry .....	426
Biopharmaceutical Analytical Sciences, Graduate Certificate .....	244	Law, Criminology and Criminal Justice, JD/MS .....	427
Biotechnology, Graduate Certificate .....	393	Economics .....	427
Biotechnology Enterprise, Graduate Certificate .....	393	Economics, PhD .....	428
Experimental Biotechnology, Graduate Certificate .....	394	Economics, PhD—Advanced Entry .....	429
Manufacturing and Quality Operations in Biotechnology, Graduate Certificate .....	394	Economics, MS .....	431
		English .....	432
		English, PhD .....	432

English, PhD—Advanced Entry .....	433	Data Analytics, Graduate Certificate .....	106
English, MA .....	434	Digital Humanities, Graduate Certificate .....	435
Digital Humanities, Graduate Certificate .....	435	Information Ethics, Graduate Certificate .....	474
History .....	435	Women's, Gender, and Sexuality Studies, Graduate Certificate .....	474
History, PhD .....	436	Faculty .....	476
History, PhD—Advanced Entry .....	436	Appendix .....	516
History, MA .....	437	University Leadership .....	516
Public History, Graduate Certificate .....	438	Governing Boards and Officers of Northeastern .....	516
Political Science .....	438	Statements of Accreditation and State Authorization .....	518
Political Science, PhD .....	439	General Information .....	520
Political Science, PhD—Advanced Entry .....	440	Resources .....	521
Political Science, MA .....	441	Index .....	522
Public Administration, MPA .....	443		
Security and Resilience Studies, MS .....	444		
Security and Resilience Studies, Graduate Certificate .....	446		
School of Public Policy and Urban Affairs .....	446		
Public Policy, PhD .....	447		
Public Policy, PhD—Advanced Entry .....	449		
International Affairs, MA .....	450		
Public Administration, MPA .....	443		
Public Policy, MPP .....	452		
Urban Informatics, MS .....	453		
Urban Planning and Policy, MS .....	64		
Environmental Science and Policy, MS .....	399		
Engineering and Public Policy with Concentration in Infrastructure Resilience, MS .....	142		
Engineering and Public Policy with Concentration in Energy & Environment, MS .....	140		
Public Policy Analysis, Graduate Certificate .....	461		
Nonprofit Sector, Philanthropy, and Social Change, Graduate Certificate .....	461		
Urban Analytics, Graduate Certificate .....	462		
Urban Studies, Graduate Certificate .....	463		
Law and Public Policy, JD/MS .....	463		
Sociology .....	464		
Sociology, PhD .....	464		
Sociology, PhD—Advanced Entry .....	466		
Interdisciplinary .....	467		
Network Science, PhD .....	227		
Environmental Science and Policy, MS .....	399		
Engineering and Public Policy with Concentration in Energy & Environment, MS .....	140		
Engineering and Public Policy with Concentration in Infrastructure Resilience, MS .....	142		



*Graduate*

# General Admission and Transfer Credit

- Regulations Applying to All Degree Programs (p. 10)
- General Regulations and Requirements for Graduate Certificate Programs (p. 11)
- General Regulations and Requirements for the Master's Degree (p. 11)
- General Regulations and Requirements for Professional Doctorate Degree Programs (p. 11)
- General Regulations and Requirements for the Certificate of Advanced Graduate Study (p. 12)
- Regulations Applying only to Doctor of Philosophy (PhD) Programs (p. 12)
- General Regulations and Requirements for Interdisciplinary Graduate Degrees (p. 13)

## Regulations Applying to All Degree Programs

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

Standards of admission are specific to certificate and degree programs and are found in the Graduate Catalog. (p. 9)

## Admission Requirements

Prior to beginning a graduate program at Northeastern, students must have:

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

## Transfer Credit

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

- For certificate programs, no transfer credit is permitted.
- For master's degree programs, a maximum of 9 semester hours or 12 quarter hours of credit earned at another institution may be accepted towards the degree being pursued at Northeastern, provided the credits:
  1. Consist of work taken at the graduate level for graduate credit,
  2. Carry grades of 3.000 or better,
  3. Have been earned at an accredited institution,
  4. Have not been used toward any baccalaureate or advanced degree or certificate at another institution.

Graduate course credits earned at Northeastern by undergraduate students enrolled in a PlusOne program will be double-counted toward both the undergraduate and graduate degrees as prescribed by the graduate program in which the student is enrolled, not to exceed 16 semester hours. Transfer credit may not be applied to graduate degrees that are completed as part of a PlusOne program. Graduate programs may approve advanced standing credit towards its degree programs from industry-based courses deemed equivalent to, or in place of, degree requirements, not to exceed 9 semester hours or 12 quarter hours. In each case the degree program curriculum committee must approve of the course assessments or provide an assessment to evaluate learning outcomes.

- For doctoral programs, a maximum of 25 percent of the total semester hours of required coursework may be granted upon the recommendation of the admitting college's graduate committee.
- Transfer credits must have been earned within five academic years of the date of matriculation in the Northeastern program to which they are to be applied.
- Grades earned in courses to be applied as transfer credits are not counted as part of the overall grade point average earned at Northeastern, and are posted with a grade of "T" to the transcript.

## Uniform Credit System

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

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

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

Additional information on course and credit guidelines can be found here (p. 32).

## Undergraduate Credit for Graduate Courses

Undergraduate students who are juniors or seniors may enroll in graduate courses for credit toward their undergraduate degrees if they meet all prerequisites as determined by the graduate director and they receive permission from the instructor of the course and from the student's undergraduate academic advisor.

## Time Limit for Course Credit

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

## Academic Progression

Grades submitted to satisfy, in whole or in part, the requirements for any graduate degree or certificate of advanced study must yield a cumulative 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 will be placed on academic probation and if the student remains on academic probation for 2 terms, they may be terminated from the graduate program.

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

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

### Language Requirements

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

### Required Training

Graduate programs may require relevant training that all of the program's students must

## General Regulations and Requirements for Graduate Certificate Programs

### Certificates that Appear on the Transcript

#### DEFINITION

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

#### ADMISSION

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

#### PROCEDURES FOR THE APPROVAL OF NEW CERTIFICATE PROGRAMS

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

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

#### PROCEDURES FOR CERTIFICATE PROGRAM REVIEW

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

#### GENERAL REGULATIONS

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

### Transcript Notation

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

## General Regulations and Requirements for the Master's Degree

### Admissions Requirements

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

### Provisional or Special Students

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

### Course Requirements

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

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

### Comprehensive Examination

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

### Thesis

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

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

## General Regulations and Requirements for Professional Doctorate Degree Programs

### Admissions Requirements

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

## Provisional or Special Students

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

## Course Requirements

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

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

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

## Comprehensive Examination

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

## Thesis

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

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

## General Regulations and Requirements for 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 masters and doctoral degree and culminates in a graduate certificate.

## Admissions Requirements

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

## Course Requirements

A candidate for the Certificate of Advanced Graduate Study 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 twenty-four (24) semester hours or, in the case of the College of Professional Studies, thirty-two (32) quarter hours of credit beyond the Master's degree.

## Regulations Applying only to Doctor of Philosophy (PhD) Programs

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

## Admissions Requirements

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

## Academic Classification and Degree Candidacy

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

## Academic Residency Requirement

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

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

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

## Responsible Conduct of Research

All doctoral students for whom Responsible Conduct of Research training is required must complete training according to the University's Policy on the Responsible Conduct of Research. ([https://www.northeastern.edu/policies/Policy\\_on\\_Responsible\\_Conduct\\_of\\_Research.pdf](https://www.northeastern.edu/policies/Policy_on_Responsible_Conduct_of_Research.pdf))

## Course Requirements

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

## Qualifying Examination(s)

In departments that require qualifying examinations, students must be notified in writing of the nature and regulations governing these

examinations and of how their performance on the examinations will affect their normal progress towards the degree. The Graduate Office shall be made aware of the department regulations concerning such examinations.

### Annual Review of Student Progress

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

### PhD Dissertation Committee

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

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

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

### Comprehensive Examination(s) and/or Proposal Defenses

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

### Dissertation

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

### Oral Defense of the Dissertation

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

public, in person attendance of the defense by the University community, and this accommodation made known to the University.

### Submission of the Dissertation

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

### Time Limitation for Achieving Candidacy and Degree Completion

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

### General Regulations and Requirements for Interdisciplinary Graduate Degrees

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

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

### University-approved Interdisciplinary Programs

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

Each interdisciplinary graduate program shall be managed as established in the approved design of the program. All interdisciplinary programs, both masters and PhD, shall identify a committee with representation from all of the units involved to oversee the administration of the program in accordance with the guidelines established here (p. 10). All administrative details, including but not limited to, admission, probation notification and graduation clearance, shall be carried out by the unit designated as the administrative home. Curriculum design and any subsequent modifications to a program shall be approved by the established procedures within all of the units involved.

### Individually Designed Interdisciplinary Programs

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

Successful application for admission to an individually designed interdisciplinary program consists of a written proposal describing the areas of proposed study and research. Part of this proposal will be a list of courses to be taken; a description of the qualifying and

comprehensive examination process to be used, if any; a timeline; and any other requirements of the program. This proposal must be designed and prepared in consultation with a faculty member at Northeastern University who is qualified to serve as the thesis or dissertation advisor. At least two units must participate in order for the proposal to be deemed interdisciplinary. The proposal must correspond in scope and depth to Northeastern's established degree standards. All of the units and the respective Associate Dean(s) for Graduate Education of the participating college(s) must approve the proposal. Approval of the proposal indicates that appropriate curricular and other academic norms for the specified degree are satisfied. A proposal for a PhD must define an area of study in which original and independent research can take place.

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

# Information for Entering Students

Graduate education at Northeastern integrates the highest level of scholarship across disciplinary boundaries with significant research and experiential learning opportunities in Boston and around the world. Northeastern offers 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 (p. 15)
- Information for International Students (p. 15)
- Academic Resources (p. 16)
- Information Technology Services (p. 17)
- Campus Resources (p. 18)

## Living in Boston

Boston is an exciting city and a great place for students to explore and learn, both on and off campus. For links to off-campus support services, Boston neighborhoods, off-campus apartment listings, renters' rights information, and citywide events, visit the links below.

### Off Campus Student Services

151 Speare Commons  
617.373.8480  
offcampus@northeastern.edu

Off Campus Student Services provides a wide range of support services, 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, making connections to area real estate agents and landlords, reading your lease, and expertise in renters' rights and responsibilities. Our extensive website offers a host of resources including an apartment search database, information on neighborhoods and transportation, and on-campus and City of Boston resources and services.

Off Campus Student Services publishes an e-newsletter that provides valuable tips and information on upcoming programs and events both on campus and off campus. Individuals interested in receiving our newsletter can email us at [offcampus@northeastern.edu](mailto:offcampus@northeastern.edu) or stop into 151 Speare Commons Monday through Friday.

For more information, visit the Off Campus Student Services website (<http://www.northeastern.edu/offcampus/>).

## Information for International Students

### Office of Global Services

Website (<http://www.northeastern.edu/ogs/>)  
405 Ell Hall

617.373.2310  
617.373.8788 (fax)

The Office of Global Services (OGS) offers a vast array of programs and services to more than 14,000 international students and scholars who represent approximately 144 nations.

OGS 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. OGS advances the international community of Northeastern through ensuring immigration compliance while providing transformational academic services and cultural experiences for student satisfaction and successful graduation.

OGS maintains 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 OGS begins with admission to the academic program and continues through such initiatives as OGS's cultural festival in February and March, "OGS Carnevale," which celebrates the cultural diversity of the entire university community. For a list of OGS services and programs, visit the OGS website. (<http://www.northeastern.edu/ogs/>)

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

### Coming to Northeastern

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

- **Obtain F-1 or J-1 visa** from the U.S. embassy or consulate in the home country to be eligible to study in the United States. An international student may attend Northeastern in a nonimmigrant status other than F-1 or J-1 only if U.S. immigration regulations allow for study in the United States under that specific nonimmigrant visa classification. Some international students must apply and be approved for a change of status (e.g., from B-2 to F-1) before beginning the program at Northeastern. For detailed information/instructions specific to a student's current nonimmigrant status, eligibility to participate in co-op, or other forms of experiential learning, contact OGS (<http://www.northeastern.edu/ogs/>).
- **Acquire Student Health Insurance:** Since September 1989, Massachusetts law (M.G.L. c.15A, § 18) has required every full-time and part-time student enrolled in a certificate, diploma, or degree-granting program in a Massachusetts institution of higher learning to participate in a Student Health Insurance Program (SHIP) or in a health benefit plan with comparable coverage. The Student Health Program defines a part-time student as a student enrolled in at least 75 percent of the full-time curriculum (College of Professional

Studies graduate students—7 credits, part-time graduate students—6 credits).

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

## Planning Information

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

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

All international students will need to attend the mandatory international student orientation program and complete the international student online immigration clearance. For further details on the OGS international student orientation and online immigration clearance process, and for other information pertinent to international students, check the OGS website (<http://www.northeastern.edu/ogs/>).

## International Student Orientation and Cultural Events

The Office of Global Services (OGS) (<http://www.northeastern.edu/ogs/>) organizes orientation and acculturation programming throughout the year for newly arrived international students and U.S. citizens from abroad. Programming features cross-cultural topics such as academic success, student life, and the dynamics of diversity. OGS's mandatory Online Immigration Clearance and orientation begin prior to the start of the fall and spring semesters, comprising several weeks of activities that provide international students (and others who have lived abroad) an opportunity to gain familiarity with Northeastern in a cross-cultural context while also serving to facilitate the formation of friendships across cultures. 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 OGS website. (<https://www.northeastern.edu/ogs/>)

International orientation is mandatory. Attendance will be marked in the student's record. Academic departments will send information about program-specific orientations. For a schedule of required sessions and other events, see the OGS website (<http://www.northeastern.edu/ogs/>).

U.S. citizens who have been living abroad are not required to complete OGS's activities and sessions. These students are welcome to attend other sessions and events planned by OGS during orientation. Visit the orientation schedule on the OGS website (<https://www.northeastern.edu/ogs/home/new-students/orientation/>) to see a full listing of other sessions and events.

## SEVIS Compliance

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

OGS advises students on the complexities of immigration compliance and interfaces with various U.S. government agencies. OGS maintains and updates the SEVIS system and advises students on relevant issues related to nonimmigrant student status by individual appointments or through workshops and information sessions. Contact OGS with questions relating to nonimmigrant student status or any aspect of SEVIS compliance.

## Academic Resources

- Libraries (p. 16)
- Office of the Registrar (p. 17)

## Libraries

### *Northeastern University Library*

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

The Northeastern University Library serves the entire Northeastern University community—in Boston, at its regional campuses, and online. The Library provides collections and services supporting research and teaching across disciplines. Its collections are extensive, with a large proportion available digitally. The Library's collections include 491,191 print titles; 718,297 e-books; 104,093 licensed e-journals; and 95,722 streaming audio and visual titles. Access to print and electronic materials is provided through Scholar OneSearch, the Library's discovery platform. The Library's Archives and Special Collections hold historical records and publications of Northeastern University and unique materials preserving the history of Boston's social movements, public infrastructure, neighborhoods, and natural environments.

Services provided by the Library include both on-site and online 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. The Library actively supports the unique needs of graduate students in research and publishing through services such as citation management workshops, copyright and fair use consultations, data management support, and digital scholarship services (including GIS and data visualization).

The Snell Library building is open 24/7 year-round to all members of the Northeastern community. Spaces in the building include areas for group work and quiet individual study, with more than 30 group study rooms with whiteboards and plug-in displays for collaborative group work. Individual study rooms are also available for graduate students. In partnership with Information Technology Services, the Library supports the Digital Media Commons and InfoCommons computing areas, providing high-level media creation and editing capabilities. The Digital Media Commons also includes a 3D printing studio with a full suite of fabrication technologies and professional-level audio and video recording studios.

### *School of Law Library*

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

The School of Law Library, located on four floors in the Knowles Law Center, includes a comprehensive collection of U.S. legal materials in print and in electronic format. Of particular note is the library's collection



in the areas of public interest law; international human rights law; and public health, death penalty issues, and progressive lawyering. More information can be found at the School of Law Library webpage (<http://www.northeastern.edu/law/library/>).

## Office of the Registrar

### Walk-in address

271 Huntington Avenue

### Mailing address

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

617.373.2300

617.373.5351 (fax)

[registrar@northeastern.edu](mailto:registrar@northeastern.edu)

Website (<http://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 myNortheastern web portal (<http://myneu.neu.edu/cp/home/displaylogin/>) to provide students convenient access to information and services, including class schedules and registration, most recent grades, unofficial transcripts, and transcript and enrollment verification requests. Additional information is available at the registrar's office website (<http://www.northeastern.edu/registrar/>).

## Information Technology Services

ITS website (<https://its.northeastern.edu>)

617.373.4357 (xHELP)

[help@northeastern.edu](mailto:help@northeastern.edu)

Information Technology Services (ITS) is the centralized technology resource for students, faculty, and staff. Among the services and solutions that ITS provides are:

- Secure, high-speed internet access through the on-campus networks NUNet and ResNet
- Wireless internet connectivity through NUwave, NUwave-guest, and Eduroam
- 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 free or discounted software applications for Windows and Mac
- Northeastern's online portal, myNortheastern
- Microsoft Office 365 licenses and support, including Outlook, Word, Excel, and OneDrive
- The SAIL digital platform, an app and online portal to facilitate Northeastern's integrated learning environment
- On-site and online training on popular software
- High-performance research computing

## ITS Service Desk

Help and Information Desk, Snell Library, First Floor

617.373.4357 xHELP

[help@northeastern.edu](mailto:help@northeastern.edu)

Support Chat (<https://northeastern.service-now.com/sp/>)

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:

- Assistance with Northeastern University–provided accounts and applications, including email, myNortheastern, and Blackboard
- Wired and wireless network connection problems
- Network printer troubleshooting
- ITS-managed lab support
- Equipment loans, including AV equipment, laptops, 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.

## myNortheastern

myNortheastern website (<https://my.northeastern.edu>)

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

The myNortheastern 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 myNortheastern. It is your responsibility to maintain accurate personal and emergency contact information.

## The ResNet Resource Center

Speare Commons

617.373.HELP (x4357)

[resnet@northeastern.edu](mailto:resnet@northeastern.edu)

The ResNet Resource Center, located in Speare Commons, provides students with support for:

- HuskyCable TV service
- Assistance with device registration for ResNet and NUres-device
- Computer troubleshooting
- Hardware repair services for Apple and Dell computers

## Printing

The Northeastern Printing Program (<https://its.northeastern.edu/services/printing-plan/>) provides a free allowance for printing each year to students, faculty, and staff. Each September, as an active member of the community, you are given an allowance of printing credit equivalent to \$120 on your Husky Card to use at your discretion at any of the ITS-managed printers located across all Northeastern campuses. Print credits do not carry over from one academic year to the next.

## Appropriate Use Policy

Appropriate Use Policy webpage (<http://www.northeastern.edu/aup/>)

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.

## Training Services

Snell Library  
training@northeastern.edu

Information Technology Services provides a variety of web-based training to all members of the Northeastern community including Mac tutorials, MS Office tutorials, and some application-specific training provided by the application vendors. With Northeastern's license to LinkedIn Learning, students with a myNortheastern username and password have 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.

Visit the training section (<https://its.northeastern.edu/services/training/>) of the ITS website to learn more.

## Academic Technology Services (ATS)

ATS website (<https://www.northeastern.edu/ats/>)  
212 Snell Library  
ats@northeastern.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.

## Research Computing

Research Computing website (<https://its.northeastern.edu/researchcomputing/>)  
researchcomputing@northeastern.edu

Information Technology Services provides high-end research computing resources to all users at Northeastern University, including faculty, students, staff, researchers, visiting scholars, and partners. These resources include:

- Centralized high-performance computing (HPC) clusters and storage through Northeastern's partnership with the Massachusetts Green High Performance Computing Center (<http://www.mghhpc.org/>)
- Visualization
- Software
- High-level technical and scientific user support
- Education and training

## Campus Resources

- Campus Recreation (p. 18)
- Center for Advancing Teaching and Learning Through Research (p. 18)
- Disability Resource Center (p. 19)
- Employer Engagement and Career Design (p. 19)
- Graduate Student Government (p. 19)
- Husky Card Services (p. 19)
- John A. and Marcia E. Curry Student Center (p. 20)
- Northeastern University Bookstore (p. 20)
- Parking (p. 20)
- Public Safety (p. 20)
- University Health and Counseling Services (p. 21)
- We Care (p. 21)

## Campus Recreation

*Marino Recreation Center*  
617.373.4433  
Website (<https://www.northeastern.edu/campusrec/>)

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 SquashBusters facility. 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.

## Center for Advancing Teaching and Learning Through Research

215 Snell Library  
617.373.3157  
617.373.7779 (fax)  
learningresearch@northeastern.edu  
Website (<http://www.northeastern.edu/learningresearch/>)

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

- Participate in workshops and other events to learn about effective practices in teaching and course design and to adapt them for your own current or future use.

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

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

## Disability Resource Center

20 Dodge Hall  
617.373.2675  
617.373.7800 (fax)  
Website (<http://www.northeastern.edu/drc/>)

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

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

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

## Employer Engagement and Career Design

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

103 Stearns Center  
617.373.2430  
617.373.4231 (fax)  
[careers@northeastern.edu](mailto:careers@northeastern.edu)

Employer Engagement and Career Design serves a diverse and sustainable network of learners, alumni, and employers forming a powerful ecosystem that nurtures lifelong career design and partnerships.

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

## Graduate Student Government

Website (<http://www.northeastern.edu/gsg/>)  
236 Curry Student Center  
617.373.4502  
[GSG@northeastern.edu](mailto:GSG@northeastern.edu)

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

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

All graduate students 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.

## Husky Card Services

4 Speare Commons  
617.373.8740  
[HuskyCard@northeastern.edu](mailto:HuskyCard@northeastern.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 one of the other campuses may contact that 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@northeastern.edu](mailto:HuskyCard@northeastern.edu) ([HuskyCard@neu.edu](mailto: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

myNortheastern 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.

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

Website (<http://www.northeastern.edu/curry/>)  
434 Curry Student Center  
617.373.2642

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.

### Northeastern University Bookstore

*Main Campus*  
Curry Student Center, ground floor  
617.373.2286  
Website (<http://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.

### Parking

Commuting Services Website (<http://www.northeastern.edu/commutingservices/>)

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 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. Please use the campus map ([http://www.northeastern.edu/commutingservices/wp-content/uploads/2015/08/CampusMap2015\\_11x17.pdf](http://www.northeastern.edu/commutingservices/wp-content/uploads/2015/08/CampusMap2015_11x17.pdf)) as a guide for handicap-accessible parking spaces on 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 (<http://www.northeastern.edu/commutingservices/>) for more information.

### Public Safety

*Public Safety Division Administrative Offices*

100 Columbus Place  
617.373.2696  
Website (<http://www.northeastern.edu/publicsafety/>)

*Police Operations Center*

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

*Personal Safety*

617.373.2121  
Website (<https://www.northeastern.edu/nupd/services/redeye/>)

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 the NUPD website (<http://www.northeastern.edu/nupd/>).

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.

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 10 to 15 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.

### **RAD Self-Defense Courses**

617.373.2696

Website (<https://www.northeastern.edu/nupd/training/rad-self-defense/>)

The R.A.D. System of defense will provide women of all ages with the knowledge to make an educated decision about resistance, on the premise that a spontaneous violent attack will stimulate a natural desire to resist on the part of the victim.

### **Lost and Found**

Website (<https://www.northeastern.edu/nupd/services/lost-found/>)

If you have lost an item on Northeastern's Boston campus, call 617.373.3913. You will be instructed to leave a detailed message describing the item lost and the best way to contact you if the item is found.

If your item has been turned in, we will contact you by telephone or mail. If your item has not been turned into our department, we will continue to keep this information on file.

If you suspect the item has been stolen, call the Northeastern University Police at 617.373.2121 to report the theft.

If you have found an item on campus, return it to our headquarters located at 100 Columbus Place.

### **Emergency Information**

617.373.2000 (snow emergencies)

Website (<http://www.northeastern.edu/emergency/>)

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

The university is prepared to respond to emergencies and urgent situations that require immediate action. A trained team of police officers, EMTs, health and counseling experts, student affairs and residential life staff, and other professionals form a coordinated group that is able to manage a wide range of potential situations.

NU ALERT, emergency broadcast communication messages, are sent to the email addresses and telephone numbers students, faculty, and staff have provided the university.

## **University Health and Counseling Services**

70 Forsyth Building, Suite 135

617.373.2772 (voice)

617.373.2601 (fax)

uhcs@northeastern.edu

Website (<https://www.northeastern.edu/uhcs/>)

University Health and Counseling Services provides medical and behavioral healthcare to current Northeastern students with walk-in, same-day, and scheduled visits. UHCS clinicians are board-certified and licensed practitioners who provide confidential assessment and treatment of medical and behavioral health concerns as well

as referrals to specialists in the community. All UHCS clinicians are trained in assessment and treatment of alcohol and other drug-use issues, as well as sexual assault and other forms of trauma. Visit us at [northeastern.edu/uhcs](http://northeastern.edu/uhcs) (<https://www.northeastern.edu/uhcs/>) for more about accessing UHCS as well as other important information, including:

- Northeastern University Student Health Plan (NUSHP)
- Medical Leave of Absence (MLOA)
- Immunization compliance (student health reports)
- Timely health updates

### **UHCS Hours:**

Monday, Wednesday, and Friday	8:00 AM – 5:00 PM
Tuesday and Thursday	8:00 AM – 8:00 PM
Saturday (September through June)	12:00 PM – 4:00 PM
Most holidays	10:00 AM – 3:00 PM

### **We Care**

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

104 Ell Hall

617.373.4384

[we\\_care@northeastern.edu](mailto:we_care@northeastern.edu)

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 (p. 22)
- Student Refunds (p. 23)
- Financial Aid Assistance (p. 23)
- Bill Payment (p. 25)

## Tuition and Fees

### Tuition

Graduate Program	Cost per Credit Hour
Applied Behavioral Analysis	\$1,186
Arts, Media and Design	\$1,580
Audiology (AuD) (per term)	\$12,894
Audiology (AuD) clinical (per term)	\$9,968
Biotechnology, Bioinformatics, Applied Math	\$1,550
Bouvé College of Health Sciences	\$1,560
Business Administration, including online graduate programs	\$1,640
College of Professional Studies—Doctorate in Education	\$862
College of Professional Studies—Graduate on campus and online (excluding MEd, MAT, Global Studies, Regulatory Affairs, Technical Communication, Commerce and Economic Development Programs, MPS Analytics, MPS Informatics, MPS Digital Media, MPS Enterprise Intelligence)	\$726
College of Professional Studies—Masters Level Graduate Courses Personal and Professional Enrichment (non-degree)	\$726
College of Professional Studies—MEd and MAT programs (Excluding Higher Ed. Administration Concentration)	\$597
College Professional Studies—MPS Analytics, Commerce Econ. Development, Enterprise Intelligence	\$747 (Students Entering Before 06/30/18)
	\$790 (Students Entering Between 07/01/18 and 06/30/19)
	\$821 (For Students Entering After 06/30/19)
College Professional Studies—MPS Informatics and MPS Digital Media	\$726 (Students Entering Before 06/30/18)
	\$768 (Students Entering Between 07/01/18 and 06/30/19)
	\$797 (Students Entering After 06/30/19)

College of Professional Studies—MS Regulatory Affairs, MS Global Studies, MS Technical Communication	\$747
College Professional Studies—Master of Education Higher Ed. Administration Concentration	\$597 (Students Entering Before 06/30/18)
	\$631 (Students Entering Between 07/01/18 and 06/30/19)
	\$656 (Students Entering After 06/30/19)
Data Analytics	\$1,632
Data Science	\$1,632
Direct Entry PharmD (per term)	\$26,210
Direct Entry PharmD Clinical	\$15,395
Engineering	\$1,616
Health Informatics	\$1,260
Information Assurance	\$1,479
Khoury College of Computer Sciences	\$1,571
Marine Biology	\$1,350
MS in Accounting	\$1,640
MS in Innovation	\$1,640
MSA/MBA (full program)	\$69,700
Nurse Anesthetist clinical (in addition to tuition)	\$3,905
Nursing, direct entry (per term)	\$18,699
Physical Therapy—postbaccalaureate direct entry (DPT) (per semester)	\$18,148
Physical Therapy—postbaccalaureate direct entry (DPT) clinical (per semester)	\$12,377
Physician Assistant (per term)	\$15,553
RN to BSN online	\$863 (per credit hour)
Science	\$1,550
Social Sciences and Humanities (excluding MS CJ, MS Econ, MS Security & Resilience Studies)	\$1,250
Social Sciences and Humanities (MS CJ, MS Econ, MS Security & Resilience Studies)	\$1,330
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
Doctorate in Law and Policy (self-paced)	\$904
Executive Doctorate in Law and Policy (Students Continuing in 48 q.h. Program)	\$1,899

Executive Doctorate in Law and Policy (Students Entering 69 q.h. Program)	\$1,321 (Students Entering After 06/30/19)
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## Fees

Item	Fee
Student Center Fee (per term, Boston campus only)	\$70 full-time \$10 part-time
College of Professional Studies Student Center Fee (per quarter, Boston campus only)	\$8.25
Student Recreation Fee (per term)	\$60 full-time \$30 part-time
College of Professional Studies Student Recreation Fee (per quarter, Boston campus only)	\$15
Student Activities Fee (per year, Boston campus only)	\$16
Residential Student Fee (per term)	\$32
Health and Counseling Fee	\$225
Health Plan Fee (yearly, optional)	Visit the NUSHP website: <a href="https://northeastern.edu/nushp">northeastern.edu/nushp</a>
Parking (optional, per semester)	Visit the parking website: <a href="https://northeastern.edu/commutingservices/">northeastern.edu/commutingservices/</a>
International Student Fee	\$350

## Student Refunds

### Refund Policies

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

Note the following exception: If the credit in your account is due to a Parent Plus/Alternative Loan and/or payment plan payment(s), the borrower or bill payer must complete the Refund Authorization form (<https://studentfinance.northeastern.edu/forms/>) prior to releasing the funds requested. If a credit stems from an overpayment with a credit card, the refund must be returned to the credit card that was used.

### Official Withdrawal Adjustments

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

Tuition credits are granted through the first five weeks of a semester or first four weeks of a half-semester, based on the date of the official withdrawal processed by the Office of the University Registrar. Nonattendance does not constitute official withdrawal. Credit policies

vary according to the duration of the course. Typical tuition adjustments are made according to the following schedule. (The end of week three corresponds with the last day to drop a class without a W grade.)

### DURING FULL SEMESTER

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

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

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

### Leave of Absence Tuition and Fee Adjustments

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 (additional information about leaves of absence (p. 27)). 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. If you choose not to return to the university for any reason, there will be no refund of tuition paid. Outstanding balances (including unpaid balances) for the academic semester in which the leave is taken are still due to 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 the University Health and Counseling Services website (<https://www.northeastern.edu/uhrs/>). Students who take a leave of absence 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 University'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. Further information is available from the DRC.

### State-Specific Refund Policies

For refund information for Maryland, Oregon, and Wisconsin residents, visit the Student Financial Services website (<https://studentfinance.northeastern.edu/policies-procedures/>).

## Financial Aid Assistance

### Student Financial Services

354 Richards Hall  
617.373.5899 (Graduate)  
617.373.2897 (College of Professional Studies)  
[sfs@northeastern.edu](mailto:sfs@northeastern.edu)  
[studentfinance.northeastern.edu](https://studentfinance.northeastern.edu) (<https://studentfinance.northeastern.edu/>)

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

contact the office (<https://studentfinance.northeastern.edu/contact-us/>) directly for additional information.

## How to Apply

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

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

## Federal Financial Aid Eligibility

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

- Be enrolled in at least 6 credits per term for federal financial aid, unless you are on a co-op, clinical rotation, or residency or are enrolled in a full-time or part-time stand-alone course
- Be a U.S. citizen or eligible noncitizen
- Be matriculated in a degree-granting program
- Have received a high school diploma or GED
- Be registered with Selective Service (if required)
- Not be convicted of a drug-related crime in the last year
- Not be in default from previous student loans
- Maintain satisfactory academic progress

## Awarding Timelines

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

Returning students are awarded throughout the summer.

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

## Typical Graduate Financial Aid Award

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

## Graduate Assistantships and Scholarships

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

To review a description of available graduate assistantships and scholarships, visit the Student Financial Services website (<https://studentfinance.northeastern.edu/applying-for-aid/graduate/types-of-aid/>).

## Health Professions Student Loans and Nursing Student Loans

These federal loan programs carry a 5 percent interest rate during repayment. You must demonstrate financial need and meet

Northeastern's priority filing date for consideration, as funds are limited. Northeastern University is the lender, and repayment is made directly to Northeastern.

To be eligible for the Federal Nursing Student Loan, students must be enrolled at least half-time in the Bouvé College of Health Sciences. These loans carry a 9-month grace period prior to repayment following graduation, withdrawal, or a drop below half-time status. Repayment on the loan is for a period of up to 10 years with a minimum \$40 monthly payment. The loan may be prepaid at any time without penalty.

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

## Physician Assistant Loan

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

## Federal Direct Graduate PLUS Loan

Unlike Federal Direct Unsubsidized Loans, the Federal Direct Graduate PLUS Loan requires credit approval by the direct loan servicer. Application requests are submitted to Student Financial Services.

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

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

Graduate students with myNortheastern access can apply for a Federal Direct Graduate PLUS Loan through the student portal by clicking on the "Federal Graduate PLUS Loan Application" link under "Services & Links." Students who do not have portal access or have trouble applying via the portal should download, print, and complete the paper application that can be found on the Student Financial Services website (<https://studentfinance.northeastern.edu/billing-payments/financing-options/>).

## Supplemental Student Loans

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



## General Financial Policies and Procedures

### FINANCIAL AID POLICIES

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

### APPEAL/CHANGE IN CIRCUMSTANCES

If the student feels that the aid process does not accurately reflect his or her situation, or if family circumstances change during the year, the student should notify his or her financial aid 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 these sources may require an adjustment to a student's financial aid award.

### REAPPLICATION PROCESS

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

### SATISFACTORY ACADEMIC PROGRESS

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

### VERIFICATION

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

### RETURN OF TITLE IV FUNDS

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

## Bill Payment

### Student Financial Services

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

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

### E-Bill

Tuition bills are generated electronically and are available via the myNortheastern portal. Once your billing statement is available, you will be notified via email.

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

### Payment of Tuition

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

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

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

### Student Financial Responsibility Agreement

As compelled by federal law, all students who enroll in classes at Northeastern University are required to complete and accept the Student Financial Responsibility Agreement (SFRA) (<https://studentfinance.northeastern.edu/billing-payments/sfra/>). This agreement

must be completed once per academic year and is located on the student's myNortheastern portal. Failure to complete the SFRA will result in a hold that prevents attendance.

### **Discrepancies in Your Bill**

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

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

### **Late Fees**

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

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

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

### **Tuition Paid Directly by Employers**

When a third party pays tuition directly to the university, the student must provide the Office of Student Accounts with a purchase order or a written statement of intent to pay by the third party prior to the first week of classes. If there are stipulations associated with the payment agreement, such as a minimum grade level, then the student must either pay the university directly or enroll in one of the payment options. Documents pertaining to a third-party agreement can be emailed to [thirdparty@northeastern.edu](mailto:thirdparty@northeastern.edu) or mailed to the address below.

Student Financial Services/Third Party  
354 Richards Hall  
360 Huntington Avenue  
Boston, MA 02115

617.373.8222 (fax)  
[thirdparty@northeastern.edu](mailto:thirdparty@northeastern.edu)

### **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, 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 (College of Professional Studies 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 their myNortheastern portal (<https://my.northeastern.edu/>) by the designated deadline date each academic year. For deadlines and additional information, visit the NUSHP website. (<http://www.northeastern.edu/nushp/>)

# University-Wide Academic Policies and Procedures

- Graduate Schools Academic Policies (p. 27)
- Academic Calendars (p. 28)
- Student Records, Transcripts, and Related Policies (p. 29)
- Course Credit Guidelines (p. 32)
- Cooperative Education (p. 32)
- Final Examinations and Related Policies on Other Exams (p. 33)
- Graduation Requirements (p. 33)
- Family Educational Rights and Privacy Act (FERPA) (p. 33)
- Student Right-to-Know Act (p. 34)
- Code of Student Conduct (p. 34)
- Academic Appeals Policies and Procedures (p. 34)
- General Regulations (p. 36)
- Students' Bill of Academic Rights and Responsibilities (p. 42)

## Graduate Schools Academic Policies

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

### Attendance Requirements

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

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

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

### Absence Because of Student Activities

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

### Absence Because of Illness

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

### Absence Because of Religious Beliefs

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

Any student who is unable, because of his/her religious beliefs, to attend classes or to participate in any examination, study, or work requirement shall be provided with an opportunity to make up such examination, study, or work requirement that he/she may have missed because of such absence on any particular day; provided, however, that such makeup

examination or work shall not create an unreasonable burden upon such school. No fees of any kind shall be charged by the institution for making available to the said student such opportunity. No adverse or prejudicial effects shall result to any student because of availing himself/herself of the provisions of this section. (Massachusetts General Laws, Chapter 151C, Section 2B, 1985)

### Absence Because of Jury Duty

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

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

### 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 myNortheastern web portal (<http://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 academic semester. International students must contact the OGS (<http://www.northeastern.edu/ogs/>) 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 Residential Life and Housing for policy information.
- Students' enrollment status cannot include more than one academic year of consecutive nonclass enrollments.
- After the 11th 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. International students returning from a leave of absence should contact

the OGS (<http://www.northeastern.edu/ogs/>) 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 OGS (<http://www.northeastern.edu/ogs/>) 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 the UHCS webpage (<http://www.northeastern.edu/uhcs/access-to-care/medical-leave-of-absence/>).

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. 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 medical leave of absence.

### 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 OGS (<http://www.northeastern.edu/ogs/>) 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 the myNortheastern web portal (<http://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 fifteen weeks. The College of Professional Studies graduate programs are offered on a quarter calendar consisting of twelve weeks.

## Quarter Programs

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

## Semester Programs

Traditional semester hours apply.

### Student Records, Transcripts, and Related Policies

## Grade Table

Grades are officially recorded by letters, evaluated as follows.

Letter Grade	Numerical Equivalent	Explanation
A	4.000	Outstanding achievement
A-	3.667	
B+	3.333	
B	3.000	Good achievement
B-	2.667	
C+	2.333	
C	2.000	Satisfactory achievement
C-	1.667	
D+	1.333	Undergraduate only
D	1.000	Undergraduate only/ Poor achievement
D-	0.667	Undergraduate only
F	0.000	Failure
I		Incomplete
IP		In progress
NE		Not enrolled
NG		Grade not reported by faculty
S		Satisfactory (pass/fail basis; counts toward total degree requirements)
U		Unsatisfactory (pass/fail basis)
X		Incomplete (pass/fail basis)
L		Audit (no credit given)
T		Transfer
W		Course withdrawal

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

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

## Northeastern University Course Numbering

0001-0999	<b>Orientation and basic</b> No degree credit
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## UNDERGRADUATE

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

## GRADUATE

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

## Clearing an Incomplete or Changing Other Grades

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

To request an incomplete grade, the student must obtain and complete in consultation with the instructor an Incomplete-Grade Contract (<http://www.northeastern.edu/registrar/form-inc-grade.pdf>) on which the precise agreement for clearing an incomplete grade is specified and which is signed by the student and the instructor. Copies of the form are kept by the student, the instructor, and the Office of the Dean of the

college in which the course is offered. Any exception to this policy on change of grades must be recommended by the Academic Standing Committee (ASC) of the college in which the course was offered and must be forwarded in writing by the ASC to the registrar for implementation. (Finishing the agreed-upon course work must be completed within one calendar year from the end of the term in which the course was offered.)

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

### Repeating Courses

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

### Substituting Courses

In some cases, it may not be possible to repeat a course if a student wishes to do so. In unusual circumstances, students may petition to substitute one course for another they have already taken, as long as the subject matter of both courses is substantially alike. With the approval of the student's academic advisor and the agreement of the department that offered the first course taken, a grade received in the new course will be labeled "Substitute" on the transcript and will be treated in the grade-point average calculation as a "repeat" grade, as described above. The original grade will remain on the student's Northeastern transcript. Students should consult with their academic advisor before enrolling in any proposed substitute course. Students are required to pay normal tuition charges for all substitute course work.

### Clearing an Academic Deficiency

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

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

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

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

### Appeal of Final Grades

Under certain circumstances, students have the right to appeal final grades given by either academic faculty or cooperative education coordinators. Criteria and procedures for such appeals can be found on p.1 of the Undergraduate Student Handbook ([http://www.northeastern.edu/osccr/wp-content/uploads/2018/06/2018-19\\_Handbook\\_full-PDF.pdf](http://www.northeastern.edu/osccr/wp-content/uploads/2018/06/2018-19_Handbook_full-PDF.pdf)) or on the appeals policies and procedures page (p. 34) within the graduate portion of the university catalog.

### Grade-Point Average (GPA)

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

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

The GPA for both courses would then be the total weight (16) divided by the total semester hours (5), or 3.200. Grades of I, IP, S, U, and X are not included in the calculation of the GPA. See grade table (p. 29) for a complete list of grades and numerical equivalents.

### Grade Reports

Grades are available to students approximately three days after the end of each term via the myNortheastern web portal (<http://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 myNortheastern web portal (<http://www.myneu.neu.edu>) and may also order official transcripts through myNortheastern. For further information on transcript requests, visit the transcript request webpage ([http://www.northeastern.edu/registrar/trans\\_request.html](http://www.northeastern.edu/registrar/trans_request.html)). All questions concerning transcript requests should be directed to 617.373.2300,

TTY 617.373.5360

### Full-Time Status

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

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

- Students who hold stipended graduate assistantships will be considered full-time if enrolled for a minimum of 6 semester hours of credit.
- Students for whom English is a second language, at the discretion of their departments, will be considered full-time if they are enrolled in a minimum of 8 semester hours or three courses, whichever is less.
- Students holding Dean's scholarships, Diversity fellowships, Double Husky awards, or being supported by Graduate Student Scholarships (GSSs) will be considered full-time if they are enrolled in a minimum of 8 semester hours.

- Students enrolled in Dissertation or Continuation are considered full-time.
- International students enrolled in graduate programs at Northeastern University must consult with the Office of Global Services (OGS) (<http://www.northeastern.edu/ogs/>) on all matters regarding the maintenance of full-time status.

### Overload Conditions for Graduate Assistants

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

They are not permitted to hold any other job during the term of their assistantship; however, they may be offered limited extra work on campus. Graduate assistants who are not on F-1 or J-1 visas can be offered overload work that does not exceed an average of 6 hours a week or 90 hours a semester, for a total of 270 hours a year (or three semesters). As part of this work, graduate assistants may be hired to teach one 3-semester-hour course as an overload during the year (180 hours). The hours worked during the weeks between semesters are included in this total.

The OGS issues and verifies on-campus work authorization to eligible students in nonimmigrant visa classifications. Due to federal regulations, international graduate assistants cannot be offered overload work. All international students must acquire the appropriate work authorization from the OGS, 405 Ell Hall, prior to engaging each and every time in any form of employment.

### Dropping Courses

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

#### IN FALL AND SPRING SEMESTERS

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

#### IN SUMMER HALF SEMESTERS

- Through the second week of the half semester, students may withdraw without any grade being posted to the transcript. Courses may be dropped via the myNortheastern web portal (<http://myneu.neu.edu/cp/home/displaylogin/>).
- Between the third week and the last day of classes, course withdrawals are indicated by a W on the student's record. Courses may be dropped via the myNortheastern web portal (<http://myneu.neu.edu/cp/home/displaylogin/>). 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.

### Audit Policy

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

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

### Minimum Cumulative GPA

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

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

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

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

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

### Maintenance of Student Records

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

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

## Course Cancellations

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

## Course Credit Guidelines

### Guidelines for Assigning Credit to Courses

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

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

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

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

#### NOTE ABOUT HOMEWORK AND STUDENT PREPARATION FOR CLASS

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

#### CREDIT ASSIGNMENT PROCESS

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

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

#### DEFINED INSTRUCTIONAL METHODS

- Traditional: meets fully on ground in a physical location with instructor present

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

#### FULL-TIME AND HALF-TIME STUDY

Courses that define academic activities related to curriculum but are not credit bearing have the following required hours of participation:

- Full-time courses: 32–40 hours per week in a semester for a minimum of 11 weeks or 55 days, or in a quarter for 9 weeks or 45 days
- Half-time courses: 20–31.99 hours per week in a semester for a minimum of 11 weeks or 55 days, or in a quarter for 9 weeks or 45 days (to achieve full-time status, graduate students must take 3 or more academic credits and undergraduate students must take 4 or more academic credits)
- Summer 1 or Summer 2 semester: minimum of 5 weeks or 25 workdays
- Summer quarter: 6 weeks or 30 workdays

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

## Cooperative Education

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

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

### General Requirements

- Be a full-time student to participate in co-op.
- Complete all pre co-op requirements as established by the college of the student.
- Make satisfactory progress towards degree completion, including grade point average requirements, as defined by the university, the colleges, and the major program curricula.
- Have a placement in an official co-op placement system with accurate start and end dates, and meet the minimum hour and day requirements.
- Not participate in co-op in the final term unless it is specified in the curriculum requirements of the program in the catalog.
- Resolve any previous disciplinary or academic probation issues, or have the cooperative education coordinator approve a plan to resolve these issues, prior to applying for co-op jobs.
- Have any self-developed co-op approved by the cooperative education coordinator before accepting the position.
- Comply with any pre-employment checks required by the employer, such as drug testing, credit checks, physical examinations, security clearance, and criminal record checks.
- Participate in Title IX training, as required.



- Complete additional requirements if participating in a global co-op. See the Global Experience Office website (<http://www.northeastern.edu/geo/globalcoop/>) for more information.
- Work with the co-operative education coordinator if an Unsatisfactory (U) grade has been received for a past co-op to re-establish eligibility in accordance with the policies and requirements of the college.

### TRANSFER AND INTERNATIONAL STUDENTS:

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

## Academic Requirements

1. **Be full-time while on co-op. Full-time status for co-op is defined as either:**
  - a. one full-time co-op job; 32-40 hours per week, or
  - b. two simultaneous half-time co-op jobs; 20-31.99 hours each, or
  - c. one half-time co-op job; 20-31.99 hours with graduate students taking 3 or more academic credits or undergraduate students taking 4 or more academic credits.
    - i. Undergraduate students on co-op in a Summer 1 or Summer 2 term may be registered for one half-time co-op without acquiring a second job or taking an accompanying class.
2. **Meet the minimum length requirements for an academic term:**
  - a. Semester full-term: minimum of 11 weeks or 55 work days
  - b. Quarter full-term: minimum of 9 weeks or 45 work days
  - c. Summer 1 or Summer 2 term: minimum of 5 weeks or 25 work days
3. **Receive a grade of Satisfactory or Unsatisfactory for the co-op experience.**

## Registration for Co-op

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

## Co-op Financial Planning

- No tuition is charged while a student is on co-op only (students will pay room and board if they stay in university housing).
- If a student takes a credit-bearing class while on co-op, tuition will be charged at the per-credit rate.
- Financial aid will be distributed to match the student's tuition bill and other allowable expenses.
- Students on co-op are required to maintain the same health insurance coverage (either through a private provider or through the university program) as they would while attending classes.

## Further Information

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

## Final Examinations and Related Policies on Other Exams

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

## Graduation Requirements

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

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

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

All eligible degree candidates must complete the graduation application by the applicable deadline. Before you apply to graduate through your myNortheastern account, we recommend you take the time to review your current program information, i.e., degree, major, and concentration. To review this information, log in to your myNortheastern account; click "Services & Links," and then "Degree Enrollment & Graduation."

## Family Educational Rights and Privacy Act (FERPA)

### FERPA for Students—General Information

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

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

### FERPA General Guidance for Parental Disclosure

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

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

### Release of Directory Information

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

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

- Student name
- Home address (city, state, country only)
- Major field of study

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

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

### Notification of Rights under FERPA

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

1. The right to inspect and review the student's education records within 45 days of the day the university receives a request for access. Students should submit to the registrar, dean, or head of the academic department (or appropriate official) written requests that identify the record(s) they wish to inspect. The university official will make arrangements for access and notify the student of the time and place where the records may be inspected. If the records are not maintained by the university official to whom the request was submitted, that official shall advise the student of the correct official to whom the request should be addressed.
2. The right to request the amendment of the student's education record that the student believes is inaccurate or misleading. Students may ask the university to amend a record that they believe is inaccurate or misleading. They should write the university official responsible for the record, clearly identify the part of the record they want changed, and specify why it is inaccurate or misleading. If the university decides not to amend the record as requested by the student, the university will notify the student of the decision and advise the student of his or her right to a hearing regarding the request for amendment. Additional information regarding the hearing procedures will be provided to the student when notified of the right to a hearing.
3. The right to consent to disclosures of personally identifiable information contained in the student's education records, except to the extent that FERPA authorizes disclosure without consent. One exception, which permits disclosure without consent, is disclosure to school officials with legitimate educational interest. A school official is defined as a person employed by the university in an administrative, supervisory, academic, or support staff position (including law enforcement unit and health staff); a person or company with whom the university has contracted (such as an attorney, auditor, or collection agent); a person serving on the Board of Trustees; or a person assisting another school official in performing his or her tasks. A school official has a legitimate educational interest if the official needs to review an education record in order to fulfill his or her professional responsibility.
4. The right to file a complaint with the U.S. Department of Education concerning alleged failures by the university to comply with the requirements of FERPA. At Northeastern, the Office of the University Registrar, 271 Huntington Avenue, administers FERPA.

### Additional Information

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

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

### Student Right-to-Know Act

For information about the Student Right-to-Know Act, visit the Registrar's website. (<http://www.northeastern.edu/registrar/right-to-know.html>)

### Code of Student Conduct

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

### Academic Appeals Policies and Procedures

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

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

Note that these policies and procedures apply to graduate students only. Appeals policies and procedures for undergraduates are found in the Undergraduate Student Handbook ([http://www.northeastern.edu/osccr/wp-content/uploads/2018/06/2018-19\\_Handbook\\_full-PDF.pdf](http://www.northeastern.edu/osccr/wp-content/uploads/2018/06/2018-19_Handbook_full-PDF.pdf)).

### Academic Appeals

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

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

Before invoking the appeals procedures, students are always encouraged to speak informally to their instructors or academic 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.

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

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

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

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

### Scientific or Research Misconduct

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

### Appeal of Final Grades and Outcomes of other Academic Evaluative Processes

#### STEP 1. DISCUSS CONCERNS WITH INSTRUCTOR AND/OR ADMINISTRATOR

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

#### STEP 2. PREPARE AN APPEAL STATEMENT

A student must initiate a formal appeal of an academic determination by submitting a written statement (the Statement) that specifies the details of the action or judgment that they seek to appeal. This Statement must start with a clear description of the basis for the appeal and should include: (1) basic facts about the situation leading to the appeal; (2) when the situation occurred; (3) who was involved; and (4)

the resolution sought by the student. All relevant supporting materials should be attached as addenda to the Statement. Appeals should avoid unsubstantiated, defamatory or *ad hominem* accusations regarding the motivations of the faculty member or other persons involved in making the academic determination.

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

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

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

#### STEP 3. COLLEGE/SCHOOL LEVEL APPEAL

The student shall submit the Statement, along with any additional relevant materials, through the college's/school's appeals mechanism, which may include department or other organizational unit levels.

This appeal shall be considered by the college/school and a decision rendered within 35 calendar days of this submission. Students should refer to their college's/school's appeals procedures for guidance in this step. The student shall be notified as to when their appeal will be considered, and given the opportunity to make an in-person and/or written statement as specified by the relevant unit or college/school policy.

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

#### STEP 4. UNIVERSITY-LEVEL APPEAL

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

##### A. Academic Appeals Resolution Committee

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

- The Provost or their designee, who shall be the chair of the committee, and non-voting member.
- Three faculty members and one alternate faculty member (with the alternate serving in instances where there is a conflict of interest or when a member has to be replaced) all from different colleges appointed by the Faculty Senate Agenda Committee. Members will serve a 1 year term with no term limits.
- If the appeal had at any point involved a matter of harassment/discrimination, the committee shall include a representative of the OUEC, who shall be a non-voting member.

##### B. Preliminary Matters

Upon receiving an appeal, the committee shall obtain copies of all documentation related to the appeal from Steps 1, 2 and 3, including the procedures of the relevant unit and college/school. If the Academic

Appeals Resolution Committee determines, by a majority vote, that the appeal is patently without substance or merit, it may dismiss the appeal.

**C. Investigation**

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

**D. Authority to Act**

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

**E. Resolution**

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

**F. Action**

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

**G. Appeal**

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

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

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

**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**

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

### **APPROPRIATE USE OF COMPUTER AND NETWORK RESOURCES POLICY**

The 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 nonuniversity 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 (<http://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.
  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
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."

### **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 12-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 (p. 34)." 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.

## PhD Programs

Northeastern offers the following PhD programs:

### B

- Bioengineering, PhD (p. 124)
- Biology, PhD (p. 384)
- Biomedical Sciences, PhD (p. 277)

### C

- Chemical Engineering, PhD (p. 131)
- Chemistry, PhD (p. 389)
- Civil Engineering, PhD (p. 138)
- Computer Engineering, PhD (p. 152)
- Computer Science, PhD (p. 97)
- Counseling Psychology, PhD (p. 246)
- Criminology and Justice Policy, PhD (p. 422)
- Cybersecurity, PhD (p. 107)

### E

- Economics, PhD (p. 428)
- Electrical Engineering, PhD (p. 152)
- English, PhD (p. 432)

### H

- History, PhD (p. 436)
- Human Movement and Rehabilitation Sciences (p. 291)

### I

- Industrial Engineering, PhD (p. 177)
- Interdisciplinary Engineering, PhD (p. )

### L

- Law, Criminology and Justice Policy, JD/PhD (p. 422)

### M

- Marine and Environmental Sciences, PhD (p. 396)
- Mathematics, PhD (p. 401)
- Mechanical Engineering, PhD (p. 177)
- Medicinal Chemistry, PhD (p. 277)

### N

- Network Science, PhD (p. 417)
- Nursing, PhD (p. 264)

### P

- Personal Health Informatics, PhD (p. 111)
- Pharmaceutical Sciences, PhD (p. 277)
- Pharmacology, PhD (p. 277)
- Physics, PhD (p. 408)
- Political Science, PhD (p. 438)
- Population Health, PhD (p. 229)
- Psychology, PhD (p. 415)
- Public Policy, PhD (p. 447)

### S

- School Psychology, PhD (p. 246)
- Sociology, PhD (p. 464)

## PhD Network

The Northeastern PhD Network is designed to build community among PhD students, providing students with support and resources university-wide to enhance their educational experience and career preparation.

Shared values unite PhD-centered activities at Northeastern:

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

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

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

- Resources that support PhD students' educational, professional, and personal lives
- Events created especially for PhD students, both at Northeastern and through our partners
- Funding in support of fellowships, internships, and conference attendance

## Experiential PhD

Northeastern's Experiential PhD programs enable students to expand critical inquiry, learn, work, and chart a path to professional success through authentic opportunities at organizations in industry, government, and the nonprofit sector. Beyond the comfort zone of their own university research group, PhD students encounter immersive experiences that help shape their research perspective. They also bring fresh ideas and talent to their host organizations.

The immersive Experiential PhD transforms the educational experience by:

- **Challenging students to solve problems in the context of society’s needs and limitations**, a mission that will help shape the questions they raise and answer through their dissertation research
- **Equipping students for a lifetime with creativity, cultural agility, and professional skills**—public speaking and communications, project management, leadership, and teamwork—they’ll need to turn discoveries into solutions
- **Enriching fields of expertise** by introducing new mentors and collaborators to each student’s professional network, host institution, and university research laboratory
- **Developing frameworks for research and dissertations that transcend traditional discipline-specific boundaries** by expanding context and content—new perspectives have an impact from start to finish

Experiential PhD offers major benefits to both students and institutional partners. As students work to solve complex problems and chart careers as future innovators, their host institutions gain advantages like these:

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

Northeastern is one of the only universities in the world to offer students options for learning and pursuing research outside of their primary research group in all of its doctoral degree programs. These real-world placements are highly flexible and customizable, tailored to meet the needs of both Northeastern’s PhD students and our institutional partners.

**Experiential PhD Leadership, Graduate Certificate**

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

This Graduate Certificate in Experiential PhD Leadership aims to:

- **Challenge students to address complex problems** through experience within the context of real-world needs and challenges faced by industry, government, or nonprofit sector organizations, broadening students’ view of stakeholders and impact, shaping the very questions they raise and answer.
- **Equip students for a lifetime with the cultural agility, creativity, and professional skills**—public speaking and communications, meeting goals and expectations (e.g., project management for personal and professional purposes), teamwork, leadership, peer influence, leading from the middle—that they will need to translate their findings into impactful solutions.

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

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

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

A B or higher is required in each course.

**Requirements**

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

**Program Credit/GPA Requirements**

12 total semester hours required

Minimum 3.000 GPA required

# College of Arts, Media and Design

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

**Elizabeth Hudson, PhD**, Dean

**Andrea Raynor, MFA**, Associate Dean for Undergraduate Programs  
**Jane Amidon, MLA**, Senior Associate Dean for Graduate Programs and Strategic Initiatives

**Hilary Poriss, PhD**, Associate Dean for Academic Affairs, Faculty and Research

**Thomas Michael, MBA**, Associate Dean for Administration and Finance

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*Graduate Enrollment and Student Services*

100 Meserve Hall  
 617.373.5329 or 617.373.2566  
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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 are designed to 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 (<https://camd.northeastern.edu/graduate-students/>) often, 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 (<http://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.

## Academic Policies and Procedures

- General Information (p. 46)
- Master’s Degree Policies (p. 46)
- Graduate Student Classification (p. 47)

## General Information

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

- Architecture
- Art + Design
- Game Design
- Journalism
- Music

## Master’s Degree Policies

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

A candidate for the master’s degree must complete a minimum of 30 semester hours of graduate-level 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 (“Minimum Cumulative Grade-Point Average (p. 29)”).

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

## Electives

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

## Graduate Student Scholarship (GSS)

Students who are registered in degree programs are eligible for a CAMD Graduate Student Scholarship (GSS). Award recipients will receive an official award letter from CAMD graduate studies. Pay attention to this letter as it is an official contract that should be read carefully. 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 must maintain a 3.000 cumulative GPA. Students whose cumulative GPA is below 3.000 will be placed on academic probationary status and are not eligible to receive the award while on probation. The GSS can be reactivated by raising the cumulative GPA to 3.000 in the subsequent semester; students who do not meet the minimum GPA requirement at the end of the next semester cannot receive additional probationary periods.

## Leave of Absence

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

## Time Limitation

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

If students wish to apply for an extension of the time limit, they must submit a petition to their department of study. The petition must include a detailed plan for completion of all remaining degree requirements. In the case of time-limit extension requests for master's degree 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 demonstrated that doing so imposes a substantial hardship, the requirements of the year in which the student matriculated will be applicable.

## Thesis

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

## Graduate Student Classification

### Regular Student

Those students who are admitted to a degree program.

### Conditional Student

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

### Provisional Student

Students whose academic records do not qualify them for acceptance as regular students. Provisional students must obtain a B (3.000) average in the first 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 (<https://camd.northeastern.edu/graduate-resources-policies/>). Special students who do not register for four consecutive semesters (excluding summer semester) will be subject to review and possible withdrawal by CAMD graduate studies.

### Student Status

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

- A student is considered full-time if enrolled in a full-time co-op (p. 32).
- All graduate students who are formally registered in thesis continuation may be considered full-time at the discretion of their department. It is ordinarily assumed that such students will be in residence.

*Note:* Full-time status may be defined differently for federal loan purposes. For information, contact Student Financial Services (<https://studentfinance.northeastern.edu/>), 354 Richards Hall, Northeastern University, Boston, MA 02115; 617.373.5899.

## School of Architecture

### Daniel Adams, MArch

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## Master of Architecture

### Amanda Lawrence

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

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

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

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

## Master of Design for Sustainable Urban Environments

### Sara Jensen Carr

Assistant Professor and Graduate Coordinator

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

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

The MDes is a unique program of study in which urban landscape design, planning, and policy dovetail with environmental engineering, environmental science, art, and visualization. Boston's history of innovation in environmental design as well as its legacy of urban

redevelopment provide a rich backdrop and laboratory of urban, infrastructural, and ecological prototypes that ideally position the program to creatively and critically explore local issues with global implications.

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

## Programs

### Master of Architecture (MArch)

- One-Year Program (p. 48)
- Two-Year Program (p. 49)
- Three-Year Program (p. 50)
- Three-Year Program—Advanced Degree Entrance (p. 51)

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

- One-Year Program (p. 52)
- Two-Year Program (p. 52)

## Master of Architecture—One-Year Program

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

Open to candidates with either a Bachelor of Science in Architecture from Northeastern University or a professional Bachelor of Architecture degree from an accredited North American program with at least one year of IDP-approved professional experience.

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

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
<b>Professional Practice</b>		
ARCH 6430	Case Studies 1	4
ARCH 6440	Case Studies 2	4
<b>Topics and Seminars</b>		
ARCH 6330	Seminar in Modern Architecture	4



ARCH 6340	Graduate Topics in Architecture	4
<b>Research and Project</b>		
ARCH 7130	Master's Research Studio	6
ARCH 7140	Master's Degree Project	6

**Elective**

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

**Program Credit/GPA Requirements**

32 total semester hours required  
 Minimum 3.000 GPA required

**Plan of Study**

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

Total Hours: 32

**Master of Architecture—Two-Year Program**

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

**YEAR ONE**

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

**YEAR TWO**

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

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Core Requirements**

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

**Electives**

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

**Program Credit/GPA Requirements**

60–68 total semester hours required  
 Minimum 3.000 GPA required

**Plan of Study**

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

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

Total Hours: 68

## Master of Architecture—Three-Year Program

Open to candidates who do not have a Bachelor of Science in Architecture or equivalent.

Applicants from all disciplines are welcome. Those who have some architecture course work may be eligible for advanced placement.

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

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

### YEAR ONE

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

### YEAR TWO

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

### YEAR THREE

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

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirements

Code	Title	Hours
<b>History</b>		
ARCH 2330	Architecture, Modernity, and the City, 1800 to 1910	4
ARCH 2340	Architecture, Modernity, and the City, 1910 to 1980	4

#### Building, Design, and Environment

ARCH 2240	Architectonic Systems	4
ARCH 3450	Advanced Architectural Communication	4
ARCH 5210	Environmental Systems	4
ARCH 5220	Integrated Building Systems	4
ARCH 5230	Structural Systems	4

#### Studio

ARCH 5115	Option Studio	6
or ARCH 3155	Studio Abroad	
ARCH 5120	Comprehensive Design Studio	6
ARCH 6100	Graduate Skills Studio	6
ARCH 6200	Graduate Studio 1: Architectural Design	6

#### Professional Practice

ARCH 6430	Case Studies 1	4
ARCH 6440	Case Studies 2	4

#### Topics and Seminars

ARCH 5310	Design Tactics and Operations	4
or ARCH 3361	Architecture and Urbanism Abroad	

ARCH 6330	Seminar in Modern Architecture	4
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Complete the following (repeatable) course twice: 8

ARCH 6340	Graduate Topics in Architecture	
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#### Research and Project

ARCH 7130	Master's Research Studio	6
ARCH 7140	Master's Degree Project	6

### Electives

Code	Title	Hours
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#### Required Electives

Complete 8 semester hours of non-ARCH courses (required).	8
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#### Optional Electives

Complete 4 semester hours of ARCH courses (optional). Electives outside architecture may be taken in consultation with your faculty advisor.

### Program Credit/GPA Requirements

96–104 total semester hours required

Minimum 3.000 GPA required

### Plan of Study

#### Year 1

Fall	Hours	Spring	Hours	Summer 1	Hours
ARCH 2240	4	ARCH 2340 and ARCH 2341	4	Vacation	0
ARCH 2330 (and)	4	ARCH 3450 (or required elective)	4		
ARCH 2331	0	ARCH 6200	6		
ARCH 5210 (and)	4	Elective (optional)	4		
ARCH 5211	0				
ARCH 6100	6				
	18		18		0

**Year 2**

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

**Year 3**

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

Total Hours: 104

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

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

Open to candidates who do not have a Bachelor of Science in Architecture or an equivalent degree.

Students with some background in architecture may be eligible for advanced placement into the program. Advanced placement will be determined by an applicant’s transcript and portfolio.

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

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

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

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

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

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

**Prerequisites**

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

Code	Title	Hours
<b>History</b>		
ARCH 2330	Architecture, Modernity, and the City, 1800 to 1910	4
ARCH 2340	Architecture, Modernity, and the City, 1910 to 1980	4
<b>Building, Design, and Environment</b>		
ARCH 2240	Architectonic Systems	4
ARCH 5210	Environmental Systems	4
ARCH 5230	Structural Systems	4

**Core Requirements**

Code	Title	Hours
<b>Building, Design, and Environment</b>		
ARCH 3450	Advanced Architectural Communication	4
ARCH 5220	Integrated Building Systems	4
<b>Studio</b>		
ARCH 5115	Option Studio (or)	6
	or ARCH 3155 Studio Abroad	
ARCH 5120	Comprehensive Design Studio	6
ARCH 6100	Graduate Skills Studio	6
ARCH 6200	Graduate Studio 1: Architectural Design	6
<b>Professional Practice</b>		
ARCH 6430	Case Studies 1	4
ARCH 6440	Case Studies 2	4
<b>Topics and Seminars</b>		
ARCH 5310	Design Tactics and Operations	4
	or ARCH 3361 Architecture and Urbanism Abroad	
ARCH 6330	Seminar in Modern Architecture	4
Complete the following (repeatable) course twice:		8
ARCH 6340	Graduate Topics in Architecture	
<b>Research and Project</b>		
ARCH 7130	Master’s Research Studio	6
ARCH 7140	Master’s Degree Project	6

**Electives**

Code	Title	Hours
<b>Required Electives</b>		
Complete 8 semester hours of non-ARCH courses.		8
<b>Additional Elective or Topics</b>		
Complete 8 semester hours of non-ARCH courses.		8

**Program Credit/GPA Requirements**

78–100 total semester hours required  
Minimum 3.000 GPA required

**Plan of Study**

Year 1			
Fall	Hours	Spring	Hours
ARCH 2240		4 ARCH 2340 and ARCH 2341	4
ARCH 2330 (and)	4	ARCH 3450 (or Required Elective)	4

ARCH 2331	ARCH 6200	6
ARCH 5210 (and)	4 Elective (Optional)	4
ARCH 5211		
ARCH 6100	6	
	18	18

**Year 2**

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

**Year 3**

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

Total Hours: 104

Total credits for the AP track may range from 78–104 depending on waivers and optional electives.

*Note:* Only courses in year one may be waived. Course waivers are at the discretion of the program director.

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

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

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirements

Code	Title	Hours
<b>Studio</b>		
SUEN 7130	Master's Research Studio: Design and the Resilient City	6
SUEN 7140	Master's Research Studio: Master's Project	6
<b>Proseminar</b>		
Complete 8 semester hours from the following (repeatable) courses:		8
SUEN 7320	Pro-Seminar: Issues in Designed Urban Environments	
SUEN 6340	Topics in Urban Environmental Design	
<b>Technology</b>		

SUEN 7230	Urban Ecologies and Technologies 1	4
SUEN 7240	Urban Ecologies and Technologies 2	4

### Electives

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

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

### Program Credit/GPA Requirements

36 total semester hours required

Minimum 3.000 GPA required

### Plan of Study

**Year 1**

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

Total Hours: 36

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

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

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

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirements

Code	Title	Hours
<b>Studio</b>		
SUEN 6110	Graduate Studio 1: Sustainable Urban Sites	6
SUEN 6120	Graduate Studio 2: Sustainable Urban Systems	6
SUEN 7130	Master's Research Studio: Design and the Resilient City	6
SUEN 7140	Master's Research Studio: Master's Project	6
<b>Cities: Design and Planning</b>		
SUEN 6310	Cities, Nature, and Design in Contemporary History and Theory	4
LPSC 7312	Cities, Sustainability, and Climate Change	4

**Proseminar**

Complete 8 semester hours from the following (repeatable) courses:	8
SUEN 7320 Pro-Seminar: Issues in Designed Urban Environments	
SUEN 6340 Topics in Urban Environmental Design	

**Technology**

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

**Electives**

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

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

**Program Credit/GPA Requirements**

64 total semester hours required  
 Minimum 3.000 GPA required

**Plan of Study**

Year 1							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
SUEN 6110	6	SUEN 6120	6	Vacation	0	Vacation	0
SUEN 6210	4	SUEN 6220	4				
SUEN 6310	4	LPSC 7312	4				
Elective (Required)	4	Elective (Required)	4				
		18		18		0	
Year 2							
Fall	Hours	Spring	Hours				
SUEN 7130	6	SUEN 7140 (or co-op)*	6				
SUEN 7320 (or)	4	SUEN 7320	4				
SUEN 6340		SUEN 7240	4				
SUEN 7230	4	Elective (Optional)	4				
Elective (Optional)	4						
		18		18			

Total Hours: 72

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

Total credits required are 64 (with two optional electives, 72).

**Art + Design**

Website (<http://www.northeastern.edu/camd/artdesign/academics/graduate/>)

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

**Programs**

**Master of Fine Arts (MFA)**

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

**Master of Science (MS)**

- Experience Design (p. 56)
- Information Design and Visualization (p. 56)
- Game Science and Design (p. 57)

**Graduate Certificate**

- Experience Design (p. 58)
- Game Analytics (p. 59)
- Information Design and Visualization (p. 59)

## Experience Design, MFA

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

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

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

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

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

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirements

Code	Title	Hours
<b>Required Core</b>		
ARTG 5120	Research Methods for Design	4
ARTG 5600	Experience Design Studio 1: Principles	4
ARTG 5610	Design Systems	4
ARTG 5620	Notational Systems for Experience	4
ARTG 5640	Prototyping for Experience Design	4
ARTG 6310	Design for Behavior and Experience	4
ARTG 6600	Experience Design Studio 2: Group and Interpersonal	4
ARTG 6700	Experience Design Studio 3: Synthesis	4
<b>Thesis</b>		

ARTG 7100	Thesis Seminar for Design	4
ARTG 7990	Thesis	8

### Electives

Code	Title	Hours
Complete 16 semester hours from the following:		
ARTG 5310	Visual Cognition	4
ARTG 5320	Statistics Basics for Designers	4
ARTG 5330	Visualization Technologies 1: Fundamentals	4
ARTG 6320	Design of Information-Rich Environments	4
ARTG 6330	Information Design Mapping Strategies	4
Other electives may be chosen in consultation with program coordinator.		

### Program Credit/GPA Requirements

60 total semester hours required  
Minimum 3.000 GPA required

### Plan of Study

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

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
ARTG 5600	4	ARTG 6600	4	Co-op (optional)	0
ARTG 5610	4	ARTG 6310	4		
ARTG 5620	4	ARTG 5120	4		
Elective	4	ARTG 5640	4		
		16	16		0
Year 2					
Fall	Hours	Spring	Hours		
ARTG 6700	4	ARTG 7990	8		
ARTG 7100	4	Elective	4		
Elective	4				
Elective	4				
		16	12		

Total Hours: 60

#### Sample Two Years, No Co-op Plan of Study

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
ARTG 5600	4	ARTG 6600	4	Vacation	0
ARTG 5610	4	ARTG 6310	4		
ARTG 5620	4	ARTG 5120	4		
ARTG 5640	4	Elective	4		
		16	16		0
Year 2					
Fall	Hours	Spring	Hours		
ARTG 6700	4	ARTG 7990	8		
ARTG 7100	4	Elective	4		
Elective	4				

Elective	4	
	16	12
Total Hours: 60		

## Information Design and Visualization, MFA

The first MFA program entirely dedicated to information design and visualization trains students in harnessing visual languages to support discovery and communicate information across a range of socially relevant issues. Successful graduates will be professional information designers and data visualization experts able to collaborate effectively in this dynamic and burgeoning field of practice and research. They will be prepared to work in design agencies, research institutions, companies, and public institutions. 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. Our students have the unique advantage of studying at a major research university known for interdisciplinary collaboration located in Boston—a global center for technology, science, and education and a hot spot for information design and data visualization.

Students have an opportunity to gain an understanding of translating data and information into visual languages and to learn to integrate theoretical, visual, and technical aspects of visualizations that engage a broad range of audiences. The curriculum is built upon an established undergraduate program in graphic, information, and interaction design and seeks applicants from diverse fields of study who are interested in exploring data, visual and auditory design, perception, and creative inquiry. 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.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
<b>Studio</b>		
ARTG 5100	Information Design Studio 1: Principles	4
ARTG 6100	Information Design Studio 2: Dynamic Mapping and Models	4
ARTG 6200	Information Design Studio 3: Synthesis	4
<b>Theory and Research Methods</b>		
ARTG 5120	Research Methods for Design	4
ARTG 5330	Visualization Technologies 1: Fundamentals	4
ARTG 6110	Information Design Theory and Critical Thinking	4
<b>Typography and History</b>		
ARTG 5110	Information Design History	4
ARTG 5130	Visual Communication for Information Design	4
<b>Thesis</b>		
ARTG 7100	Thesis Seminar for Design	4
ARTG 7990	Thesis	8

### Electives

Code	Title	Hours
In consultation with faculty advisor, complete four courses from the following:		
ARTG 5310	Visual Cognition	
ARTG 5320	Statistics Basics for Designers	
ARTG 6310	Design for Behavior and Experience	
ARTG 6320	Design of Information-Rich Environments	
ARTG 6330	Information Design Mapping Strategies	
ARTG 6900	Special Topics in Design	
INSH 5301	Introduction to Computational Statistics	

### Program Credit/GPA Requirements

60 total semester hours required

Minimum 3.000 GPA required

### Plan of Study

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

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
ARTG 5100	4	ARTG 5120	4	ARTE 6964	
ARTG 5110	4	ARTG 6100	4		
ARTG 5130	4	ARTG 6110	4		
ARTG 5330	4	Open elective	4		
			16	16	0
Year 2					
Fall	Hours	Spring	Hours		
ARTG 6200	4	ARTG 7990	8		
ARTG 7100	4	Open elective	4		
Open elective	4				
Open elective	4				
			16	12	

Total Hours: 60

#### Sample Two Years, No Co-op Plan of Study

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
ARTG 5100	4	ARTG 5120	4	Vacation	0
ARTG 5110	4	ARTG 6100	4		
ARTG 5130	4	ARTG 6110	4		
ARTG 5330	4	Open elective	4		
			16	16	0
Year 2					
Fall	Hours	Spring	Hours		
ARTG 6200	4	ARTG 7990	8		
ARTG 7100	4	Open elective	4		

Open elective	4	
Open elective	4	
	16	12

Total Hours: 60

## Experience Design, MS

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

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

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

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

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

The MS degree is intended for graduate students from related fields—media, design, communications, data science, and more—who would like to acquire competencies in experience design to complement their skills and address their professional needs. Embedded in the course offering of our Master of Fine Arts in Experience Design (p. 54) program, students in the MS program will have the opportunity to join MFA students for activities such as attending guest lectures and workshops.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

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

### Electives

Code	Title	Hours
Complete two of the following:		8
ARTG 5310	Visual Cognition	
ARTG 5320	Statistics Basics for Designers	
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 5640	Prototyping for Experience Design	
Other electives may be chosen in consultation with program coordinator.		

### Program Credit/GPA Requirements

32 total semester hours required  
Minimum 3.000 GPA required

### Plan of Study

Year 1			
Fall	Hours	Spring	Hours
ARTG 5600	4	ARTG 5120	4
ARTG 5610	4	ARTG 6310	4
ARTG 5620	4	ARTG 6600	4
Elective	4	Elective	4
		16	16

Total Hours: 32

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

## Information Design and Visualization, MS

The Master of Science in Information Design and Visualization is a two-semester research and analysis oriented program focusing on visual interfaces to communicate and explore digital information. Graduates will be professional information designers and data visualization experts able to collaborate effectively in this dynamic and burgeoning field of practice and research, prepared to work in data-driven areas including design, technology, business, health, education and public institutions. The curriculum is designed to train students in design principles, critical inquiry and the analytical and creative practices needed to assume leadership roles in an evolving interdisciplinary field. Course work focuses on the translation of data and information into visual languages, and the integration of theoretical, cognitive and technical aspects of visualizations that engage a broad range of audiences. From this master's program, students have multiple options to expand their



advanced studies along diverse avenues, including adding Graduate Certificates in related topics such as User Analytics, Data Analytics, Experience Design and Cultural Entrepreneurship, engaging in co-op opportunities, and applying to proceed academically into a terminal Master of Fine Arts degree.

A typical plan of study includes:

Semester 1 is dedicated to foundations, including introductory courses in information visualization and visual communication principles and practices, visualization technologies, design studio, and visual cognition.

Semester 2 continues foundational training in statistics and data analysis, information design theory and critical thinking, and provides an advanced studio and information design elective allowing students to focus their studies along lines of individual interest.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

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

### Elective

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

### Program Credit/GPA Requirements

32 total semester hours required  
Minimum 3.000 GPA required

## Plan of Study

Year 1			
Fall	Hours	Spring	Hours
ARTG 5100	4	ARTG 5320	4
ARTG 5150 and ARTG 5151	4	ARTG 6100	4
ARTG 5310	4	ARTG 6110	4
ARTG 5330	4	Information Design Elective	4
		16	16

Total Hours: 32

## Game Science and Design, MS

The **Master of Science (MS) in Game Science and Design** is a program that seeks to give students a comprehensive understanding of how successful game products are created in a player-centric environment. Focusing on the science of game development, students have an opportunity to learn the design and technological skills needed to build a game and develop a deep understanding of playability and analytics that make products successful in an increasingly competitive marketplace.

The game industry has expanded to include social and mobile gaming; games in health, education, and training; and innovations in play psychology, middleware, graphics tools, game mechanics, game evaluation methods, and advanced artificial intelligence and narrative techniques. It has become an increasingly competitive space.

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

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

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

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirements

Code	Title	Hours
<b>Foundations</b>		
GSND 5110 and GSND 5111	Game Design and Analysis and Seminar for GSND 5110	5
GSND 5122	Business Models in the Game Industry	1
<b>Research and Statistics</b>		
GSND 5130	Mixed Research Methods for Games	4
GSND 6330	Player Experience	4

<b>Thesis</b>		
GSND 7990	Thesis	4

**Restricted Electives**

Code	Title	Hours
<b>Game Design or Development</b>		
Complete one from the following: 4		
CS 5150	Game Artificial Intelligence	
CS 5850	Building Game Engines	
GSND 6240	Exploratory Concept Design	
GSND 6250	Spatial and Temporal Design	

<b>Research or Analytics</b>		
Complete one from the following: 4		
CS 5340	Computer/Human Interaction	
GSND 6320	Psychology of Play	
GSND 6340	Biometrics for Design	
GSND 6350	Data-Driven Player Modeling	

**Electives**

Note: Choose electives in consultation with your faculty advisor.

Code	Title	Hours
Complete two from the following: 8		
<b>Game Design and Development</b>		
ARTG 5610	Design Systems	
ARTG 5640	Prototyping for Experience Design	
CS 5520	Mobile Application Development	
CS 5610	Web Development	
<b>User Research and Analytics</b>		
ARTG 5130	Visual Communication for Information Design	
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 6110	Information Design Theory and Critical Thinking	
ARTG 6310	Design for Behavior and Experience	
DA 5020	Collecting, Storing, and Retrieving Data	
DA 5030	Introduction to Data Mining/Machine Learning	
INSH 5302	Information Design and Visual Analytics	
JRNL 6341	Telling Your Story with Data	

**Program Credit/GPA Requirements**

34 total semester hours required  
 Minimum 3.000 GPA required

**Plan of Study**

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

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
GSND 5110	4	Elective	4	Co-op (Optional)	0
GSND 5111	1	Elective	4		

GSND 5130	4				
	9		8		0
<b>Year 2</b>					
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>		<b>Hours</b>	
GSND 5122	1	General elective		4	
Elective	4	GSND 7990		4	
General elective	4				
	9		8		
Total Hours: 34					

**Sample Two Years, No Co-op Plan of Study**

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
GSND 5110	4	Concentration elective	4	Vacation	0
GSND 5111	1	Concentration elective	4		
GSND 5130	4				
	9		8		0
<b>Year 2</b>					
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>		<b>Hours</b>	
GSND 5122	1	General elective		4	
Concentration elective	4	GSND 7990		4	
General elective	4				
	9		8		
Total Hours: 34					

**Experience Design, Graduate Certificate**

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

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

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

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

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

The certificate is intended for practitioners and graduate students from related fields—media, design, communications, data science, and more—who would like to acquire competencies in experience design to complement their skills and address their professional needs. Embedded in the course offering of our Master of Fine Arts in Experience Design (p. 54) program, students in the certificate program will have the opportunity to join MFA students for activities such as attending guest lectures and workshops.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirements

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

#### Elective

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

### Program Credit/GPA Requirements

16 total semester hours required  
 Minimum 3.000 GPA required

### Game Analytics, Graduate Certificate

The Graduate Certificate in Game Analytics offers students an opportunity to obtain the ability to analyze vast amounts of data, which 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 have dramatically increased the demand for qualified game analysts. Northeastern’s unique Graduate Certificate in Game Analytics is a one-year, 20-semester-hour program developed to meet this need.

### Program Requirements

Complete all five courses and requirements listed below unless otherwise indicated.

#### Core Requirements

Code	Title	Hours
<b>Data Science Core</b>		
DA 5020	Collecting, Storing, and Retrieving Data	4
DA 5030	Introduction to Data Mining/Machine Learning	4
INSH 5302	Information Design and Visual Analytics	4
<b>Game Science and Design Core</b>		
GSND 5110	Game Design and Analysis	4
GSND 6350	Data-Driven Player Modeling	4

### Program Credit/GPA Requirements

20 total semester hours required  
 Minimum 3.000 GPA required

### Information Design and Visualization, Graduate Certificate

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

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

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

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirements

Code	Title	Hours
ARTG 5130	Visual Communication for Information Design	4

ARTG 5330	Visualization Technologies 1: Fundamentals	4
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## Electives

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

## Program Credit/GPA Requirements

16 total semester hours required  
Minimum 3.000 GPA required

### School of Journalism

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

**Jonathan Kaufman, MA**  
Professor and Director

102 Lake Hall  
617.373.3236  
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Graduate Program Contact:  
Aleszu Bajak, Graduate Program Manager, [a.bajak@northeastern.edu](mailto:a.bajak@northeastern.edu)

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

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

It is our goal to help you put your passion into practice. To that end, our graduate programs afford students the opportunity to study in Boston with a small and dedicated faculty of specialists with years of experience and extensive contacts in the media world.

## Programs

### Master of Arts (MA)

- Journalism (p. 60)

### Master of Science (MS)

- Media Advocacy (p. 61)

### Journalism, MA

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

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

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirement

Code	Title	Hours
JRNL 6340	Fundamentals of Digital Journalism	4

### Tracks

Complete one of the following two tracks:

#### PROFESSIONAL TRACK

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

#### MEDIA INNOVATION TRACK

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

## Electives

Code	Title	Hours
Complete 20 semester hours from the following areas:		20
JRNL 5309 to JRNL 7976		

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

No more than two courses outside of CAMD may be taken.

## Program Credit/GPA Requirements

36 total semester hours required  
Minimum 3.000 GPA required

## Plan of Study

### Professional Track: Sample Two Years with Co-op

#### Year 1

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

#### Year 2

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

Total Hours: 37

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

#### Year 1

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

#### Year 2

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

Total Hours: 36

## Media Advocacy, MS

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

## Program Requirements

### Core Requirements

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

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

## Electives

Code	Title	Hours
Complete 18 semester hours from the following:		18

### Advocating for Change

Complete 9–12 semester hours from the following:

JRNL 6202	Perspective on Journalism Ethics
LW 6120	Law and Strategy
LW 6180	Health Law Survey
LW 6211	Antidiscrimination Law
LW 6231	Identifying and Securing Intellectual Property Rights
LW 7329	Environmental Law
LW 7335	Health Law
LW 7369	Intellectual Property
LW 7428	State and Local Government
LW 7463	Nonprofit Organizations
LW 7488	Sexuality, Gender and the Law
LW 7512	Problems in Public Health Law
LW 7525	Law and Economic Development
LW 7582	Elder Law
LW 7588	Reproductive Rights and Health
LW 7597	Civil Rights and Restorative Justice Clinic
LW 7600	Current Issues in Health Law and Policy
LW 7635	Lab Seminar in Applied Design and Legal Empowerment
LW 7651	Human Rights in the United States

### Techniques of Advocacy

Complete 9–12 semester hours from the following:

ARTD 5001	Art, Context, Action 1
ARTD 5002	Art, Context, Action 2
ARTD 5582	Collaborative Video and Community Engagement
ARTG 5100	Information Design Studio 1: Principles
ARTG 5110	Information Design History
ARTG 5310	Visual Cognition
ARTG 5330	Visualization Technologies 1: Fundamentals
ARTG 5600	Experience Design Studio 1: Principles
ARTG 5610	Design Systems
ARTG 5620	Notational Systems for Experience
ARTG 6310	Design for Behavior and Experience
ARTG 6320	Design of Information-Rich Environments
JRNL 5310	Photojournalism
JRNL 6340	Fundamentals of Digital Journalism
LW 6120	Law and Strategy
LW 6180	Health Law Survey
LW 6231	Identifying and Securing Intellectual Property Rights
LW 7597	Civil Rights and Restorative Justice Clinic

LW 7635 Lab Seminar in Applied Design and  
Legal Empowerment

## Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

## Plan of Study

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

#### Year 1

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
JRNL 5400	4	Media Advocacy and Communication Research	4	Vacation	0	Vacation	0
LW 6400	4	Elective 2	3-4				
Elective 1	3-4	Elective 3	3-4				
	11-12		10-12		0		0

#### Year 2

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

Total Hours: 33-39

## Interdisciplinary Programs

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 are designed to produce graduates equipped to engage the international marketplace and shape global culture.

## Programs

### Master of Science

- Arts Administration and Cultural Entrepreneurship (p. 62)
- Creative Practice Leadership (p. 63)
- Urban Planning and Policy (p. 64)

### Graduate Certificate

- Arts Administration (p. 66)
- Cultural Entrepreneurship (p. 67)

## Arts Administration and Cultural Entrepreneurship, MS

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

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

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

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

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

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

### Electives

Code	Title	Hours
<b>Arts Administration Directed Elective</b>		
AACE 6110	Information Technology for Arts and Cultural Organizations	3
<b>Cultural Entrepreneurship Directed Elective</b>		
Complete one of the following:		3
ENTR 6212	Business Planning for New Ventures	

ENTR 6210	Managing Operations in Early Stage Ventures
ENTR 6214	Social Enterprise
ENTR 6216	Global Social Entrepreneurship and Innovation
ENTR 6218	Business Model Design and Innovation
TECE 6222	Emerging and Disruptive Technologies
TECE 6250	Lean Design and Development

**Experiential Electives in Arts Leadership**

Complete two of the following courses not taken to fulfill above requirements: 6

ARTG 6310	Design for Behavior and Experience
MUSI 5540	Special Topics in Music Industry
MUSI 6000	Management of Music Organizations
MUSI 6300	Intellectual Property for Music Management
MUSI 6400	Marketing Strategies in the Music Industry

**Program Credit/GPA Requirements**

30 total semester hours required  
Minimum 3.000 GPA required

**Plan of Study**

**Sample Plans of Study:**

**One Year**

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

Total Hours: 30

**One and a Half Years**

Year 1		Year 2		Hours
Fall	Hours Spring	Hours	Summer 1	
AACE 6000	3 AACE 6020	3		3
AACE 6010	3 AACE 6220	3		3
AACE 6200	3 Arts administration directed elective	3		3
AACE 6210	3	3		
12		12		9

**Year 2**

Fall	Hours
Cultural entrepreneurship directed elective	3

Experiential elective 1	3
Experiential elective 2	3
<hr/>	
9	

Total Hours: 30

**Creative Practice Leadership, MS**

**Daniel Strong Godfrey, PhD**

Professor and Chair, Program Coordinator

351 Ryder Hall  
617.373.2776  
617.373.4129 (fax)

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

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

**JD/MS Option**

The JD/MS in Creative Practice Leadership is a dual-degree program that offers students a variety of 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.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Core Requirements**

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

**Electives**

Code	Title	Hours
Complete 16 semester hours in the following subject areas in consultation with your advisor:		16

AACE, ARTG, ARTH, COMM, INAM, JRNL, MUSI, THTR, 5000 level or above

**Program Credit/GPA Requirements**

32 total semester hours required  
Minimum 3.000 GPA required

**Plan of Study****Sample One Year, No Co-op**

Year 1			
Fall	Hours	Spring	Hours
INAM 6100	4	INAM 6210	4
INAM 6200	4	INAM 6300	4
Elective	4	Elective	4
Elective	4	Elective	4
		16	16

Total Hours: 32

**Sample Two Year, One Co-op**

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

Year 2	
Fall	Hours
Co-op	
Elective <sup>1</sup>	4
	4

Total Hours: 32

<sup>1</sup> International students cannot take an online elective in their last term as their only class.

**Urban Planning and Policy, MS****Gavin Shatkin, PhD**

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**Brianna Freeman**

Academic Program Administrator  
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The Master of Science in Urban Planning and Policy (MUPP) program trains leaders interested in building just and sustainable solutions to today's critical urban problems, including challenges of affordable housing provision, equitable and sustainable economic growth, sustainable transportation, and climate change adaptation and mitigation. This innovative program combines the expertise in urban planning and policy analysis and data analytics of the School of Public Policy and Urban Affairs with expertise in physical planning, design, and data visualization at the School of Architecture. The core curriculum of the program provides students with a solid foundation in essential skills and concepts, including research design and statistics, economic analysis, legal foundations of urban planning and policy, and the history of urban development and urban planning. Students also have the opportunity to develop substantial expertise in a specialization area, including urban analytics, urban sustainability and resilience, urban design and physical planning, and urban development policy and planning.

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

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

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Core Requirements**

Code	Title	Hours
<b>Planning and Policy</b>		
LPSC 5201	Law and the City	4
PPUA 6201	The 21st-Century City: Urban Opportunities and Challenges in a Global Context	4
PPUA 6502	Economic Analysis for Policy and Planning	4
SUEN 6340	Topics in Urban Environmental Design	4
<b>Research Design</b>		
INSH 6300	Research Methods in the Social Sciences	4



**Quantitative Techniques**

Students in the urban analytics focus area are encouraged to take INSH 5301.

Choose one from the following:		4
INSH 5301	Introduction to Computational Statistics	
INSH 6500	Statistical Analysis	

- Focus Areas**
- Complete one of the following focus areas:
- Urban Design and Physical Planning (p. 65)
  - Urban Analytics (p. 65)
  - Sustainability and Resilience (p. 65)
  - Urban Development Policy and Planning (p. 65)

**URBAN DESIGN AND PHYSICAL PLANNING**

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

**URBAN ANALYTICS**

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

**SUSTAINABILITY AND RESILIENCE**

Code	Title	Hours
<b>Gateway Course</b>		
LPSC 7312	Cities, Sustainability, and Climate Change	4
or SUEN 6310	Cities, Nature, and Design in Contemporary History and Theory	
<b>Methods</b>		
Complete one of the following:		4
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
SUEN 7230	Urban Ecologies and Technologies 1	
<b>Capstone</b>		
PPUA 7673	Capstone in Public Policy and Urban Affairs	4
<b>Elective</b>		
Complete one of the following:		4
PPUA 5260	Ecological Economics	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 7231	Transportation Policy	
PPUA 7234	Land Use and Urban Growth Policy	
PPUA 7249	Urban Coastal Sustainability	
SUEN 6110	Graduate Studio 1: Sustainable Urban Sites	
SUEN 6120	Graduate Studio 2: Sustainable Urban Systems	
SUEN 6220	Implementation and Visualization for Urban Environments 2	
SUEN 6310	Cities, Nature, and Design in Contemporary History and Theory	
SUEN 6340	Topics in Urban Environmental Design	
SUEN 7230	Urban Ecologies and Technologies 1	
SUEN 7240	Urban Ecologies and Technologies 2	
SUEN 7320	Pro-Seminar: Issues in Designed Urban Environments	

**URBAN DEVELOPMENT POLICY AND PLANNING**

Code	Title	Hours
<b>Gateway Course</b>		
Complete one of the following:		4
PPUA 7230	Housing Policy	
PPUA 7231	Transportation Policy	
PPUA 7233	Contemporary Community Development	
<b>Methods</b>		
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	4
or PPUA 7236	Introduction to Real Estate Development for Urban Policy Makers	
<b>Capstone</b>		
PPUA 7673	Capstone in Public Policy and Urban Affairs	4
<b>Elective</b>		
Complete one of the following:		4

PPUA 5270	Food Systems and Public Policy
PPUA 6506	Techniques of Policy Analysis
PPUA 6530	State and Local Public Finance
PPUA 6551	Nonprofit Organizations and Social Change
PPUA 7230	Housing Policy
PPUA 7231	Transportation Policy
PPUA 7232	Immigration and Urban America
PPUA 7233	Contemporary Community Development
PPUA 7234	Land Use and Urban Growth Policy
PPUA 7236	Introduction to Real Estate Development for Urban Policy Makers
SUEN 6110	Graduate Studio 1: Sustainable Urban Sites
SUEN 6120	Graduate Studio 2: Sustainable Urban Systems
SUEN 6340	Topics in Urban Environmental Design

## Electives

Code	Title	Hours
Complete two of the following:		8
ARCH 5310	Design Tactics and Operations	
ARCH 5530	Innovative Models in Real Estate Development and Design	
ARCH 6100	Graduate Skills Studio	
ARCH 6330	Seminar in Modern Architecture	
ARCH 6340	Graduate Topics in Architecture	
ARTG 5100	Information Design Studio 1: Principles	
ARTG 5120	Research Methods for Design	
ARTG 5130	Visual Communication for Information Design	
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 6330	Information Design Mapping Strategies	
DA 5020	Collecting, Storing, and Retrieving Data	
DA 5030	Introduction to Data Mining/Machine Learning	
INSH 5302	Information Design and Visual Analytics	
PPUA 5260	Ecological Economics	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
PPUA 5270	Food Systems and Public Policy	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6530	State and Local Public Finance	
PPUA 6551	Nonprofit Organizations and Social Change	
PPUA 7245	Education Policy in the United States	
PPUA 7230	Housing Policy	
PPUA 7231	Transportation Policy	
PPUA 7232	Immigration and Urban America	
PPUA 7233	Contemporary Community Development	

PPUA 7234	Land Use and Urban Growth Policy
PPUA 7236	Introduction to Real Estate Development for Urban Policy Makers
PPUA 7237	Advanced Spatial Analysis of Urban Systems
PPUA 7249	Urban Coastal Sustainability
SUEN 6110	Graduate Studio 1: Sustainable Urban Sites
SUEN 6120	Graduate Studio 2: Sustainable Urban Systems
SUEN 6210	Implementation and Visualization for Urban Environments 1
SUEN 6220	Implementation and Visualization for Urban Environments 2
SUEN 6310	Cities, Nature, and Design in Contemporary History and Theory
SUEN 6340	Topics in Urban Environmental Design
SUEN 7230	Urban Ecologies and Technologies 1
SUEN 7240	Urban Ecologies and Technologies 2
SUEN 7320	Pro-Seminar: Issues in Designed Urban Environments

## Optional Co-op Experience

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

## Program Credit/GPA Requirements

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

## Arts Administration, Graduate Certificate

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

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

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

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

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

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

### Elective

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

### Program Credit/GPA Requirements

12 total semester hours required  
Minimum 3.000 GPA required

## Cultural Entrepreneurship, Graduate Certificate

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

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

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

The program learning objectives provide students with opportunities to:

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

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

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

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

### Elective

Code	Title	Hours
Complete one of the following:		
AACE 6000	Arts and Culture Organizational Leadership	3
AACE 6010	Planning for Arts and Cultural Organizations	3
AACE 6110	Information Technology for Arts and Cultural Organizations	3
ENTR 6212	Business Planning for New Ventures	3

### Program Credit/GPA Requirements

12 total semester hours required  
Minimum 3.000 GPA required

# D'Amore-McKim School of Business

Website (<https://damore-mckim.northeastern.edu/>)

**Raj Echambadi, PhD**, Dunton Family Dean

**Emery A. Trahan, PhD**, Senior Associate Dean of Faculty and Research

**Jeffrey A. Born, PhD**, Associate Dean of Undergraduate Programs

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**Maureen Underhill, MEd**, Associate Dean of Finance and Administration

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Most graduate certificates: [gradcertificates@northeastern.edu](mailto:gradcertificates@northeastern.edu)

Online MBA, Online Master of Science in Finance, Online

Master of Science in Taxation, and Online Graduate

Certificates: [onlinegradbusiness@northeastern.edu](mailto:onlinegradbusiness@northeastern.edu)

Master of Science in Business Analytics and Master

of Science in Innovation: [c.boviard@northeastern.edu](mailto:c.boviard@northeastern.edu)

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Northeastern University's D'Amore-McKim School of Business is known for its experience-driven educational model that fuses robust classroom education with real-world application. We develop leaders and thinkers who will guide the future of work that is being transformed by digital convergence. D'Amore-McKim's graduate programs are specifically designed to meet the needs of students and professionals in this fast-paced and changing global economy.

Here, you will have the opportunity to learn from our respected business faculty who share their use-inspired research and teaching with their students daily, many of whom are founders of tech startups and respected management leaders. In the classroom you will study alongside an experienced and diverse group of classmates who share your passion for business and innovation. And everything we do is backed by the power of experience.

## Master of Science

Northeastern University's D'Amore-McKim School of Business develops leaders and thinkers who will guide the future of work that is being transformed by digital convergence. D'Amore-McKim's master's degree programs are specifically designed to meet the needs of students and professionals like you in this fast paced and changing global economy.

Here, you will have the opportunity to learn from our respected business faculty, many of which are founders of tech start-ups, consultants, and respected management leaders. In the classroom you will study alongside an experienced and diverse group of classmates who share your passion.

Accelerate your career whether it's developing a new expertise or advancing in your current field with a degree in:

- Accounting
- Business analytics
- Entrepreneurship
- Finance
- Innovation
- International business
- Taxation

Learn more about master's degree programs (<https://damore-mckim.northeastern.edu/programs/?s&filters%5B0%5D=program%7Ctype%7Cgraduate&filters%5B1%5D=program%7Ctype%7Cmasters/>) on the D'Amore-McKim website.

## Programs

### Master of Science (MS)

- Business Analytics (p. 68)
- Innovation (p. 69)
- International Management (p. 69)
- Technological Entrepreneurship (p. 70)

### Master of Science in Accounting (MSA)

- Accounting (p. 70)

### Master of Science in Finance (MSF)

- Finance (p. 71)
- Finance—Part-Time (p. 71)
- Finance—Online (p. 72)
- Quantitative Finance (p. 72)

### Master of Science in International Business (MSIB)

- International Business (p. 73)

### Master of Science in Taxation (MST)

- Taxation (p. 73)
- Taxation—Online (p. 74)

## Business Analytics, MS

Businesses are looking for professionals who can connect the dots and build successful marketing strategies based on massive amounts of structured and unstructured data. Become one of them with our Master of Science in Business Analytics (<https://damore-mckim.northeastern.edu/programs/ms-business-analytics/>) degree with a marketing focus.

This program addresses a critical need for those who can interpret and apply data in an increasingly competitive and technology-driven business environment. Core courses will introduce you to data analytics concepts, and our marketing track courses will build upon this foundation to emphasize the practice-oriented application of business analytics.

**About the program:**

- Addresses a critical need for those who can interpret and apply data in an increasingly competitive and technology-driven business environment
- Core courses introduce you to data analytics concepts, and our marketing track courses will build upon this foundation to emphasize the practice-oriented application of business analytics
- D'Amore-McKim faculty will help you achieve success and connect you to new opportunities in this growing field
- Graduates will be prepared to play an important role in making data-driven decisions

**Build toward something more.**

Your next step could be your MBA. When you are ready to pursue an MBA—now or in the future—the credits you earn during your Master of Science in Business Analytics program may be applied to eligible MBA programs at D'Amore-McKim. An MBA degree can further deepen your knowledge, strengthen your resumé, and demonstrate additional value to employers.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Core Requirements**

Code	Title	Hours
<b>Required Core</b>		
MISM 6200	Introduction to Business Analytics	3
MISM 6202	Foundations of Data Analysis for Business	3
MISM 6203	Business Analytics Methods	3
MISM 6210	Information Visuals and Dashboards for Business	3
MISM 6212	Data Mining and Machine Learning for Business	3
MISM 6213	Business Information Design, Quality, and Strategy	3
MISM 6214	Business Analytics Capstone	3
<b>Marketing</b>		
MKTG 6232	Engaging Customers and Markets	3
MKTG 6294	Customer-Centric Research Methods for Marketing	3
MKTG 6295	Customer Performance Modeling	3

**Program Credit/GPA Requirements**

30 total semester hours required  
 Minimum 3.000 GPA required

**Innovation, MS**

The Master of Science in Innovation (<https://damore-mckim.northeastern.edu/programs/ms-innovation/>) is a part-time program, offered on Northeastern University's Boston campus and 100 percent online. The program is designed specifically for working professionals who want to become innovation leaders. Through project work, case studies, and real-world application, possibly at your own organization, you will study the principles of innovation from multiple perspectives. You'll have an opportunity to learn about product and

service development, financing innovation, go-to-market strategies, lean development, managing high-performance teams, and more.

Build expertise in:

- Next-generation product, system, and service design
- Designing and leading innovation teams
- Reinventing business processes and introducing change
- Exploring new business models and ventures
- Selling new products and services

**Build toward something more.** Your next step could be your MBA. When you are ready to pursue an MBA—now or in the future—the credits you earn during your MS in Innovation program may be applied to eligible MBA programs at D'Amore-McKim. An MBA degree can further deepen your knowledge, strengthen your resumé, and demonstrate additional value to employers.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Core Requirements**

Code	Title	Hours
<b>Required Core</b>		
Complete one of the following:		3
<i>On-campus only</i>		
BUSN 6280	How Executives Shape and Lead Innovation and Enterprise Growth	
<i>Online Only</i>		
ENTR 6225	Acquisitions, Alliances, and Growth	
<b>Accounting and Finance</b>		
ACCT 6280	Planning and Budgeting for Innovation	3
FINA 6284	Financing Innovation and Growth	3
<b>Entrepreneurship</b>		
ENTR 6217	Lean Innovation	3
ENTR 6222	Competing in Dynamic, Innovation-Driven Markets	3
<b>Management</b>		
HRMG 6280	The Human Side of Innovation	3
MGMT 6280	Innovation for Next-Generation Products and Systems	3
MGSC 6281	Service Innovation and Management	3
<b>Marketing</b>		
MKTG 6280	Gaining Customer Insight	3
MKTG 6283	Marketing and Selling Innovation	3

**Program Credit/GPA Requirements**

30 total semester hours required  
 Minimum 3.000 GPA required

**International Management, MS**

The Master of Science in International Management delves into topics ranging from international trade to globalization of the world economy and is designed to help young professionals thrive in today's international marketplace. This program offers the opportunity to learn in the heart

of Boston, home to one of the largest, most vibrant, and highly regarded global marketplaces in the United States.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
FINA 6209	Introduction to International Accounting and Finance	3
INTB 6226	Becoming a Global Leader	3
INTB 6260	Advanced Topics in Global Management and Strategy	3
MGSC 6209	Business Statistics	3

### Electives

Code	Title	Hours
Complete six electives from the following:		18
ENTR 6200	Enterprise Growth and Innovation	
ENTR 6220	Family Business Leadership and Governance	
ENTR 6225	Acquisitions, Alliances, and Growth	
FINA 6204	International Finance Management	
INTB 6201	International Business Management	
INTB 6232	Doing Business in Emerging Markets	
MECN 6203	Global Managerial Economics	
MKTG 6206	International Marketing	
SCHM 6213	Global Supply Chain Strategy	
STRT 6210	Workforce Metrics and Analytics	

### Program Credit/GPA Requirements

30 total semester hours required  
Minimum GPA 3.000 required

## Technological Entrepreneurship, MS

To achieve success, you need more than just a good idea. You need entrepreneurial know-how to create new product lines and services from innovations, strong business models, go-to-market strategies, and business plans for investors. The Master of Science in Technological Entrepreneurship ([http://www.damore-mckim.northeastern.edu/academic-programs/graduate-programs/ms/technological-entrepreneurship?utm\\_source=neu-course-catalog&utm\\_medium=referral&utm\\_campaign=mstefofu/](http://www.damore-mckim.northeastern.edu/academic-programs/graduate-programs/ms/technological-entrepreneurship?utm_source=neu-course-catalog&utm_medium=referral&utm_campaign=mstefofu/)) offers an immersion in the frameworks and methods needed for successful entrepreneurship.

The 30-credit Master of Science in Technological Entrepreneurship is offered in both a full- and part-time option. The full-time option is designed for completion in three semesters, from September through June. The part-time option is designed for completion in two calendar years.

## Program Requirements

### Core Requirements

Code	Title	Hours
ENTR 6200	Enterprise Growth and Innovation	3

ENTR 6212	Business Planning for New Ventures	3
ENTR 6218	Business Model Design and Innovation	3
ENTR 6219	Financing Ventures from Early Stage to Exit	3

### Technology

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

### Elective

Code	Title	Hours
Complete 3 semester hours from the following subject areas:		3
ACCT, BUSN, ENTR, FINA, HRMG, INTB, MECN, MKTG, MGMT, SCHM, STRT, or TECE		

### Program Credit/GPA Requirements

30 total semester hours required  
Minimum 3.000 GPA required

## Accounting, MSA

An accelerated program designed to accelerate your career.

Heading for a great career in public accounting? You want to get there as soon as possible. With our MS in Accounting (<https://damore-mckim.northeastern.edu/programs/ms-accounting/>), you will prepare to sit for the CPA exam in just seven months and build the skills and credentials to stay ahead of the fast-changing business world.

Your success will begin in the classroom, where, with the help of our faculty, the robust curriculum is fused with real-world application. Our faculty includes a number of CPAs, many of whom are former partners in national and regional CPA firms. They are currently active consultants in the business community, ready to present you with real-world public accounting issues and challenges.

What's more, our audit and tax track offerings allow you to specialize your studies even further and guide you toward the career that best suits your goals. In the audit track, students take courses geared toward being a professional in the audit and assurance industry. This means extensive exposure to ethics, auditing research, forensic accounting, and a detailed understanding of the industry environment. In the tax track, students are exposed to the intricacies of the tax industry with detailed course work and experience with tax research and communications, state and local taxation, income tax accounting, and international taxation.

Students in this program are registered for classes by the advising team in the Graduate School of Professional Accounting. Please contact an advisor at 617-373-3244 with any questions or requests.

This program is approved by the Board of Public Accountancy in Massachusetts.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
<b>Accounting</b>		
ACCT 6203	Business Entity Taxation	3
ACCT 6204	Financial Reporting for Integrated Multinational Enterprises	3
ACCT 6229	Accounting for Foreign Currency Transactions	1
<b>Ethics</b>		
ACCT 6253	Ethics in the Accounting Profession	3
<b>Financial Reporting</b>		
ACCT 6207	Contemporary and Emerging Issues in Financial Reporting	3
ACCT 6216	Financial Reporting for Governments and Nonprofit Entities	2

## Tracks

Complete one of the following tracks:

### AUDIT TRACK

Code	Title	Hours
<b>Required Core</b>		
ACCT 6205	Auditing in a Big Data Environment	3
ACCT 6217	Corporate Governance, Ethics, and Financial Reporting	3
ACCT 6254	Accounting Research and Communication	3

### Electives

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

ACCT 5255	Forensic Accounting	3
ACCT 5256	Internal Auditing	3

### TAXATION TRACK

Code	Title	Hours
<b>Required Core</b>		
ACCT 6231	Corporations and Shareholders	3
ACCT 6235	Partners and Partnerships	3
ACCT 6254	Accounting Research and Communication	3

### Electives

Complete 6 semester hours from the following: 6

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	
ACCT 6240	International Taxation: Inbound Transactions	
ACCT 6246	Retirement Plans	
ACCT 6248	Income Taxation of Trusts and Estates	

## Program Credit/GPA Requirements

30 total semester hours required  
Minimum 3.000 GPA required

## Finance, MSF

Our full-time Master of Science in Finance (<https://damore-mckim.northeastern.edu/programs/ms-finance/>) offers advanced training in finance. You will have the opportunity to explore topics such as financial risk management, valuation methodology, mergers and acquisitions, and business turnaround.

This 30-credit master's degree is a full-time, lockstep program, beginning in September and ending the following August. You and your classmates will progress through the course work together as a cohort—sharing experiences and building strong networks. Within this program, you have an opportunity to build a foundation to work toward the CFA designation, prepare to enter a finance PhD program, or seek employment in specialized finance positions globally.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
<b>Required Core</b>		
FINA 6201	Financial Theory and Policy	3
FINA 6202	Analysis of Financial Institutions and Markets	3
FINA 6203	Investment Analysis	3
FINA 6204	International Finance Management	3
FINA 6205	Financial Strategy	3
FINA 6206	Finance Seminar	3
<b>Optional</b>		
BUSN 6200	Career Management	

### Electives

Code	Title	Hours
Complete four electives (course offerings are at the discretion of the finance department): 12		
FINA 6211	Financial Risk Management	
FINA 6212	Fixed Income Securities and Risk	
FINA 6214	Mergers, Acquisitions, and Private Equity	
FINA 6217	Real Estate Finance and Investment	
FINA 6219	Portfolio Management	
FINA 6231	Disrupting the Finance and Insurance Service Industries	
FINA 6260	Entrepreneurial Finance and Venture Capital	
FINA 6292	Advanced Topics in Finance	

## Program Credit/GPA Requirements

30 total semester hours required  
Minimum 3.000 GPA required

## Finance—Evening/Part-Time Program, MSF

It's time to make a short-term investment in yourself, for long-term returns. We aim to prepare you to take your place among global financial leaders tackling real-world challenges. Our part-time MS in Finance (<https://damore-mckim.northeastern.edu/programs/ms-finance/>) offers

rigorous training in finance, helping you to develop strong analytic and problem-solving skills that will set you apart from other professionals in the market. At our program's core is a top-tier curriculum that consists of challenging course work, real-world applications, and a commitment to ethics.

This 30-credit part-time Master of Science in Finance program provides flexibility for working professionals seeking to brush up on their finance skills and advance in their current roles. The program enrolls in the fall term.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
FINA 6201	Financial Theory and Policy	3
FINA 6202	Analysis of Financial Institutions and Markets	3
FINA 6203	Investment Analysis	3
FINA 6204	International Finance Management	3
FINA 6205	Financial Strategy	3
FINA 6206	Finance Seminar	3

### Electives

Code	Title	Hours
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#### Finance Electives

Complete 9 semester hours of FINA courses.	9
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#### Business Elective

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

## Program Credit/GPA Requirements

30 total semester hours required

Minimum 3.000 GPA required

## Finance—Online Program, MSF

The practice-oriented curriculum of Online Master of Science in Finance explores a comprehensive range of relevant financial topics. Designed to serve the needs of working professionals in the finance field, this 30-credit-hour program—which includes six core courses and four electives—can be completed entirely online in as few as 16 months. Students in the Online MS in Finance are classified as part-time and participate in one course at a time, completing core courses in the first year and capstone and elective courses in the second year.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
FINA 6201	Financial Theory and Policy	3
FINA 6202	Analysis of Financial Institutions and Markets	3
FINA 6203	Investment Analysis	3

FINA 6204	International Finance Management	3
FINA 6205	Financial Strategy	3
FINA 6206	Finance Seminar	3

### Electives

Code	Title	Hours
Complete 12 semester hours in the following range:		12
FINA 6211 to FINA 6219		

## Program Credit/GPA Requirements

30 total semester hours required

Minimum 3.000 GPA required

## Quantitative Finance, MSF

The quantitative finance MSF program is designed to prepare students for careers requiring analytical rigor in the financial industry. The curriculum for this track integrates economics, mathematics, statistics, and computer science with the theories and applications of finance. Students will study advanced modeling techniques and data analytics applied to financial markets. The rigorous program combines in-depth study of quantitative techniques with practical business problem solving. Elective courses will draw content from computer science, econometrics, and mathematics. Courses include quantitative portfolio management, computational methods in finance, foundations of artificial intelligence, database management systems, and applied econometrics.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
FINA 6203	Investment Analysis	3
FINA 6331	Corporate Finance	3
FINA 6332	Fundamentals of Financial Math and Financial Markets	3
FINA 6333	Data Analytics in Finance	3
FINA 6334	Empirical Methods in Finance	3
FINA 6335	Derivatives and Risk Analysis	3

### Electives

Code	Title	Hours
Complete four of the following:		12
CS 5100	Foundations of Artificial Intelligence	
CS 5200	Database Management Systems	
ECON 5140	Applied Econometrics	
FINA 6207	Financial Modeling	
FINA 6204	International Finance Management	
FINA 6214	Mergers, Acquisitions, and Private Equity	
FINA 6216	Valuation and Value Creation	
FINA 6217	Real Estate Finance and Investment	
FINA 6219	Portfolio Management	
FINA 6260	Entrepreneurial Finance and Venture Capital	
FINA 6336	Derivatives and Fixed-Income Securities	



FINA 6337	Computational Methods in Finance
FINA 6338	Alternative Investments

### Program Credit/GPA Requirements

30 total semester hours required  
 Minimum 3.000 GPA required

### International Business, MSIB

The Master of Science in International Business (<https://damore-mckim.northeastern.edu/programs/ms-international-business/>) is designed to expose talented, driven students to the global business environment that will distinguish them as they enter the workforce. Successful graduates of this master’s program will be culturally sensitive, with an international orientation, business acumen, and the analytic skills needed to best be prepared to navigate an increasingly interconnected and fast-paced world. Students will have an opportunity to develop critical skills to handle the opportunities and challenges in organizations and businesses operating internationally.

The 30-credit Master of Science in International Business is offered in both a full- and part-time option and begins in September. The full-time option is designed for completion in one year, including two full semester terms and two summer terms. The part-time option is designed for completion in two calendar years with study in the fall and spring terms.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirements

Code	Title	Hours
<b>Required Core</b>		
FINA 6204	International Finance Management	3
FINA 6209	Introduction to International Accounting and Finance	3
INTB 6200	Managing the Global Enterprise	3
INTB 6226	Becoming a Global Leader	3
MECN 6203	Global Managerial Economics	3
MKTG 6206	International Marketing	3
SCHM 6213	Global Supply Chain Strategy	3

#### International Field Study

INTB 6230	International Field Study	3
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#### Electives

Code	Title	Hours
Complete 6 semester hours from the following subject areas:		6
ACCT, BUSN, ENTR, FINARMG, INTSTRT, TECEB, MECN, MKTG, MGMT, MGSC, SCHM, Students may also consider political science or sociology courses.		

### Program Credit/GPA Requirements

30 total semester hours required  
 Minimum 3.000 GPA required

### Taxation, MST

Build skills to meet the demands of a steadily changing industry head-on.

Always changing and increasingly complex, the issue of taxes demands a professional who is knowledgeable and skilled in his or her field. Our Master of Science in Taxation (<https://damore-mckim.northeastern.edu/programs/ms-taxation/>) prepares you to be adaptable and in step with this dynamic industry and the future of work.

This program is ideal for those with an accounting or tax background seeking to launch or advance their career as advisors and consultants, executives in public and private enterprises. Our master’s degree is specifically designed for those ready to become leaders in their field. As you sharpen your technical skills and command of current tax legislation, you have an opportunity to learn how to research and navigate the current Internal Revenue Code and other tax platforms and anticipate and respond to changes in regulation.

In the active environment of your classroom, experience drives education. Courses are taught by leading professionals currently working in taxation, finance, and accounting. As they work with you one-on-one, you have an opportunity to gain a deep understanding of the relevant, practical insights that drive the industry today. You and your classmates bring client scenarios to class and make them case topics, engaging in discussions that go beyond the textbook into real-world applications.

This program is offered full-time and part-time.

For assistance in course selection or registration, please contact the Graduate School of Professional Accounting advising team at 617-373-3244.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirements

Code	Title	Hours
ACCT 5230	Federal Tax Issues and Analysis	3
ACCT 5232	Estate and Gift Taxation	3
ACCT 6231	Corporations and Shareholders	3
ACCT 6233	Tax Research Methodology	1.5
ACCT 6234	Tax Practice, Procedure, and Ethics	1.5
ACCT 6235	Partners and Partnerships	3

#### Electives

Code	Title	Hours
Complete 15 semester hours from the following:		15
ACCT 6239	State and Local Taxation	
ACCT 6240	International Taxation: Inbound Transactions	
ACCT 6241	International Taxation: Outbound Transactions	
ACCT 6243	Advanced Flow-Through Entities	
ACCT 6246	Retirement Plans	
ACCT 6248	Income Taxation of Trusts and Estates	
ACCT 6249	Financial Planning for Investments	
ACCT 6250	Financial Planning for Insurance	
ACCT 6262	Advanced Topics in Accounting	
ACCT 6264	Planning for Estate Tax Issues	
ACCT 6265	Tax Accounting for Income Taxes	

### Program Credit/GPA Requirements

30 total semester hours required

Minimum 3.000 GPA required

## Taxation—Online Program, MST

Our Online Master of Science in Taxation has been specifically designed and structured for working professionals like you. To accommodate your schedule, there are six start dates available throughout the year, so you can get started at your convenience. Students in the Online Master of Science in Taxation are classified as part-time and participate in one course at a time, completing core courses in the first year and elective courses in the second year.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirements

Code	Title	Hours
ACCT 5230	Federal Tax Issues and Analysis	3
ACCT 5232	Estate and Gift Taxation	3
ACCT 6231	Corporations and Shareholders	3
ACCT 6235	Partners and Partnerships	3
ACCT 6292	Tax Research, Practice, and Ethics	3

#### Electives

Code	Title	Hours
Complete 15 semester hours from the following:		15
ACCT 6239	State and Local Taxation	
ACCT 6240	International Taxation: Inbound Transactions	
ACCT 6241	International Taxation: Outbound Transactions	
ACCT 6243	Advanced Flow-Through Entities	
ACCT 6246	Retirement Plans	
ACCT 6248	Income Taxation of Trusts and Estates	
ACCT 6249	Financial Planning for Investments	
ACCT 6250	Financial Planning for Insurance	
ACCT 6264	Planning for Estate Tax Issues	
ACCT 6265	Tax Accounting for Income Taxes	

### Program Credit/GPA Requirements

30 total semester hours required  
Minimum 3.000 GPA required

## Master of Business Administration

At the D'Amore-McKim School of Business, experiential learning is at the heart of our MBA programs.

Our unique learning model integrates classroom study and professional work experiences with 3,200+ employer partners located in more than 131 countries and on every continent. This model encourages intellectual development, innovative thinking, and personal growth, and helps you gain a global perspective. So you won't just acquire the skills and experience you need to keep pace with today's rapidly evolving workforce, you'll be in demand.

Each of our industry-aligned MBA programs offers you the distinct opportunity to exchange ideas and experiences with students, faculty,

and people from around the world—helping you learn with anyone, anywhere, at any time.

No other institution has greater experience advancing and applying this standard of learning, making Northeastern a university like no other.

### Programs

- MBA—Full-Time Program (p. 74)
- MBA—Part-Time Program (p. 77)
- MBA—Online Program (p. 80)

## Business Administration, MBA—Full-Time Program

Our MBA fully integrates world-class academics and meaningful business experience, creating a powerful fusion that informs, inspires, and connects you to the pulse of today's business world. Our Full-Time MBA (<https://damore-mckim.northeastern.edu/programs/full-time-mba/>) program offers both academic rigor and valuable experience.

The first powerful component of our program is the outstanding classroom experience. The second dynamic component is your corporate residency. Far removed from the typical internship, this will take your work experience to a whole new level—as a valued member of the team at a leading business, you will be fully integrated in your company, working side-by-side with staff members to deliver on organizational goals. The third unique component is our interdisciplinary coursework. You will gain broad exposure to multiple disciplines and perspectives, better equipping you for the complex needs of the modern business world.

D'Amore-McKim's newest innovative, interdisciplinary program, MBA x Computer Science, is designed to give students a comprehensive framework in business and leadership combined with technical knowledge and skills in computer science. MBA x Computer Science students will hone crucial technical skills as they select one of four new MBA x Computer Science concentrations offered through a partnership with the Khoury College of Computer Sciences.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

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

#### Core Requirements

Code	Title	Hours
<b>Required Core</b>		
<i>Marketing</i>		
MKTG 6318	Customer Value and the Enterprise	2
<i>Strategic Decision Making</i>		
ACCT 6318	Analyzing Accounting Data for Strategic Decision Making	2
STRT 6318	Strategic Planning for the Future	2
<i>Management</i>		
FINA 6318	Financial Management	2
HRMG 6318	Managing the Organization	2
SCHM 6318	Managing Operations and the Supply Chain	2
<i>Innovation and Social Impact</i>		
BUSN 6363	Social Impact of Business	2
ENTR 6318	Innovating and Creating Futures	2
<b>Career Management</b>		

BUSN 6200	Career Management	0
BUSN 6950	MBA Skills Workshop	0
<b>Experiential Coursework</b>		
Complete 3 semester hours.		1-3
<b>Corporate Residency</b>		
BUSN 6964	Co-op Work Experience	0
Three-month, six-month, or two six-month Corporate Residency placement options		

### Concentration Options

Complete two of the following concentrations:

- Analytics (p. 75)
- Corporate Innovation and Venturing (p. 75)
- Entrepreneurship (p. 75)
- Finance (p. 75)
  - Corporate Finance
  - Investments
- Healthcare (p. 76) Management (p. 76)
- International Business (p. )
- Leading People and Organizations (p. )
- Marketing (p. 76)
- Operations and Supply Chain Management (p. 77)
- MBA x Computer Science (p. 77)
  - Artificial Intelligence
  - Cybersecurity
  - Data Science
  - Software Development

### CONCENTRATION IN ANALYTICS

Code	Title	Hours
<b>Required Core</b>		
BUSN 6365	Business Analytics	3
<b>Electives</b>		
Complete 9 semester hours from the following:		9
CS 5100	Foundations of Artificial Intelligence	
CS 5200	Database Management Systems	
ECON 5140	Applied Econometrics	
IE 6600	Computation and Visualization for Analytics	
INSH 5302	Information Design and Visual Analytics	
MISM 6203	Business Analytics Methods	
MISM 6210	Information Visuals and Dashboards for Business	
MISM 6212	Data Mining and Machine Learning for Business	
MISM 6213	Business Information Design, Quality, and Strategy	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	
MKTG 6234	Marketing Analytics	
SCHM 6215	Supply Chain Analytics	
STRT 6210	Workforce Metrics and Analytics	

### CONCENTRATION IN CORPORATE INNOVATION AND VENTURING

Code	Title	Hours
<b>Required Core</b>		
ENTR 6320	Innovation, Entrepreneurship, and Dynamic Competition	3
<b>Electives</b>		
Complete 9 semester hours from the following:		9
ARTG 5610	Design Systems	
ENTR 6212	Business Planning for New Ventures	
ENTR 6218	Business Model Design and Innovation	
ENTR 6222	Competing in Dynamic, Innovation-Driven Markets	
ENTR 6224	Intellectual Property and Other Legal Aspects of Business and Innovation	
ENTR 6225	Acquisitions, Alliances, and Growth	
ENTR 6230	Platform Innovation	
GE 5100	Product Development for Engineers	
HRMG 6212	Creating an Innovative Organization	
MGMT 6280	Innovation for Next-Generation Products and Systems	
TECE 6222	Emerging and Disruptive Technologies	
TECE 6250	Lean Design and Development	

### CONCENTRATION IN ENTREPRENEURSHIP

Code	Title	Hours
<b>Required Core</b>		
ENTR 6320	Innovation, Entrepreneurship, and Dynamic Competition	3
<b>Electives</b>		
Complete 9 semester hours from the following:		9
ENTR 6200	Enterprise Growth and Innovation	
ENTR 6214	Social Enterprise	
ENTR 6218	Business Model Design and Innovation	
ENTR 6219	Financing Ventures from Early Stage to Exit	
ENTR 6222	Competing in Dynamic, Innovation-Driven Markets	
ENTR 6224	Intellectual Property and Other Legal Aspects of Business and Innovation	
ENTR 6225	Acquisitions, Alliances, and Growth	
ENTR 6230	Platform Innovation	
FINA 6260	Entrepreneurial Finance and Venture Capital	
GE 5030	Iterative Product Prototyping for Engineers	
GE 5100	Product Development for Engineers	
TECE 6230	Entrepreneurial Marketing and Selling	
TECE 6300	Managing a Technology-Based Business	

### CONCENTRATION IN FINANCE

Code	Title	Hours
<b>Required Core</b>		
FINA 6320	Advanced Financial Management	3
<i>Complete the requirements for your choice of the Corporate Finance or Investments coursework listed below.</i>		
<b>Corporate Finance Required Course</b>		

Complete 3 semester hours from the following: 3

FINA 6203	Investment Analysis
FINA 6216	Valuation and Value Creation
FINA 6260	Entrepreneurial Finance and Venture Capital

#### Corporate Finance Electives

Complete 6 semester hours from the following: 6

FINA 6203	Investment Analysis
FINA 6204	International Finance Management
FINA 6205	Financial Strategy
FINA 6207	Financial Modeling
FINA 6211	Financial Risk Management
FINA 6213	Investment Banking
FINA 6214	Mergers, Acquisitions, and Private Equity
FINA 6215	Business Turnarounds
FINA 6216	Valuation and Value Creation
FINA 6217	Real Estate Finance and Investment
FINA 6260	Entrepreneurial Finance and Venture Capital
MECN 6200	Global Competition and Market Dominance

#### Investments Required Course

Complete the following course: 3

FINA 6203	Investment Analysis
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#### Investments Electives

Complete 6 semester hours from the following: 6

FINA 6204	International Finance Management
FINA 6207	Financial Modeling
FINA 6211	Financial Risk Management
FINA 6212	Fixed Income Securities and Risk
FINA 6213	Investment Banking
FINA 6214	Mergers, Acquisitions, and Private Equity
FINA 6216	Valuation and Value Creation
FINA 6217	Real Estate Finance and Investment
FINA 6219	Portfolio Management
FINA 6260	Entrepreneurial Finance and Venture Capital
FINA 6360	Fund Management for Analysts
FINA 6361	Fund Management for Managers
MECN 6200	Global Competition and Market Dominance

#### CONCENTRATION IN BUSINESS MANAGEMENT FOR HEALTHCARE

Code	Title	Hours
<b>Required Core</b>		
HINF 5105	The American Healthcare System	3
HRMG 6220	Health Organization Management	3
STRT 6220	Strategic Management for Healthcare Organizations	3

Complete 3 semester hours of the following:

FINA 6220	Healthcare Finance	3
or SCHM 6223	Managing Healthcare Supply Chain Operations	

#### Optional Electives

Note: electives are not required, the following course(s) are suggested beyond the concentration: 3-9

ENTR 6214	Social Enterprise
FINA 6220	Healthcare Finance
HINF 6202	Business of Healthcare Informatics
HINF 6205	Creation and Application of Medical Knowledge
HRMG 6213	Leadership
MGMT 6214	Negotiations
MKTG 6218	Marketing in Service Sector
MKTG 6226	Consumer Behavior
PHTH 5232	Evaluating Healthcare Quality
PPUA 7247	U.S. Healthcare Reform: Past, Present, and Future
SCHM 6223	Managing Healthcare Supply Chain Operations

#### CONCENTRATION IN INTERNATIONAL BUSINESS

Code	Title	Hours
<b>Required Core</b>		
INTB 6208	Global Management	3
<b>Electives</b>		
Complete 9 semester hours from the following: 9		
FINA 6204	International Finance Management	
INTB 6212	Cultural Aspects of International Business	
INTB 6224	Competing to Win in Emerging Markets	
INTB 6226	Becoming a Global Leader	
INTB 6230	International Field Study	
INTB 6232	Doing Business in Emerging Markets	
INTB 6260	Advanced Topics in Global Management and Strategy	
MKTG 6212	International Marketing	

#### CONCENTRATION IN LEADING PEOPLE AND ORGANIZATIONS

Code	Title	Hours
Complete the following 12 semester hours: 12		
Only one course outside HRMG and MGMT may be taken to fulfill the concentration.		
HRMG 6212	Creating an Innovative Organization	
HRMG 6213	Leadership	
HRMG 6214	A Management Perspective of Human Resource Management	
HRMG 6218	Great Companies	
HRMG 6219	Leadership for Environmental Sustainability	
HRMG 6221	Power and Influence	
HRMG 6223	Global Talent Management	
INTB 6226	Becoming a Global Leader	
MGMT 6214	Negotiations	
STRT 6210	Workforce Metrics and Analytics	

#### CONCENTRATION IN MARKETING

Code	Title	Hours
<b>Required Core</b>		
MKTG 6320	Advanced Marketing Management (Advanced Marketing Management)	3

**Electives**

Complete 9 semester hours from the following:	9
MKTG 6210 Marketing Research	
MKTG 6212 International Marketing	
MKTG 6214 New Product Development	
MKTG 6216 Market Focused Strategy	
MKTG 6218 Marketing in Service Sector	
MKTG 6222 Digital Marketing	
MKTG 6223 Brand and Advertising Management	
MKTG 6224 B2B and Strategic Sales	
MKTG 6226 Consumer Behavior	
MKTG 6230 Driving Marketing Performance: Measure, Analyze, Profit	
MKTG 6234 Marketing Analytics	
MKTG 6260 Special Topics in Marketing	

**CONCENTRATION IN OPERATIONS AND SUPPLY CHAIN MANAGEMENT**

Code	Title	Hours
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**Required Core**

SCHM 6213 Global Supply Chain Strategy	3
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**Electives**

Complete 9 semester hours from the following:	9
SCHM 6211 Logistics and Transportation Management	
SCHM 6214 Sourcing and Procurement	
SCHM 6215 Supply Chain Analytics	
SCHM 6221 Sustainability and Supply Chain Management	
SCHM 6223 Managing Healthcare Supply Chain Operations	
SCHM 6224 Demand Planning and Forecasting	

**MBA X COMPUTER SCIENCE**

Code	Title	Hours
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**Concentration in Artificial Intelligence**

CS 5100 Foundations of Artificial Intelligence	4
CS 6120 Natural Language Processing	4
CS 6140 Machine Learning	4

**Concentration in Cybersecurity**

CY 5770 Software Vulnerabilities and Security	4
CY 6750 Cryptography and Communications Security	4
CS 6760 Privacy, Security, and Usability	4

**Concentration in Data Science**

CS 5200 Database Management Systems	4
CS 6140 Machine Learning	4
CS 6220 Data Mining Techniques	4

**Concentration in Software Development**

CS 5500 Foundations of Software Engineering	4
CS 5610 Web Development	4
CS 5520 Mobile Application Development	4

**Electives**

Code	Title	Hours
In consultation with faculty advisor, complete 6 semester hours:		6

ACCT, BUSN, ENTR, FINA, HRMG, INTB, MECN, MGMT, MKTG, SCHM, STRT, and TECE	
Complete 6 semester hours outside of D'Amore-Mckim School of Business; please consult program director for course options:	6
AACE 6000 Arts and Culture Organizational Leadership	
ARTG 6310 Design for Behavior and Experience	
CS 5100 Foundations of Artificial Intelligence	
CS 5200 Database Management Systems	
DS 5110 Introduction to Data Management and Processing	
ECON 5140 Applied Econometrics	
GE 5030 Iterative Product Prototyping for Engineers	
GE 5100 Product Development for Engineers	
IE 5640 Data Mining for Engineering Applications	
IE 6600 Computation and Visualization for Analytics	
IE 7374 Special Topics in Industrial Engineering	
INTL 5200 Political Economy: Interdisciplinary Perspectives	
JRNL 5311 Design for Storytelling	
LPSC 6313 Economic Analysis for Law, Policy, and Planning	
ME 5645 Environmental Issues in Manufacturing and Product Use	
INSH 5301 Introduction to Computational Statistics	
INSH 5302 Information Design and Visual Analytics	
PPUA 6553 Nonprofit Financial Resource Development	

**Program Credit/GPA Requirements**

55 total semester hours required  
 Minimum 3.000 GPA required

**Business Administration, MBA – Part-Time Program**

Our Part-Time MBA (<https://damore-mckim.northeastern.edu/programs/part-time-mba/>) program is made for motivated professionals like you, who seek to expand their skill set and accelerate their career. Learn from our faculty thought leaders who apply their unique practice-oriented approach that has established Northeastern University as a leader in experiential education.

Part-Time MBA students typically follow a three-year academic plan. Please note that required courses may not be offered every semester and you should register for your courses accordingly. You are encouraged to consult with your academic advisor throughout your program to ensure you are registered for the correct courses and that future courses are planned appropriately.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
<b>Accounting</b>		
ACCT 6200	Financial Reporting and Managerial Decision Making 1	3
ACCT 6201	Financial Reporting and Managerial Decision Making 2	1.5
<b>Management</b>		
HRMG 6200	Managing People and Organizations	3
INTB 6200	Managing the Global Enterprise	3
MGSC 6204	Managing Information Resources	1.5
SCHM 6201	Operations and Supply Chain Management	3
<b>Marketing</b>		
MKTG 6200	Creating and Sustaining Customer Markets	3
MECN 6200	Global Competition and Market Dominance	3
<b>Analysis</b>		
FINA 6200	Value Creation through Financial Decision Making	3
MGSC 6200	Information Analysis	3
STRT 6200	Strategic Decision Making in a Changing Environment	3
<b>Entrepreneurship</b>		
ENTR 6200	Enterprise Growth and Innovation	3

### Electives

Note: Elective courses are either 1 or 3 credits. Of the 27 elective credits, no more than 6 can be drawn from 1-credit courses. 27 credits

## Concentration Options

Students in the part-time program may apply for up to two concentrations. Each concentration requires 9 credits (unless noted otherwise) of course work as outlined below:

- Corporate finance (p. 78)
- Corporate renewal (p. 79)
- Entrepreneurship (p. 79)
- Healthcare management (p. 78)
- International business (p. 79)
- Investments (p. 79)
- Marketing (p. 78)
- Mutual fund management (p. 79)
- Supply chain management (p. 78)
- Technical entrepreneurship (p. 79)

Consult your college administrator for more information.

### CONCENTRATION IN CORPORATE FINANCE

Code	Title	Hours
<b>Required Core</b>		
FINA 6205	Financial Strategy	3
<b>Restricted Electives</b>		
Complete two of the following:		6
FINA 6204	International Finance Management	
FINA 6207	Financial Modeling	

FINA 6213	Investment Banking	
FINA 6214	Mergers, Acquisitions, and Private Equity	
FINA 6215	Business Turnarounds	
FINA 6216	Valuation and Value Creation	
FINA 6231	Disrupting the Finance and Insurance Service Industries	
FINA 6260	Entrepreneurial Finance and Venture Capital	

### CONCENTRATION IN MARKETING

Code	Title	Hours
<b>Restricted Electives</b>		
Complete three of the following:		9
MKTG 6210	Marketing Research	
MKTG 6212	International Marketing	
MKTG 6214	New Product Development	
MKTG 6216	Market Focused Strategy	
MKTG 6218	Marketing in Service Sector	
MKTG 6222	Digital Marketing	
MKTG 6223	Brand and Advertising Management	
MKTG 6224	B2B and Strategic Sales	
MKTG 6226	Consumer Behavior	
MKTG 6260	Special Topics in Marketing	

### CONCENTRATION IN SUPPLY CHAIN MANAGEMENT

Code	Title	Hours
<b>Restricted Electives</b>		
Complete three of the following:		9
SCHM 6211	Logistics and Transportation Management	
SCHM 6213	Global Supply Chain Strategy	
SCHM 6214	Sourcing and Procurement	
SCHM 6215	Supply Chain Analytics	
SCHM 6221	Sustainability and Supply Chain Management	
SCHM 6223	Managing Healthcare Supply Chain Operations	
SCHM 6224	Demand Planning and Forecasting	

### CONCENTRATION IN HEALTHCARE MANAGEMENT

Code	Title	Hours
<b>Required Core</b>		
HINF 5105	The American Healthcare System	3
STRT 6220	Strategic Management for Healthcare Organizations	3
HRMG 6220	Health Organization Management	3
<b>Restricted Elective</b>		
Complete one of the following:		3
PHTH 5234	Economic Perspectives on Health Policy	
PHTH 5232	Evaluating Healthcare Quality	
HINF 5101	Introduction to Health Informatics and Health Information Systems	

SCHM 6223	Managing Healthcare Supply Chain Operations	
FINA 6220	Healthcare Finance	

**CONCENTRATION IN INVESTMENTS**

Code	Title	Hours
<b>Required Core</b>		
FINA 6203	Investment Analysis	3
<b>Restricted Electives</b>		
Complete two of the following:		6
FINA 6207	Financial Modeling	
FINA 6211	Financial Risk Management	
FINA 6212	Fixed Income Securities and Risk	
FINA 6213	Investment Banking	
FINA 6217	Real Estate Finance and Investment	
FINA 6219	Portfolio Management	
FINA 6292	Advanced Topics in Finance	

**CONCENTRATION IN CORPORATE RENEWAL**

Code	Title	Hours
<b>Restricted Electives</b>		
Complete three of the following:		9
ENTR 6214	Social Enterprise	
ENTR 6224	Intellectual Property and Other Legal Aspects of Business and Innovation	
FINA 6215	Business Turnarounds	
FINA 6216	Valuation and Value Creation	
HRMG 6212	Creating an Innovative Organization	
HRMG 6213	Leadership	
HRMG 6218	Great Companies	
MGMT 6210	Law for Managers and Entrepreneurs	
MGMT 6214	Negotiations	
MKTG 6214	New Product Development	
MKTG 6216	Market Focused Strategy	

**CONCENTRATION IN INTERNATIONAL BUSINESS**

Code	Title	Hours
<b>Required Core</b>		
INTB 6212	Cultural Aspects of International Business	3
<b>Restricted Electives</b>		
Complete two of the following:		6
ENTR 6225	Acquisitions, Alliances, and Growth	
FINA 6204	International Finance Management	
INTB 6217	Creating Sustainable Competitive Advantage through Global Innovation	
INTB 6224	Competing to Win in Emerging Markets	
INTB 6226	Becoming a Global Leader	
INTB 6230	International Field Study	
INTB 6232	Doing Business in Emerging Markets	
MKTG 6212	International Marketing	
SCHM 6213	Global Supply Chain Strategy	

**CONCENTRATION IN ENTREPRENEURSHIP**

Code	Title	Hours
<b>Restricted Electives</b>		
Complete three of the following:		9

ENTR 6212	Business Planning for New Ventures	
ENTR 6214	Social Enterprise	
ENTR 6218	Business Model Design and Innovation	
ENTR 6219	Financing Ventures from Early Stage to Exit	
ENTR 6220	Family Business Leadership and Governance	
ENTR 6222	Competing in Dynamic, Innovation-Driven Markets	
ENTR 6224	Intellectual Property and Other Legal Aspects of Business and Innovation	
ENTR 6225	Acquisitions, Alliances, and Growth	
ENTR 6230	Platform Innovation	
MKTG 6214	New Product Development	
TECE 6300	Managing a Technology-Based Business	

**CONCENTRATION IN TECHNICAL ENTREPRENEURSHIP**

Code	Title	Hours
<b>Restricted Electives</b>		
Complete three of the following:		9
ENTR 6212	Business Planning for New Ventures	
ENTR 6219	Financing Ventures from Early Stage to Exit	
ENTR 6224	Intellectual Property and Other Legal Aspects of Business and Innovation	
FINA 6225	Entrepreneurial Finance for High Tech Companies	
FINA 6260	Entrepreneurial Finance and Venture Capital	
TECE 6222	Emerging and Disruptive Technologies	
TECE 6230	Entrepreneurial Marketing and Selling	
TECE 6250	Lean Design and Development	
TECE 6300	Managing a Technology-Based Business	
TECE 6340	The Technical Entrepreneur as Leader	

**CONCENTRATION IN MUTUAL FUND MANAGEMENT**

Code	Title	Hours
<b>Required Core</b>		
FINA 6203	Investment Analysis	3
FINA 6219	Portfolio Management	3
<b>Restricted Elective</b>		
Complete 3 semester hours of restricted electives. At least one credit must be from FINA 6361		3
FINA 6360	Fund Management for Analysts	
or FINA 6361	Fund Management for Managers	

**Electives**

Code	Title	Hours
<b>Marketing</b>		
MKTG 6210	Marketing Research	
MKTG 6212	International Marketing	
MKTG 6214	New Product Development	
MKTG 6216	Market Focused Strategy	
MKTG 6218	Marketing in Service Sector	
MKTG 6222	Digital Marketing	

MKTG 6223	Brand and Advertising Management
MKTG 6224	B2B and Strategic Sales
MKTG 6226	Consumer Behavior
MKTG 6260	Special Topics in Marketing

**Finance Group A**

FINA 6203	Investment Analysis
FINA 6204	International Finance Management
FINA 6211	Financial Risk Management
FINA 6212	Fixed Income Securities and Risk
FINA 6213	Investment Banking
FINA 6217	Real Estate Finance and Investment
FINA 6219	Portfolio Management

**Finance Group B**

FINA 6205	Financial Strategy
FINA 6204	International Finance Management
FINA 6213	Investment Banking
FINA 6214	Mergers, Acquisitions, and Private Equity
FINA 6215	Business Turnarounds
FINA 6216	Valuation and Value Creation
FINA 6260	Entrepreneurial Finance and Venture Capital

**Supply Chain Management**

SCHM 6211	Logistics and Transportation Management
SCHM 6213	Global Supply Chain Strategy
SCHM 6214	Sourcing and Procurement
SCHM 6215	Supply Chain Analytics
SCHM 6221	Sustainability and Supply Chain Management
SCHM 6223	Managing Healthcare Supply Chain Operations

**Entrepreneurship**

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

**Technical Entrepreneurship**

TECE 6222	Emerging and Disruptive Technologies
TECE 6230	Entrepreneurial Marketing and Selling
TECE 6250	Lean Design and Development
TECE 6300	Managing a Technology-Based Business
TECE 6340	The Technical Entrepreneur as Leader
ENTR 6212	Business Planning for New Ventures

ENTR 6222	Competing in Dynamic, Innovation-Driven Markets
FINA 6260	Entrepreneurial Finance and Venture Capital

**Healthcare**

HINF 5105	The American Healthcare System
HRMG 6220	Health Organization Management
STRT 6220	Strategic Management for Healthcare Organizations
HINF 5101	Introduction to Health Informatics and Health Information Systems
PHTH 5232	Evaluating Healthcare Quality
PHTH 5234	Economic Perspectives on Health Policy
SCHM 6223	Managing Healthcare Supply Chain Operations

**Mutual Fund Management**

FINA 6203	Investment Analysis
FINA 6219	Portfolio Management
FINA 6360	Fund Management for Analysts
FINA 6361	Fund Management for Managers

**International Business**

INTB 6212	Cultural Aspects of International Business
FINA 6204	International Finance Management
INTB 6217	Creating Sustainable Competitive Advantage through Global Innovation
INTB 6226	Becoming a Global Leader
INTB 6230	International Field Study
MKTG 6212	International Marketing
SCHM 6213	Global Supply Chain Strategy

**Corporate Renewal**

ENTR 6214	Social Enterprise
FINA 6215	Business Turnarounds
FINA 6216	Valuation and Value Creation
HRMG 6212	Creating an Innovative Organization
HRMG 6213	Leadership
MGMT 6214	Negotiations
MKTG 6214	New Product Development
MKTG 6216	Market Focused Strategy

**Program Credit/GPA Requirements**

60 total semester hours required

Minimum 3.000 GPA required

**Business Administration, MBA—Online Program**

Our online MBA is a 100 percent online program with no campus residency requirements. Students may enter the program at one of nine start dates per academic year. By adhering to a schedule established at the semester of entry, the program may be completed in as little as two years. Students in the online MBA are classified as part-time and participate in one course at a time, completing core courses in the first year and capstone and elective courses in the second year.



## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
<b>Accounting</b>		
ACCT 6272	Financial Statement Preparation and Analysis	2.25
ACCT 6273	Identifying Strategic Implications in Accounting Data	2.25
<b>Management</b>		
SCHM 6201	Operations and Supply Chain Management	3
HRMG 6200	Managing People and Organizations	3
INTB 6200	Managing the Global Enterprise	3
MGSC 6204	Managing Information Resources	1.5
MGMT 6213	Managing Ethics in the Workplace and Marketplace	2
<b>Marketing</b>		
MKTG 6200	Creating and Sustaining Customer Markets	3
MECN 6200	Global Competition and Market Dominance	3
<b>Analysis</b>		
FINA 6200	Value Creation through Financial Decision Making	3
MGSC 6200	Information Analysis	3
STRT 6200	Strategic Decision Making in a Changing Environment	3
<b>Entrepreneurship</b>		
ENTR 6200	Enterprise Growth and Innovation	3

### Electives

Code	Title	Hours
Choose 15 semester hours from the following subject areas:		15
ENTR, FINA, HRMG, INTB, MKTG, MGMT, MGSC, SCHM		

### Concentration Options

- Finance (p. 81)
- Healthcare management (p. 81)
- High-technology management (p. 81)
- Innovation entrepreneurship (p. 81)
- International management (p. 81)
- Marketing (p. 81)
- Operations and supply chain management (p. 82)
- Sustainability (p. 82)

#### CONCENTRATION IN FINANCE

Code	Title	Hours
Choose 9 semester hours from the following:		9
FINA 6203	Investment Analysis	
FINA 6204	International Finance Management	
FINA 6205	Financial Strategy	
FINA 6213	Investment Banking	
FINA 6214	Mergers, Acquisitions, and Private Equity	

FINA 6215	Business Turnarounds	
FINA 6216	Valuation and Value Creation	
FINA 6220	Healthcare Finance	
FINA 6225	Entrepreneurial Finance for High Tech Companies	
MECN 6205	Sustainability and the Economics of Markets	

#### CONCENTRATION IN HEALTHCARE MANAGEMENT

Code	Title	Hours
Choose 9 semester hours from the following:		9
FINA 6220	Healthcare Finance	
MGSC 6221	Introduction to Health Informatics and Health Information Systems	
MGMT 6222	Healthcare Industry	
MGMT 6223	Strategic Decision Making for Healthcare Professionals	

#### CONCENTRATION IN HIGH-TECHNOLOGY MANAGEMENT

Code	Title	Hours
Choose 9 semester hours from the following:		9
ENTR 6212	Business Planning for New Ventures	
FINA 6225	Entrepreneurial Finance for High Tech Companies	
HRMG 6217	Virtual, Vicious Teams: Building and Leading High-Performance Teams	

#### CONCENTRATION IN INNOVATION ENTREPRENEURSHIP

Code	Title	Hours
Choose 9 semester hours from the following:		9
ENTR 6210	Managing Operations in Early Stage Ventures	
ENTR 6211	Entrepreneurship: Services and Retail Business Creation	
ENTR 6212	Business Planning for New Ventures	
ENTR 6216	Global Social Entrepreneurship and Innovation	
FINA 6225	Entrepreneurial Finance for High Tech Companies	
MKTG 6214	New Product Development	

#### CONCENTRATION IN INTERNATIONAL MANAGEMENT

Code	Title	Hours
Choose 9 semester hours from the following:		9
ENTR 6216	Global Social Entrepreneurship and Innovation	
INTB 6212	Cultural Aspects of International Business	
INTB 6217	Creating Sustainable Competitive Advantage through Global Innovation	
FINA 6204	International Finance Management	
MKTG 6212	International Marketing	
SCHM 6213	Global Supply Chain Strategy	

#### CONCENTRATION IN MARKETING

Code	Title	Hours
Choose 9 semester hours from the following:		9
MKTG 6210	Marketing Research	
MKTG 6212	International Marketing	

MKTG 6214	New Product Development
MKTG 6216	Market Focused Strategy
MKTG 6218	Marketing in Service Sector
MKTG 6223	Brand and Advertising Management

### CONCENTRATION IN OPERATIONS AND SUPPLY CHAIN MANAGEMENT

Code	Title	Hours
Choose 9 semester hours from the following:		
SCHM 6211	Logistics and Transportation Management	9
SCHM 6213	Global Supply Chain Strategy	
SCHM 6214	Sourcing and Procurement	
SCHM 6221	Sustainability and Supply Chain Management	

### CONCENTRATION IN SUSTAINABILITY

Code	Title	Hours
Choose 9 semester hours from the following:		
MECN 6205	Sustainability and the Economics of Markets	9
MGMT 6225	Sustainability and Leadership	
MGMT 6226	Sustainability and the Business Environment	
SCHM 6221	Sustainability and Supply Chain Management	

### Program Credit/GPA Requirements

50 total semester hours required

Minimum 3.000 GPA required

### Dual Degrees

Northeastern University's D'Amore-McKim School of Business is known for its experience-driven educational model that fuses robust classroom education with real-world application. Our dual degree graduate programs are specifically designed for students like you, whose interests and goals may span multiple academic disciplines or areas of expertise.

Through our dual degree programs, we develop leaders and thinkers by combining the rigorous graduate coursework of the D'Amore-McKim MBA with a specialized master's degree. Because some courses can be counted toward both degrees, you can complete the two degrees in less time than it would take to earn them individually.

Learn more about dual degree programs (<https://damore-mckim.northeastern.edu/programs?s=&filters%5B%5D=program%7Ctype%7Cdual-degrees&filters%5B%5D=program%7Ctype%7Cgraduate/>) on the D'Amore-McKim website.

### Programs

- MSA/MBA—Accounting and Business Administration (p. 82)
- MSF/MBA—Finance and Business Administration—Part-Time (p. 83)
- MSF/MBA—Finance and Business Administration—Online (p. 84)

### MSA/MBA—Accounting and Business Administration

A fast track to an accounting career for those that didn't plan on one.

In a time of rapid technological change, you need to keep learning to keep up. With our Master of Science in Accounting/Master of Business Administration (<https://damore-mckim.northeastern.edu/programs/ms-accounting-mba/>) dual-degree program, successful students will distinguish themselves from their peers as dynamic leaders in the business world. In just 15 months you will transform your career, earning two degrees and building the skills for a successful future.

Your journey begins with a robust curriculum that has been designed in partnership with some of the region's leading accounting firms. This experience-driven education maintains a sharp focus on business and accounting insights that you will put to work every day in your new career. In addition, you will be immersed in contemporary issues related to audit and tax, giving you a valuable perspective that is always fresh and topical.

You will put your new skills and insights to work during the busiest time of the year in a three-month, paid corporate residency at one of the top accounting firms in the business. In this role, you will have the one-on-one guidance of a seasoned mentor, where your exchange of ideas and insights will be mutually beneficial.

Students in this program will automatically be registered for classes by the advising team in the Graduate School of Professional Accounting. Please contact an advisor at 617-373-3244 with any questions or requests.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

#### MASTER OF SCIENCE IN ACCOUNTING REQUIREMENTS

Code	Title	Hours
<b>Required Core</b>		
ACCT 6223	Audit and Other Assurance Services	6
ACCT 6224	Taxation of Individuals and Business Entities	6
ACCT 6226	Strategic Cost Management	3
ACCT 6227	Accounting for Business Combinations	3
ACCT 6228	Contemporary Issues in Accounting Theory	3

#### Financial Reporting

ACCT 6217	Corporate Governance, Ethics, and Financial Reporting	3
ACCT 6220	Corporate Financial Reporting and Decision Making 1	3
ACCT 6221	Corporate Financial Reporting and Decision Making 2	6
ACCT 6222	Corporate and Governmental/Nonprofit Financial Reporting and Decision Making	6

#### MASTER OF BUSINESS ADMINISTRATION REQUIREMENTS

Code	Title	Hours
<b>Entrepreneurship</b>		
ENTR 6211	Entrepreneurship: Services and Retail Business Creation	3
<b>Analysis</b>		
FINA 6200	Value Creation through Financial Decision Making	3

MGSC 6200	Information Analysis	3
MGSC 6201	Information Systems and Technology	3
STRT 6200	Strategic Decision Making in a Changing Environment	3

**Management**

HRMG 6200	Managing People and Organizations	3
INTB 6200	Managing the Global Enterprise	3
MGMT 6211	Business Law and Professional Ethics	3
SCHM 6201	Operations and Supply Chain Management	3

**Marketing**

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

**Co-op Requirement**

Code	Title	Hours
BUSN 6964	Co-op Work Experience	0

**Program Credit/GPA Requirements**

72 total semester hours required  
 Minimum 3.000 GPA required

**Plan of Study**

**Term 1**

	Summer 1	Hours	Summer 2	Hours
Corporate Reporting 1	Corporate Reporting 2			
ACCT 6220	3	ACCT 6221	6	
Management		Global Competition		
HRMG 6200	3	MECN 6200	3	
		Information Analysis		
		MGSC 6200	3	
			6	12

**Term 2**

Fall	Hours
Corporate Government	
ACCT 6217	3
ACCT 6222	6
Audit	
ACCT 6223	6
Taxation	
ACCT 6224	6
Information Systems	
MGSC 6201	3
	24

**Term 3**

Spring	Hours
Internship	
BUSN 6964	0

Cost Management	
ACCT 6226	3
Service and Manufacturing Operations	
SCHM 6201	3

6

**Term 4**

	Summer 1	Hours	Summer 2	Hours
Accounting	Accounting			
ACCT 6227	3	ACCT 6228	3	
Entrepreneurship		Business Law and Ethics		
ENTR 6211	3	MGMT 6211	3	
Financial Decision Making		Global Enterprise		
FINA 6200	3	INTB 6200	3	
Customer Markets		Strategic Decision Making		
MKTG 6200	3	STRT 6200	3	
			12	12

Total Hours: 72

**MSF/MBA—Finance and Business Administration—Part-Time**

You know where you want to go. Our Part-Time MS in Finance/MBA (<https://damore-mckim.northeastern.edu/programs/part-time-ms-finance-mba/>) dual-degree program will help you get there. Gain the vital knowledge, skills, and expertise you need to accelerate your career while you build a strong personal portfolio of core business skills and specialized financial expertise.

Our Part-Time MS in Finance/MBA program is made for motivated professionals like you. It allows you to complete your degree on your own timetable, set your schedule, and specialize in an area that meets your career goals. Learn from our faculty thought leaders who apply their unique practice-oriented approach that has established Northeastern University as a leader in experiential education.

You may be admitted to the MS in Finance/MBA program when you enroll, or you may petition to change into the dual-degree program from either the MBA or the MS in Finance programs partway through your master’s program, but not after you have completed your master’s curriculum.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Core Requirements**

Code	Title	Hours
<b>Accounting</b>		
ACCT 6200	Financial Reporting and Managerial Decision Making 1	3

ACCT 6201	Financial Reporting and Managerial Decision Making 2	1.5
<b>Management</b>		
HRMG 6200	Managing People and Organizations	3
INTB 6200	Managing the Global Enterprise	3
MGSC 6204	Managing Information Resources	1.5
SCHM 6201	Operations and Supply Chain Management	3
<b>Marketing</b>		
MKTG 6200	Creating and Sustaining Customer Markets	3
MECN 6200	Global Competition and Market Dominance	3
<b>Analysis</b>		
FINA 6200	Value Creation through Financial Decision Making	3
MGSC 6200	Information Analysis	3
STRT 6200	Strategic Decision Making in a Changing Environment	3
<b>Entrepreneurship</b>		
ENTR 6200	Enterprise Growth and Innovation	3
<b>Additional Required Finance Courses</b>		
FINA 6203	Investment Analysis	3
FINA 6204	International Finance Management	3
FINA 6205	Financial Strategy	3
FINA 6206	Finance Seminar	3

## Electives

Code	Title	Hours
<b>Finance Electives</b>		
Complete 12 semester hours of FINA courses.		12
<b>Business Electives</b>		
Complete 15 semester hours of courses from the following subject areas. Note that these courses may include finance courses:		15
ACCT, ENTR, FINA, HRMG, INTB, MECN, MKTG, MGMT, SCHM, and STRT		

## Program Credit/GPA Requirements

72 total semester hours required  
Minimum 3.000 GPA required

### MSF/MBA—Finance and Business Administration—Online

Our online Master of Science in Finance/Master of Business Administration dual-degree program is designed to help you develop your managerial potential and practical finance skills in key areas such as valuation, mergers and acquisitions, risk management, insurance, and investments. The online MS in finance/MBA can be completed in as little as three years.

All interested candidates will start by enrolling in the online MBA and may apply to move into the dual program at any point during their second year. Our 100 percent online dual-degree program is available to second-year online MBA students who have achieved a minimum of a 3.000 grade-point average and a B grade in Financial Statement Preparation and Analysis (ACCT 6272), Identifying Strategic Implications in Accounting

Data (ACCT 6273), and Value Creation through Financial Decision Making (FINA 6200).

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
<b>Accounting</b>		
ACCT 6272	Financial Statement Preparation and Analysis	2.25
ACCT 6273	Identifying Strategic Implications in Accounting Data	2.25
<b>Management</b>		
HRMG 6200	Managing People and Organizations	3
INTB 6200	Managing the Global Enterprise	3
MGMT 6213	Managing Ethics in the Workplace and Marketplace	2
MGSC 6204	Managing Information Resources	1.5
SCHM 6201	Operations and Supply Chain Management	3
<b>Marketing</b>		
MKTG 6200	Creating and Sustaining Customer Markets	3
MECN 6200	Global Competition and Market Dominance	3
<b>Analysis</b>		
FINA 6200	Value Creation through Financial Decision Making	3
MGSC 6200	Information Analysis	3
STRT 6200	Strategic Decision Making in a Changing Environment	3
<b>Entrepreneurship</b>		
ENTR 6200	Enterprise Growth and Innovation	3
<b>Additional Required Finance Courses</b>		
FINA 6203	Investment Analysis	3
FINA 6204	International Finance Management	3
FINA 6205	Financial Strategy	3
FINA 6206	Finance Seminar	3

## Electives

Code	Title	Hours
<b>Finance Electives</b>		
Complete 9 semester hours of finance electives.		9
<b>Business Electives</b>		
Complete 6 semester hours in the following subject areas. Note that these courses may include finance courses:		6
MGSC, ENTR, FINA, HRMG, MKTG, MGMT, SCHM, SUST		

## Program Credit/GPA Requirements

62 total semester hours required  
Minimum 3.000 GPA required

## Graduate Certificate Programs

Business professionals are much like businesses themselves—as opportunities emerge and the marketplace evolves, their needs change. Designed for working professionals, our graduate certificates are a way to quickly gain specialized knowledge and a professional credential in order to advance your career. Our certificates require 12 to 15 credits that you may accelerate and take in as little as one semester, or spread out and take up to three years to complete.

**Shape your own experience.** When you pursue a graduate certificate, you have the opportunity to focus your studies and specialize in the area of business that provides you with the best career opportunities.

**Study on your own terms.** Our graduate certificate programs are designed with working professionals in mind. Courses are offered on weeknights and Saturdays. You may even take one of our courses online. You can choose to come to campus just one night a week or accelerate the program by taking a heavier course load each semester. Start your graduate certificate at a time that works for you. You can enter your program in January, May, or September.

**Build toward something more.** Our graduate certificate programs are a unique opportunity to quickly gain fundamental business knowledge and earn a graduate-level credential from a top 40 U.S. research university, as ranked by *U.S. News & World Report*. And that's just the beginning. When you are ready to pursue a full graduate degree at D'Amore-McKim—now or in the future—the credits you earn during the certificate program may be applied to eligible master's programs, including the part-time MBA. This is a valuable opportunity to turn your career-enhancing graduate certificate into a more advanced professional credential.

Learn more about graduate certificates (<https://damore-mckim.northeastern.edu/programs?s=&filters%5B%5D=program%7Ctype%7Cgraduate&filters%5B%5D=program%7Ctype%7Ccertificates/>) on the D'Amore-McKim website.

## Programs

- Accounting and Financial Decision Making (p. 85)
- Accounting and Financial Decision Making—Online (p. 86)
- Business Administration (p. 86)
- Business Administration—Online (p. 87)
- Corporate Finance (p. 88)
- Corporate Finance—Online (p. 88)
- Corporate Renewal (p. 89)
- Corporate Renewal—Online (p. 89)
- Healthcare Administration and Policy (p. 89)
- Innovation Management (p. 90)
- International Business (p. 90)
- International Business—Online (p. 91)
- Investments (p. 91)
- Leadership and Human Capital (p. 92)
- Marketing (p. 92)
- Marketing—Online (p. 92)
- Mutual Fund Management (p. 93)
- Supply Chain Management (p. 93)
- Supply Chain Management—Online (p. 94)
- Technological Entrepreneurship (p. 94)

## Accounting and Financial Decision Making, Graduate Certificate

Sharpen your insight into how businesses succeed. Accounting and financial decision-making skills are the foundation of any successful business venture. Individuals with the knowledge and experience to make informed financial decisions are highly valued contributors in businesses across the globe.

In the Graduate Certificate in Accounting and Financial Decision Making, you will have the opportunity to explore topics such as financial risk management, value creation, and information analysis. Exposure to decision-making theory will assist your conceptual understanding of how investors, money managers, and corporate managers make economic and financial decisions.

Once you have completed your D'Amore-McKim Graduate Certificate in Accounting and Financial Decision Making, endless opportunities lie ahead. Apply to a master's degree program and the credits you have already earned may be applied toward an eligible program, or explore new opportunities for career growth.

Learn more about this program ([http://www.damore-mckim.northeastern.edu/academic-programs/certificates/accounting?utm\\_source=neu-course-catalog&utm\\_medium=referral&utm\\_campaign=gcafdm-mofu/](http://www.damore-mckim.northeastern.edu/academic-programs/certificates/accounting?utm_source=neu-course-catalog&utm_medium=referral&utm_campaign=gcafdm-mofu/)) on the D'Amore-McKim website.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
ACCT 6200 and ACCT 6201	Financial Reporting and Managerial Decision Making 1 and Financial Reporting and Managerial Decision Making 2	4.5
MGSC 6200	Information Analysis	3
FINA 6200	Value Creation through Financial Decision Making	3

### Elective

Code	Title	Hours
Complete one of the following:		1.5-3
MGSC 6204	Managing Information Resources	
Any MBA core course titled 6200 (see below):		
ENTR 6200	Enterprise Growth and Innovation	
HRMG 6200	Managing People and Organizations	
INTB 6200	Managing the Global Enterprise	
MKTG 6200	Creating and Sustaining Customer Markets	
MECN 6200	Global Competition and Market Dominance	
STRT 6200	Strategic Decision Making in a Changing Environment	

## Program Credit/GPA Requirements

12 total semester hours required, may complete a maximum of 15 semester hours

Minimum 3.000 GPA required

## Accounting and Financial Decision Making—Online Program, Graduate Certificate

Sharpen your insight into how businesses succeed. Accounting and financial decision-making skills are the foundation of any successful business venture. Individuals with the knowledge and experience to make informed financial decisions are highly valued contributors in businesses across the globe.

In the Graduate Certificate in Accounting and Financial Decision Making, you will have the opportunity to explore topics such as financial statement preparation, value creation, and information analysis. Exposure to decision-making theory will assist your conceptual understanding of how investors, money managers, and corporate managers make economic and financial decisions.

Once you have completed your D'Amore-McKim Graduate Certificate in Accounting and Financial Decision Making, endless opportunities lie ahead. Apply to an eligible master's degree program and the credits you have already earned may be applied toward that program, or explore new opportunities for career growth.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirements

Code	Title	Hours
ACCT 6272	Financial Statement Preparation and Analysis	2.25
ACCT 6273	Identifying Strategic Implications in Accounting Data	2.25
FINA 6200	Value Creation through Financial Decision Making	3
MGSC 6200	Information Analysis	3
MGSC 6204	Managing Information Resources	1.5

#### Program Credit/GPA Requirements

12 total semester hours required  
Minimum 3.000 GPA required

## Business Administration, Graduate Certificate

Northeastern University's Graduate Certificates in Business Administration can help you quickly gain specialized knowledge and a professional credential to advance your career. The Graduate Certificate in Business Administration at the D'Amore-McKim School of Business is designed to help you learn the skills you need to excel today, while earning credits to drive you toward tomorrow's goals.

Your program will consist of four to six essential business courses. You may accelerate the curriculum and complete in as little as eight months, or spread out and take up to three years to complete. You may choose to focus on one area of specialty or gain fundamental business knowledge around financial reporting and managerial decision making, managing people and organizations, information analysis, and managing information resources.

You can gain this specialized knowledge in four ways:

#### PART-TIME MBA PATH

Have you considered pursuing your MBA, but a full-time commitment isn't the right fit for your life? Do you want to gain experience in graduate-level classes before committing to a full degree? Our Part-Time MBA Path ([http://www.damore-mckim.northeastern.edu/academic-programs/certificates/business-administration/academics/part-time-mba-path?utm\\_source=neu-course-catalog&utm\\_medium=referral&utm\\_campaign=gcba-mofu/](http://www.damore-mckim.northeastern.edu/academic-programs/certificates/business-administration/academics/part-time-mba-path?utm_source=neu-course-catalog&utm_medium=referral&utm_campaign=gcba-mofu/)) has been designed for you. This program offers six foundational classes (15 credits) from the D'Amore-McKim MBA curriculum to prepare you now for emerging opportunities in your field.

Once you have completed your Graduate Certificate in Business Administration through the Part-Time MBA Path and you have applied and been accepted to our part-time MBA, then the credits you've earned during your certificate program will apply. Not only that, but your performance in the courses can make you eligible to waive the GMAT requirement.

#### BUILD YOUR OWN CURRICULUM

Do you need specialized knowledge in a particular area of business? Building your own ([http://www.damore-mckim.northeastern.edu/academic-programs/certificates/business-administration/academics/build-your-own?utm\\_source=neu-course-catalog&utm\\_medium=referral&utm\\_campaign=gcba-mofu/](http://www.damore-mckim.northeastern.edu/academic-programs/certificates/business-administration/academics/build-your-own?utm_source=neu-course-catalog&utm_medium=referral&utm_campaign=gcba-mofu/)) Graduate Certificate in Business Administration gives you the power to create the business curriculum you need. Custom select any five courses (15 credits) from our MBA program—just the courses you need to propel you toward your career goals and personal aspirations.

#### EIGHT-MONTH INTERNATIONAL STUDENT COHORT

Are you ready to study in the United States.? This full-time, eight-month program is tailored to meet the needs of international students. You'll complete this rigorous course work as part of a small, intimate cohort. The International Student Cohort ([http://www.damore-mckim.northeastern.edu/academic-programs/certificates/business-administration/academics/international-cohort?utm\\_source=neu-course-catalog&utm\\_medium=referral&utm\\_campaign=gcba-mofu/](http://www.damore-mckim.northeastern.edu/academic-programs/certificates/business-administration/academics/international-cohort?utm_source=neu-course-catalog&utm_medium=referral&utm_campaign=gcba-mofu/)) is designed to help you build your knowledge of essential business practices like financial decision making, innovation, and management. You will have the opportunity to gain relevant, in-demand skills that will help you to tackle today's business challenges.

#### ACCELERATED FOUR-MONTH CURRICULUM

Where do you want to be four months from now? With our Accelerated Four-Month Curriculum ([http://www.damore-mckim.northeastern.edu/academic-programs/certificates/business-administration/academics/accelerated?utm\\_source=neu-course-catalog&utm\\_medium=referral&utm\\_campaign=gcba-mofu/](http://www.damore-mckim.northeastern.edu/academic-programs/certificates/business-administration/academics/accelerated?utm_source=neu-course-catalog&utm_medium=referral&utm_campaign=gcba-mofu/)), you can learn meaningful business skills in just one semester. Open to both U.S. and international students, this option is perfect for professionals with the ability to dedicate four months to an intensive, condensed educational experience. If you are an international student returning to your home country after your semester at D'Amore-McKim, you may be able to transfer credits back to your home program.

Through successful completion of the Graduate Certificate in Business Administration, you will earn credits that may be applied to eligible master's programs, both within D'Amore-McKim School of Business or in the College of Professional Studies. Upon acceptance to one of the eligible degree programs, you may be able to apply the credits you have already earned toward the completion of your degree.

Learn more about this program ([http://www.damore-mckim.northeastern.edu/academic-programs/certificates/business-administration?utm\\_source=neu-course-](http://www.damore-mckim.northeastern.edu/academic-programs/certificates/business-administration?utm_source=neu-course-)

catalog&utm\_medium=referral&utm\_campaign=gcba-mofu/) on the D'Amore-McKim website.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Tracks

Complete one of the following three tracks. *Note:* The part-time MBA track and the international student track require an additional 3 semester hours.

#### PART-TIME MBA TRACK

Code	Title	Hours
ACCT 6200	Financial Reporting and Managerial Decision Making 1	3
ACCT 6201	Financial Reporting and Managerial Decision Making 2	1.5
FINA 6200	Value Creation through Financial Decision Making	3
HRMG 6200	Managing People and Organizations	3
MGSC 6200	Information Analysis	3
MGSC 6204	Managing Information Resources	1.5

#### INTERNATIONAL STUDENT TRACK

Code	Title	Hours
ACCT 6200	Financial Reporting and Managerial Decision Making 1	3
ENTR 6200	Enterprise Growth and Innovation	3
HRMG 6200	Managing People and Organizations	3
INTB 6200	Managing the Global Enterprise	3
MKTG 6200	Creating and Sustaining Customer Markets	3

#### BUILD YOUR OWN TRACK

Customize your schedule by taking any 12 credits within the part-time MBA program assuming you meet prerequisites per course.

### Program Credit/GPA Requirements

12 total semester hours required  
 Minimum 3.000 GPA required

### Business Administration—Online Program, Graduate Certificate

Our 100 percent online Graduate Certificate in Business Administration can help you quickly gain specialized knowledge and a professional credential to advance your career. The Graduate Certificate in Business Administration at the D'Amore-McKim School of Business is designed to help you learn the skills you need to excel today, while earning credits to drive you toward tomorrow's goals.

Your program will consist of four essential business courses. You may accelerate the curriculum and complete it in as little as eight months, or spread it out and take up to three years to complete. You may choose to focus on one area of specialty or gain fundamental business knowledge in topics such as financial reporting and managerial decision making, managing people and organizations, and marketing.

Once you have completed your D'Amore-McKim Graduate Certificate in Business Administration, endless opportunities lie ahead. Apply to an eligible master's degree program, including the online MBA, and the

credits you have already earned may be applied to that program, or you may opt to explore new opportunities for career growth.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
Complete 12 semester hours from the following:		12
MGSC 6200	Information Analysis	
MGSC 6204	Managing Information Resources	
HRMG 6200	Managing People and Organizations	
FINA 6200	Value Creation through Financial Decision Making	
ACCT 6272	Financial Statement Preparation and Analysis	
ACCT 6273	Identifying Strategic Implications in Accounting Data	
FINA 6203	Investment Analysis	
FINA 6204	International Finance Management	
FINA 6205	Financial Strategy	
FINA 6211	Financial Risk Management	
FINA 6213	Investment Banking	
FINA 6214	Mergers, Acquisitions, and Private Equity	
FINA 6215	Business Turnarounds	
FINA 6216	Valuation and Value Creation	
FINA 6217	Real Estate Finance and Investment	
MECN 6205	Sustainability and the Economics of Markets	
ENTR 6211	Entrepreneurship: Services and Retail Business Creation	
ENTR 6216	Global Social Entrepreneurship and Innovation	
ENTR 6200	Enterprise Growth and Innovation	
ENTR 6212	Business Planning for New Ventures	
ENTR 6210	Managing Operations in Early Stage Ventures	
MKTG 6212	International Marketing	
MECN 6200	Global Competition and Market Dominance	
MKTG 6200	Creating and Sustaining Customer Markets	
MKTG 6210	Marketing Research	
MKTG 6214	New Product Development	
MKTG 6216	Market Focused Strategy	
MKTG 6218	Marketing in Service Sector	
MKTG 6222	Digital Marketing	
MKTG 6223	Brand and Advertising Management	
MKTG 6212	International Marketing	
MGMT 6222	Healthcare Industry	
MGMT 6223	Strategic Decision Making for Healthcare Professionals	
MGMT 6225	Sustainability and Leadership	
MGMT 6226	Sustainability and the Business Environment	

MGMT 6283	Business Law, Corporate Governance, and Intellectual Property Strategies
MGSC 6221	Introduction to Health Informatics and Health Information Systems
INTB 6200	Managing the Global Enterprise
INTB 6212	Cultural Aspects of International Business
INTB 6217	Creating Sustainable Competitive Advantage through Global Innovation
HRMG 6217	Virtual, Vicious Teams: Building and Leading High-Performance Teams
SCHM 6213	Global Supply Chain Strategy
SCHM 6211	Logistics and Transportation Management
SCHM 6201	Operations and Supply Chain Management
SCHM 6214	Sourcing and Procurement
SCHM 6221	Sustainability and Supply Chain Management

### Program Credit/GPA Requirements

12 total semester hours required  
Minimum 3.000 GPA required

#### Corporate Finance, Graduate Certificate

Sharpen your financial perspective. Financial acumen is the foundation of any successful business venture. Now you can explore this essential business knowledge through a flexible, part-time program and gain insight into strategies needed for tackling real-world financial challenges.

Through the Graduate Certificate in Corporate Finance, you will develop foundational financial knowledge through the study of global markets. Your course work will introduce methods of implementing financial strategy by stressing the impact of ethical and legal considerations. You may also choose to examine the financial, managerial, accounting, and legal factors affecting corporate mergers or explore advanced financial risk management.

Once you have completed your D'Amore-McKim Graduate Certificate in Corporate Finance and apply to an eligible master's degree program, the credits you have already earned may be applied.

Learn more about this program ([http://www.damore-mckim.northeastern.edu/academic-programs/certificates/corporate-finance?utm\\_source=neu-course-catalog&utm\\_medium=referral&utm\\_campaign=gccf-mofu/](http://www.damore-mckim.northeastern.edu/academic-programs/certificates/corporate-finance?utm_source=neu-course-catalog&utm_medium=referral&utm_campaign=gccf-mofu/)) on the D'Amore-McKim website.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirement

Code	Title	Hours
FINA 6205	Financial Strategy	3

#### Electives

Code	Title	Hours
Complete 9 semester hours from the following:		9
FINA 6211	Financial Risk Management	

FINA 6213	Investment Banking
FINA 6214	Mergers, Acquisitions, and Private Equity
FINA 6215	Business Turnarounds
FINA 6216	Valuation and Value Creation
FINA 6260	Entrepreneurial Finance and Venture Capital
Any MBA core course titled 6200 (see below):	
ACCT 6200	Financial Reporting and Managerial Decision Making 1
HRMG 6200	Managing People and Organizations
INTB 6200	Managing the Global Enterprise
MKTG 6200	Creating and Sustaining Customer Markets
MECN 6200	Global Competition and Market Dominance
STRT 6200	Strategic Decision Making in a Changing Environment

### Program Credit/GPA Requirements

12 total semester hours required, may complete a maximum of 15 semester hours  
Minimum 3.000 GPA required

#### Corporate Finance—Online Program, Graduate Certificate

Sharpen your financial perspective. Financial acumen is the foundation of any successful business venture. Now you can explore this essential business knowledge through a flexible, 100 percent online program and gain insight into strategies needed for tackling real-world financial challenges.

Through the online Graduate Certificate in Corporate Finance, you will develop foundational financial knowledge through the study of global markets. Your course work will introduce methods of implementing financial strategy by stressing the impact of ethical and legal considerations. You may also choose to examine the financial, managerial, accounting, and legal factors affecting corporate mergers or explore advanced financial risk management.

Once you have completed your D'Amore-McKim online Graduate Certificate in Corporate Finance, endless opportunities lie ahead. Apply to an eligible master's degree program—including the online MBA—and the credits you have already earned may be applied toward that program, or explore new opportunities for career growth.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirement

Code	Title	Hours
FINA 6200	Value Creation through Financial Decision Making	3
FINA 6205	Financial Strategy	3

#### Electives

Code	Title	Hours
Complete 6 semester hours from the following:		6
FINA 6204	International Finance Management	



FINA 6213	Investment Banking
FINA 6214	Mergers, Acquisitions, and Private Equity
FINA 6215	Business Turnarounds
FINA 6216	Valuation and Value Creation

### Program Credit/GPA Requirements

12 total semester hours required  
 Minimum 3.000 GPA required

### Corporate Renewal, Graduate Certificate

Are you looking for a short course of study to help you enhance your understanding of the analysis and planning required to help struggling companies transform a successful future? The Graduate Certificate in Corporate Renewal at Northeastern University's D'Amore-McKim School of Business is for you.

Through the Graduate Certificate in Corporate Renewal, you will have the opportunity to build your knowledge of business turnarounds, value creation, negotiations, and more to help you propel your success in this exciting and challenging field.

Once you have completed your D'Amore-McKim Graduate Certificate in Corporate Renewal, endless opportunities lie ahead. Apply to a master's degree program and the credits you have already earned may be applied toward an eligible program, or explore new opportunities for career growth.

Learn more about this program ([http://www.damore-mckim.northeastern.edu/academic-programs/certificates/corporate-renewal?utm\\_source=neu-course-catalog&utm\\_medium=referral&utm\\_campaign=gccr-mofu/](http://www.damore-mckim.northeastern.edu/academic-programs/certificates/corporate-renewal?utm_source=neu-course-catalog&utm_medium=referral&utm_campaign=gccr-mofu/)) on the D'Amore-McKim website.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirements

Code	Title	Hours
Complete 12 semester hours from the following:		12
ENTR 6214	Social Enterprise	
FINA 6215	Business Turnarounds	
FINA 6216	Valuation and Value Creation	
HRMG 6212	Creating an Innovative Organization	
MKTG 6214	New Product Development	
MKTG 6216	Market Focused Strategy	
MGMT 6214	Negotiations	

### Program Credit/GPA Requirements

12 total semester hours required, may complete a maximum of 15 semester hours  
 Minimum 3.000 GPA required

### Corporate Renewal—Online Program, Graduate Certificate

Are you looking for a short course of study to help you enhance your understanding of the analysis and planning required to help struggling

companies transform for a successful future? Our 100 percent online Graduate Certificate in Corporate Renewal is for you.

Through the online Graduate Certificate in Corporate Renewal, you will have the opportunity to build your knowledge of business turnarounds, value creation, negotiations, and more to help you propel your success in this exciting and challenging field.

Once you have completed your D'Amore-McKim Graduate Certificate in Corporate Renewal, endless opportunities lie ahead. Apply to an eligible master's degree program—including the online MBA—and the credits you have already earned may be applied toward that program, or you may opt to explore new opportunities for career growth.

### Program Requirements

#### Core Requirement

Code	Title	Hours
Complete two of the following:		6
FINA 6200	Value Creation through Financial Decision Making	
MKTG 6200	Creating and Sustaining Customer Markets	
HRMG 6200	Managing People and Organizations	

#### Electives

Code	Title	Hours
Complete 6 semester hours from the following:		6
FINA 6215	Business Turnarounds	
FINA 6216	Valuation and Value Creation	
MKTG 6214	New Product Development	
MKTG 6216	Market Focused Strategy	

### Program Credit/GPA Requirements

12 total semester hours required  
 Minimum 3.000 GPA required

### Healthcare Administration and Policy, Graduate Certificate

Through Northeastern University's Graduate Certificate in Healthcare Administration and Policy, you will have the opportunity to explore fundamental business strategy concepts as they apply to the healthcare industry.

The D'Amore-McKim School of Business at Northeastern University creates a rich learning environment where theories and concepts are applied to real-world business issues. In a dynamic classroom environment, you will have the opportunity to gain exposure to the fundamental principles of health organization management. You may choose to study topics such as the impact of global economics on the American healthcare system or management of supply chain operations in the healthcare sector.

Through successful completion of your Graduate Certificate in Healthcare Administration and Policy, you will earn credits that may be applied to eligible master's programs, both within D'Amore-McKim School of Business or in the College of Professional Studies. Upon acceptance to one of the eligible degree programs, you may be able to apply the credits you have already earned toward the completion of your degree.

Learn more about this program ([http://www.damore-mckim.northeastern.edu/academic-programs/certificates/healthcare?utm\\_source=neu-course-](http://www.damore-mckim.northeastern.edu/academic-programs/certificates/healthcare?utm_source=neu-course-)

catalog&utm\_medium=referral&utm\_campaign=gchap-mofu/) on the D'Amore-McKim website.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
HINF 5105	The American Healthcare System	3
STRT 6220	Strategic Management for Healthcare Organizations	3
HRMG 6220	Health Organization Management	3

### Elective

Code	Title	Hours
Complete 3 semester hours from the following: 3		
HINF 5101	Introduction to Health Informatics and Health Information Systems	
LAW 7617	Economic Perspectives on Health Policy	
PTHH 5232	Evaluating Healthcare Quality	
SCHM 6223	Managing Healthcare Supply Chain Operations	

### Program Credit/GPA Requirements

12 total semester hours required  
Minimum 3.000 GPA required

## Innovation Management, Graduate Certificate

Creative thinkers bring new ideas to life. They embrace critical thinking and seek continuous improvement. However, with any business venture, there are challenges that must be overcome to establish sustainable growth.

Are you interested in learning about the techniques required to manage an innovative business environment? In our Graduate Certificate in Innovation Management, you will have the opportunity to build a strong conceptual understanding of the processes behind developing a business plan, the legal environment for innovation, the new product development process, and much more. This targeted curriculum will help you learn to introduce an innovative culture and mindset to your business to develop and sustain its growth.

Once you have completed your D'Amore-McKim Graduate Certificate in Innovation Management, endless opportunities lie ahead. Apply to a master's degree program and the credits you have already earned may be applied toward an eligible program, or explore new opportunities for career growth.

Learn more about this program ([http://www.damore-mckim.northeastern.edu/academic-programs/certificates/innovation-management?utm\\_source=neu-course-catalog&utm\\_medium=referral&utm\\_campaign=gcim-mofu/](http://www.damore-mckim.northeastern.edu/academic-programs/certificates/innovation-management?utm_source=neu-course-catalog&utm_medium=referral&utm_campaign=gcim-mofu/)) on the D'Amore-McKim website.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirement

Code	Title	Hours
ENTR 6200	Enterprise Growth and Innovation	3

### Electives

Code	Title	Hours
Complete 9 semester hours from the following: 9		
ENTR 6212	Business Planning for New Ventures	
ENTR 6214	Social Enterprise	
ENTR 6218	Business Model Design and Innovation	
ENTR 6220	Family Business Leadership and Governance	
ENTR 6222	Competing in Dynamic, Innovation-Driven Markets	
ENTR 6224	Intellectual Property and Other Legal Aspects of Business and Innovation	
ENTR 6225	Acquisitions, Alliances, and Growth	
MGMT 6210	Law for Managers and Entrepreneurs	
MKTG 6214	New Product Development	
TECE 6222	Emerging and Disruptive Technologies	
TECE 6230	Entrepreneurial Marketing and Selling	
TECE 6250	Lean Design and Development	
TECE 6300	Managing a Technology-Based Business	
TECE 6340	The Technical Entrepreneur as Leader	

### Program Credit/GPA Requirements

12 total semester hours required  
Minimum 3.000 GPA required

## International Business, Graduate Certificate

Delve into the driving forces behind today's global business landscape with our Graduate Certificate in International Business. Benefit from the expertise of international business professionals and earn valuable business perspective to accelerate your career and impact your current job, while still working full-time.

In this targeted curriculum, you will have the opportunity to understand what influences multinational corporations and what are key considerations when entering business partnerships with foreign companies. You can analyze why and how firms internationalize their operations, key features of successful global partnerships, and study areas of international business operations, such as manufacturing, marketing, and organizational management. You may also choose to develop your understanding of emerging markets and how emerging market companies compete with developed companies to support future viability and success.

Once you have completed your D'Amore-McKim Graduate Certificate in International Business, endless opportunities lie ahead. Apply to a master's degree program and the credits you have already earned may be applied toward an eligible program, or explore new opportunities for career growth.

Learn more about this program ([http://www.damore-mckim.northeastern.edu/academic-programs/certificates/international-business?utm\\_source=neu-course-](http://www.damore-mckim.northeastern.edu/academic-programs/certificates/international-business?utm_source=neu-course-)

catalog&utm\_medium=referral&utm\_campaign=gcib-mofu/) on the D'Amore-McKim website.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
INTB 6200	Managing the Global Enterprise	3
INTB 6212	Cultural Aspects of International Business	3

### Electives

Code	Title	Hours
Complete 6 semester hours from the following: 6		
ENTR 6200	Enterprise Growth and Innovation	
FINA 6204	International Finance Management	
INTB 6224	Competing to Win in Emerging Markets	
INTB 6230	International Field Study	
MECN 6200	Global Competition and Market Dominance	
MKTG 6212	International Marketing	
SCHM 6213	Global Supply Chain Strategy	

### Program Credit/GPA Requirements

12 total semester hours required, may take a maximum of 15 credits  
Minimum 3.000 GPA required

## International Business—Online Program, Graduate Certificate

Delve into the driving forces behind today's global business landscape with our 100 percent online Graduate Certificate in International Business. Benefit from the expertise of international business professionals and earn valuable business perspective to accelerate your career and impact your current job, while still working full time.

In this targeted curriculum, you will have the opportunity to understand what influences multinational corporations and how corporate cultures evolve in the context of national cultures. You can analyze why and how firms internationalize their operations or explore key features of successful global partnerships. You may also choose to develop your understanding of emerging markets and how emerging market companies compete with developed companies to support future viability and success.

Once you have completed your online Graduate Certificate in International Business, endless opportunities lie ahead. Apply to an eligible master's degree program—including the online MBA—and the credits you have already earned may be applied toward that program, or you may opt to explore new opportunities for career growth.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
INTB 6200	Managing the Global Enterprise	3
INTB 6212	Cultural Aspects of International Business	3

### Electives

Code	Title	Hours
Complete 6 semester hours from the following: 6		
ENTR 6200	Enterprise Growth and Innovation	
FINA 6204	International Finance Management	
MECN 6200	Global Competition and Market Dominance	
MKTG 6212	International Marketing	
SCHM 6213	Global Supply Chain Strategy	

### Program Credit/GPA Requirements

12 total semester hours required  
Minimum 3.000 GPA required

## Investments, Graduate Certificate

Investment skills are a foundation of any successful business venture. Individuals with the knowledge and experience to make informed investment decisions are highly valued contributors in businesses across the globe.

Through our Graduate Certificate in Investments, you will have the opportunity to analyze concepts like market efficiency, intrinsic value, and risk and learn how to build unique valuation models to suit particular investment alternatives.

Through successful completion of your Graduate Certificate in Investments, you will earn credits that may be applied to eligible master's programs, both within D'Amore-McKim School of Business or in the College of Professional Studies. Upon acceptance to one of the eligible degree programs, you may be able to apply the credits you have already earned toward the completion of your degree.

Learn more about this program ([http://www.damore-mckim.northeastern.edu/academic-programs/certificates/investments?utm\\_source=neu-course-catalog&utm\\_medium=referral&utm\\_campaign=gcib-mofu/](http://www.damore-mckim.northeastern.edu/academic-programs/certificates/investments?utm_source=neu-course-catalog&utm_medium=referral&utm_campaign=gcib-mofu/)) on the D'Amore-McKim website.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirement

Code	Title	Hours
FINA 6203	Investment Analysis	3

### Electives

Code	Title	Hours
Complete 9 semester hours from the following: 9		
FINA 6211	Financial Risk Management	
FINA 6212	Fixed Income Securities and Risk	
FINA 6213	Investment Banking	

FINA 6217	Real Estate Finance and Investment
FINA 6219	Portfolio Management

### Program Credit/GPA Requirements

12 total semester hours required, may take a maximum of 15 credits  
Minimum 3.000 GPA required

#### Leadership and Human Capital, Graduate Certificate

Are you ready to lead in a changing world? As our world continues to change and grow, new business leaders are emerging with the skills and insight to push the forefront of workforce management. Will you be among them?

Northeastern University's Graduate Certificate in Leadership and Human Capital will help you enhance your potential to grow into leadership positions, while exploring topics like managing high-performance teams, workforce analytics, developing great company culture, and more.

Once you have completed your Graduate Certificate in Leadership and Human Capital, endless opportunities lie ahead. Apply to a master's degree program and the credits you have already earned may be applied toward an eligible program, or explore new opportunities for career growth.

Learn more about this program ([http://www.damore-mckim.northeastern.edu/academic-programs/certificates/leadership?utm\\_source=neu-course-catalog&utm\\_medium=referral&utm\\_campaign=gclhc-mofu/](http://www.damore-mckim.northeastern.edu/academic-programs/certificates/leadership?utm_source=neu-course-catalog&utm_medium=referral&utm_campaign=gclhc-mofu/)) on the D'Amore-McKim website.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirement

Code	Title	Hours
HRMG 6200	Managing People and Organizations	3

#### Electives

Code	Title	Hours
Complete 9 semester hours from the following: 9		
HRMG 6212	Creating an Innovative Organization	
HRMG 6213	Leadership	
HRMG 6219	Leadership for Environmental Sustainability	
HRMG 6220	Health Organization Management	
MGMT 6214	Negotiations	
STRT 6210	Workforce Metrics and Analytics	

### Program Credit/GPA Requirements

12 total semester hours required, may take a maximum of 15 credits  
Minimum 3.000 GPA required

#### Marketing, Graduate Certificate

Through Northeastern University's Graduate Certificate in Marketing, you will have the opportunity to gain the core knowledge and skills necessary to carry out essential marketing functions—from branding new products to advertising services and exploring new consumer audiences.

This program will help you enhance your understanding of marketing fundamentals to build customer connections through targeted messaging and advertising. Your course work will introduce theories and case studies, exploring ways to influence behavior and drive customers to make purchase decisions. You may explore the latest trends in technology and new media, their effect on marketing goods and services, and how to deliver value using the latest technologies. You may also expand your knowledge of mobile platforms, branding, social networks, and technology adoption in emerging markets.

Once you have completed your D'Amore-McKim Graduate Certificate in Marketing, endless opportunities lie ahead. Apply to a master's degree program and the credits you have already earned may be applied toward an eligible program, or explore new opportunities for career growth.

Learn more about this program ([http://www.damore-mckim.northeastern.edu/academic-programs/certificates/marketing?utm\\_source=neu-course-catalog&utm\\_medium=referral&utm\\_campaign=gcm-mofu/](http://www.damore-mckim.northeastern.edu/academic-programs/certificates/marketing?utm_source=neu-course-catalog&utm_medium=referral&utm_campaign=gcm-mofu/)) on the D'Amore-McKim website.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirement

Code	Title	Hours
MKTG 6200	Creating and Sustaining Customer Markets	3

#### Electives

Code	Title	Hours
Complete 9 semester hours from the following:		9
MKTG 6212	International Marketing	
MKTG 6214	New Product Development	
or TECE 6250	Lean Design and Development	
MKTG 6216	Market Focused Strategy	
MKTG 6218	Marketing in Service Sector	
MKTG 6222	Digital Marketing	
MKTG 6223	Brand and Advertising Management	
MKTG 6224	B2B and Strategic Sales	
MKTG 6226	Consumer Behavior	
MKTG 6260	Special Topics in Marketing	

### Program Credit/GPA Requirements

12 total semester hours required, may take a maximum of 15 credits  
Minimum 3.000 GPA required

#### Marketing—Online Program, Graduate Certificate

Through our 100 percent online Graduate Certificate in Marketing, you will have the opportunity to gain the core knowledge and skills necessary to carry out essential marketing functions—from branding new products to advertising services and exploring new consumer audiences.

This program is designed to help you enhance your understanding of marketing fundamentals to build customer connections through targeted messaging and advertising. Your course work will introduce theories and case studies, exploring ways to influence behavior and drive customers to make purchase decisions. You may explore the latest trends in technology and new media, their effect on marketing goods

and services, and how to deliver value using the latest technologies. You may also expand your knowledge of mobile platforms, branding, social networks, and technology adoption in emerging markets.

Once you have completed your online Graduate Certificate in Marketing, endless opportunities lie ahead. The credits you have already earned may be applied toward an eligible master's degree program, including the online MBA, or you may opt to explore new opportunities for career growth.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirement

Code	Title	Hours
MKTG 6200	Creating and Sustaining Customer Markets	3

### Electives

Code	Title	Hours
Complete 9 semester hours from the following:		9
MKTG 6212	International Marketing	
MKTG 6214	New Product Development	
MKTG 6216	Market Focused Strategy	
MKTG 6218	Marketing in Service Sector	
MKTG 6223	Brand and Advertising Management	

### Program Credit/GPA Requirements

12 total semester hours required  
Minimum 3.000 GPA required

### Mutual Fund Management, Graduate Certificate

Accelerate your career with a Graduate Certificate in Mutual Fund Management.

With our Graduate Certificate in Mutual Fund Management, you will have a chance to further your analytical knowledge and lay the groundwork to perform managerial tasks related to the management and operations of mutual funds. You may choose to explore topics like reconsideration of the fund's investment policy statement and asset allocation plan, preparation of accounting statements, compliance issues, ethical concerns, or measuring and managing risk.

Through successful completion of your Graduate Certificate in Mutual Fund Management, you will earn credits that may be applied to eligible master's programs, both within D'Amore-McKim School of Business or in the College of Professional Studies. Upon acceptance to one of the eligible degree programs, you may be able to apply the credits you have already earned toward the completion of your degree.

Learn more about this program ([http://www.damore-mckim.northeastern.edu/academic-programs/certificates/mutual-fund-management?utm\\_source=neu-course-catalog&utm\\_medium=referral&utm\\_campaign=gcmfm-mofu/](http://www.damore-mckim.northeastern.edu/academic-programs/certificates/mutual-fund-management?utm_source=neu-course-catalog&utm_medium=referral&utm_campaign=gcmfm-mofu/)) on the D'Amore-McKim website.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
Complete 12 semester hours from the following:		12
FINA 6200	Value Creation through Financial Decision Making	3
FINA 6202	Analysis of Financial Institutions and Markets	3
FINA 6203	Investment Analysis	3
FINA 6212	Fixed Income Securities and Risk	3
FINA 6219	Portfolio Management	3
FINA 6360	Fund Management for Analysts	1
or FINA 6361	Fund Management for Managers	

### Program Credit/GPA Requirements

12 total semester hours required, may take a maximum of 15 credits  
Minimum 3.000 GPA required

### Supply Chain Management, Graduate Certificate

Are you ready to develop effective strategies to help differentiate a company through efficient and effective supply chain management?

Understanding the most reliable, cost-effective ways to source materials, assemble products, manage inventory, and deliver products to customers has always been essential to business success. As all businesses have become increasingly global and advances in information technology continue to reshape manufacturing, transportation, inventory control, and customer relationship management, supply chain management has become an even more fascinating and rewarding field. Through this program, you will take four or five classes to assist you in developing your career knowledge and potential.

Once you have completed your D'Amore-McKim Graduate Certificate in Supply Chain Management, endless opportunities lie ahead. Apply to a full master's degree program and the credits you have already earned may be applied toward an eligible program, or explore new opportunities for career growth.

Learn more about this program ([http://www.damore-mckim.northeastern.edu/academic-programs/certificates/supply-chain-management?utm\\_source=neu-course-catalog&utm\\_medium=referral&utm\\_campaign=gcscm-mofu/](http://www.damore-mckim.northeastern.edu/academic-programs/certificates/supply-chain-management?utm_source=neu-course-catalog&utm_medium=referral&utm_campaign=gcscm-mofu/)) on the D'Amore-McKim website.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
SCHM 6201	Operations and Supply Chain Management	3
SCHM 6213	Global Supply Chain Strategy	3

### Electives

Code	Title	Hours
Complete 6 semester hours from the following:		6
SCHM 6211	Logistics and Transportation Management	
SCHM 6214	Sourcing and Procurement	

SCHM 6215	Supply Chain Analytics
SCHM 6221	Sustainability and Supply Chain Management
SCHM 6223	Managing Healthcare Supply Chain Operations

### Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

### Supply Chain Management—Online Program, Graduate Certificate

Are you ready to develop effective strategies to help differentiate a company through efficient and effective supply chain management?

Understanding the most reliable, cost-effective ways to source materials, assemble products, manage inventory, and deliver products to customers has always been essential to business success. As all businesses have become increasingly global and advances in information technology continue to reshape manufacturing, transportation, inventory control, and customer relationship management, supply chain management has become an even more fascinating and rewarding field. Through this 100 percent online program, you will take four or five classes to assist you in developing your career knowledge and potential.

Once you have completed your online Graduate Certificate in Supply Chain Management, endless opportunities lie ahead. Apply to an eligible master's degree program, including the online MBA, and the credits you have already earned may be applied to that program, or you may opt to explore new opportunities for career growth.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
SCHM 6201	Operations and Supply Chain Management	3
SCHM 6213	Global Supply Chain Strategy	3

### Electives

Code	Title	Hours
Complete two of the following: 6		
SCHM 6211	Logistics and Transportation Management	
SCHM 6214	Sourcing and Procurement	
SCHM 6221	Sustainability and Supply Chain Management	

### Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

### Technological Entrepreneurship, Graduate Certificate

Are you interested in developing a startup?

This specialized program will help you build the foundational business knowledge required to commercialize theories you have or products you

are developing and bring your innovative ideas to the next level. Through this program, you will take four or five classes to assist you in developing your knowledge and entrepreneurial potential.

Through successful completion of the Graduate Certificate in Technological Entrepreneurship, you will earn credits that may be applied to eligible master's programs. Once you have applied and been accepted to the Master of Science in Technological Entrepreneurship, then the credits you've earned during your certificate program will apply. Not only that, but your performance in the courses can make you eligible to waive the GRE/GMAT requirement. Upon successful completion of a graduate certificate on campus, international students may even apply for up to 12 months of OPT work authorization in the United States.

Learn more about this program ([http://www.damore-mckim.northeastern.edu/academic-programs/certificates/technological-entrepreneurship?utm\\_source=neu-course-catalog&utm\\_medium=referral&utm\\_campaign=gcte-mofu/](http://www.damore-mckim.northeastern.edu/academic-programs/certificates/technological-entrepreneurship?utm_source=neu-course-catalog&utm_medium=referral&utm_campaign=gcte-mofu/)) on the D'Amore-McKim website.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
ENTR 6200	Enterprise Growth and Innovation	3
ENTR 6212	Business Planning for New Ventures	3

### Electives

Code	Title	Hours
Complete 6 semester hours from the following: 6		
ENTR 6218	Business Model Design and Innovation	
ENTR 6219	Financing Ventures from Early Stage to Exit	
ENTR 6222	Competing in Dynamic, Innovation-Driven Markets	
TECE 6222	Emerging and Disruptive Technologies	
TECE 6230	Entrepreneurial Marketing and Selling	
TECE 6250	Lean Design and Development	
TECE 6300	Managing a Technology-Based Business	
TECE 6340	The Technical Entrepreneur as Leader	

### Program Credit/GPA Requirements

12 total semester hours required, may take a maximum of 15 credits

Minimum 3.000 GPA required

# Khoury College of Computer Sciences

Website (<http://www.ccis.northeastern.edu>)

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At the Khoury College of Computer Sciences, we are inspired by our information-driven world and strive to make it a better place. Our students engage in rigorous learning and real-world co-op experiences. Our renowned faculty shapes minds, sparks innovation, and inspires ideas. Our interdisciplinary research breaks new ground to solve everyday problems.

Khoury maintains a strong research program with significant funding from the major federal research agencies and private industry. With a substantial increase in faculty strength and research funding in recent years, we are actively seeking highly motivated, bright, hardworking students who are interested in pursuing a PhD degree in computer science or in the interdisciplinary field of 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, robotics, visualization, and artificial intelligence. Colloquia and weekly research seminars contribute to the vibrant research atmosphere in the college.

Our curriculum encompasses both the breadth and depth needed for graduate school. Specialized, advanced courses for PhD students in computer science, information assurance, and personal health informatics are designed to prepare all students for research early in their doctoral education.

The Master of Science in Computer Science curriculum combines the study of basic algorithms and theoretical computer science principles with advanced programming and software design methods. It offers students the opportunity to develop the analytical and problem-solving skills needed to pursue challenging professional careers.

Khoury also offers the Master of Science in Artificial Intelligence, which provides a comprehensive framework of theory and practice in this emerging field and incorporates elements of data science, robotics, and machine learning; and the Master of Science in Cybersecurity focuses on information technology and incorporates the understanding of the social sciences, law, criminology, and management needed to prevent and combat cyberattacks.

In addition, we offer five interdisciplinary master's degree programs: the Master of Science in Health Informatics, which seeks to prepare graduates to use information technology to improve healthcare delivery and outcomes; the Master of Science in Data Science, which is designed to give students a comprehensive framework for processing, modeling, analyzing, and reasoning about data; the Master of Science in Health Data Analytics, which aims to prepare students to succeed in an emerging field at the intersection of health informatics, data science, and computational modeling; the Master of Science in Robotics, which offers

students an opportunity to obtain a comprehensive understanding of the algorithms, sensors, control systems, and mechanisms used in robotics; and the Master of Science in Game Science and Design, which seeks to provide students with a comprehensive understanding of how successful game products are created in a player-centric environment.

The Align program enables intellectually curious students to earn a Master of Science in Computer Science without a background in the field. Regardless of undergraduate major or prior programming experience, Align's custom curricula prepares students for high-demand industries.

Khoury College is a tightly knit community, and the faculty, staff, and students interact regularly through town hall meetings, social gatherings, lectures, and seminars. A diverse, multicultural graduate student body and faculty encourage rich extracurricular interaction. The Masters Council organizes a number of social events to promote friendship and camaraderie within the Khoury community.

## Academic Policies and Procedures

- Absenteeism (p. 95)
- Academic Integrity (p. 95)
- Academic Probation and Dismissal (p. 96)
- Transfer of Credit (p. 96)

## Absenteeism

Students are expected to attend all classes and lab sections for their registered courses. Any student who anticipates missing a class due to illness or emergency situations is expected to contact their professor as soon as possible.

While students are welcome to travel over winter and summer breaks, the Khoury College of Computer Sciences expects students to return to campus in a timely manner and to be present for the first week of classes each term. Students who do not arrive back to campus on time may be dropped from their classes until they return to campus. The Office of the Registrar posts current and future academic calendars (<https://registrar.northeastern.edu/article/calendar-2017-2018/>) on their website so travel plans can be made accordingly.

Students who are hired as teaching assistants are to be present and fulfill all expected employment responsibilities for the entirety of the semester. The scope of employment will include but not be limited to first class welcome/orientation through the grading of final examinations or final projects. Any violation or neglect of these requirements will be considered a violation of the Student Code of Conduct.

## Academic Integrity

### Violation Submission and Review Process

In the event a faculty member finds a student in violation of the Academic Integrity Policy, faculty will be asked to submit a report to the Khoury College Academic Integrity Committee. The Academic Integrity Committee will convene on a regular basis to review all proposals and appeals. Students will be notified of the determination made by the Academic Integrity Committee after the nearest meeting takes place.

Students will have the opportunity to appeal all decisions made by the college.

### Violations by Khoury College Master's Students

Students found in violation of the Academic Integrity Policy will be placed on deferred suspension by the college. A deferred suspension is the most serious formal warning for a violation of the Academic Integrity Policy and remains with the student for the remainder of their time in the program. Based on the severity of the violation, the Academic Integrity Committee may recommend one or more of the following sanctions:

- Removal of co-op privilege for the remainder of time in the MS program
- Suspension or deferral of co-op for one to two semesters
- Disqualification from paid graduate student positions within the college (i.e., graders, course assistants, TA/RA appointments)
- No further consequence beyond assignment of a deferred suspension

Students deemed to be in violation of the Academic Integrity Policy for a second instance may be terminated from their respective graduate program.

In accordance with university policy, the college maintains the right to override decisions issued by OSCCR in the area of academic performance.

Students will have the right to appeal any and all decisions issued by the Master's Academic Integrity Committee. The appeals process is outlined below.

### Appeals Process

Students are entitled to appeal all decisions made by the college's Academic Integrity Appeals Committee. The Appeals Committee will be comprised of a graduate co-op faculty member, the associate director of graduate student services, and one Khoury faculty member. Cases submitted concerning students from interdisciplinary programs will be reviewed by an appeals committee that includes a member of the partner college administration at the associate dean or faculty level. Student appeals will first be heard by the committee itself and then by the college dean. In the event the appeal is denied at both college levels, the student will have the right to have their appeal heard by a provost review committee. Appeals will be heard on a monthly basis, in accordance with the Academic Integrity Committee meeting schedule.

Details regarding the university appeal process can be found in the graduate catalog here (<http://catalog.northeastern.edu/graduate/academic-policies-procedures/appeals/>).

### Academic Probation and Dismissal

A student whose overall GPA falls below 3.000 will be automatically placed on academic probation and will be notified by the college. Once on probation, a student has one academic semester (summer excluded) to achieve a 3.000 GPA. If the GPA is still unsatisfactory at the end of that semester, the student will be eligible for dismissal from the graduate program.

Students should refer to their program's requirements page regarding the core GPA requirement.

### Transfer of Credit

A maximum of 9 semester hours of credit obtained at another institution may be accepted toward the degree, provided the credits meet the following criteria:

- Work is completed at the graduate level for graduate credit
- Student received a grade of 3.000 or better
- Credits were earned at an accredited institution
- Credits have not been used toward any other degree

Transfer credit will be offered only for courses that match a course offered at Northeastern University and that have been approved by the graduate committee. However, no transfer credit will be given for courses listed as Interdisciplinary courses.

Students can submit a request for transfer of credit after they have begun taking courses in the Khoury College of Computer Sciences. Please see your academic advisor for the procedure to submit a request.

### Computer Science

At the Khoury College of Computer Sciences, we are inspired by an increasingly interconnected society, informed by a rapidly changing job market, and focused on addressing the challenges of a complex world. Our goal is to equip students with knowledge as diverse as it is deep. Our programs provide a strong technical foundation and an essential understanding of computing concepts while integrating computer and data sciences across disciplines and industries.

Our master's degrees are advanced programs that are designed to prepare students to be job ready through a rigorous curriculum, innovative research, experiential learning, and a collaborative environment rich in faculty expertise.

Our research-driven doctoral programs offer students an opportunity to engage in exciting projects, a vibrant community, and a challenging curriculum that offers breadth and depth in areas both within computer science and across disciplines throughout Northeastern.

Graduate education in computer science also features the top-ranked Northeastern co-op program, enabling students to supplement their classroom education with real-world experience in the field. The college has over 450 industry partners, including:

- Amazon
- Bloomberg
- Chewy
- Facebook
- Fidelity Investments
- Goldman Sachs
- Hubspot
- Intuit
- Microsoft
- MITRE
- Red Hat
- Rue La La
- Toast
- Trip Advisor
- Verizon Communications



## Programs

### Doctor of Philosophy (PhD)

- Computer Science (p. 97)
- Computer Science—Advanced Entry (p. 100)

### Master of Science (MS)

- Artificial Intelligence (p. 101)
- Data Science (p. 101)
- Health Data Analytics (p. 102)
- Robotics (p. 103)

### Master of Science in Computer Science (MSCS)

- Computer Science (p. 103)
- Computer Science—Align Program (p. 105)

### Graduate Certificate

- Computer Science (p. 106)
- Data Analytics (p. 106)

## Computer Science, PhD

The PhD in Computer Science is designed to prepare students for careers in academia and industry—from conducting research to developing systems to publishing and presenting papers. The rigorous curriculum provides a broad background in the fundamentals of computer science and advanced courses in a wide range of focus areas.

The past decade has witnessed a dramatic increase in Northeastern's international reputation for research and innovative educational programs. Since 2012, the Khoury College of Computer Sciences has hired 30 outstanding faculty members and plans to continue this strategic growth in the coming years, advancing its position among the nation's top research universities. Today, the college has a diverse faculty of 62 working in a wide range of research areas. Seventeen faculty members have joint appointments with other colleges and schools, including engineering, science, business, social sciences and humanities, health sciences, and Arts, Media and Design.

Northeastern University is located in the heart of Boston, a city with one of the richest research environments in the world, with over 10,000 researchers, 50,000 graduate students, and a top startup community. Every week there are numerous talks and lectures on cutting-edge research, either at Northeastern or at other universities and research labs easily accessible from Northeastern.

### Course Work

A minimum of 48 semester hours of course work beyond the BS/BA degree is required of all students.

All students must demonstrate sufficient knowledge in the fundamentals of computer science, as well as the ability to carry out research in an area of computer science.

The student must maintain a minimum grade-point average (GPA) of 3.500 among the six core courses and receive a grade of B or better in each of these courses. Students who have taken equivalent courses in other institutions may petition to be exempted from the course(s) (subject to the approval of the PhD computer science curriculum committee). Each student may repeat a course once for no more than three out of the six courses if they do not receive a B or better in the course. Students with a Master of Science in Computer Science may petition to the PhD computer science curriculum committee for an

exemption from these courses. Petition forms are available on the college website.

The fields listed do not necessarily represent areas of specialization or separate tracks within the PhD program. Rather, they attempt to delineate areas on which the student must be examined in order to measure his or her ability to complete the degree. Therefore, they may be adjusted in the future to reflect changes in the discipline of computer science and in faculty interests within the Khoury College of Computer Sciences. Similarly, these fields do not represent the only areas in which a student may write his or her dissertation. They are, however, intended to serve as a basis for performing fundamental research in computer science.

### Paper Requirement

To demonstrate research ability, the student is required to submit to the PhD committee a research or a survey paper in an area of specialty under the supervision of a faculty advisor. A submitted paper from a student is considered to have fulfilled the paper requirement if:

1. The paper has been 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 computer science curriculum committee has voted on a positive recommendation. The committee may require a presentation from the student before making a recommendation.

### Admission to Candidacy

Upon completion of the course and the research paper requirements, the student is admitted to candidacy for the PhD degree. It is highly recommended that the student complete the candidacy requirement by the end of his or her second year but no later than the third year.

### Residency

One year of continuous full-time study is required after admission to the PhD candidacy. It is expected that during this period the student will make substantial progress in preparing for the comprehensive examination.

### Teaching Requirement

All computer science PhD students must satisfy the teaching requirement in order to graduate. This requirement is fulfilled when the student works as a teaching assistant (TA) or instructor of record (IoR) for one semester and during this semester.

- Teaches at least 3 hours of classes
- Prepares at least one assignment, or quiz, or equivalent

PhD students are expected to satisfy the teaching requirement some time after completing their first year and at least one semester prior to scheduling their PhD defense.

### Comprehensive Examination/Dissertation Proposal

After the student has achieved sufficient depth in a field of study, they prepare a proposal for the PhD dissertation. This process should take place no later than the end of the fifth year in residence. The student prepares a dissertation proposal, which describes the proposed research, including the relevant background materials from the literature. The proposal should clearly specify the research problems to be attacked, the techniques to be used, and a schedule of milestones toward completion.

The dissertation proposal must be approved by the dissertation committee. With the help of the advisor, a student selects the committee, consisting of at least four members, to be approved by the PhD computer

science curriculum committee. The four members must include the advisor, two internal members, and an external member.

Upon approval of the written proposal, the student has to present the proposed work orally in a public forum, followed by a closed-door oral examination from the dissertation committee. The student may take the dissertation proposal examination twice, at most.

## Doctoral Dissertation

Upon successful completion of solving the research proposed in the dissertation proposal, the candidate has an opportunity to prepare the dissertation for approval by the dissertation committee. The dissertation must contain results of extensive research and make an original contribution to the field of computer science. The work should give evidence of the candidate's ability to carry out independent research. It is expected that the dissertation should be of sufficient quality to merit publication in a reputable journal in computer science.

## Doctoral Committee

With the help of the advisor, a student selects the committee, consisting of at least four members, to be approved by the PhD computer science curriculum committee. The four members must include the advisor, two internal members, and an external member.

## Dissertation Defense

The dissertation defense is held in accordance with the regulations of the University Graduate Council. It consists of a lecture given by the candidate on the subject matter of the dissertation. This is followed by questions from the dissertation committee and others in attendance concerning the results of the dissertation as well as any related matters. The defense is chaired by the PhD advisor.

## Time and Time Limitation

After the establishment of degree candidacy, a maximum of five years will be allowed for the completion of the degree requirements, unless an extension is granted by the college graduate committee.

## Learning Outcomes

Students graduating with a PhD in Computer Science must:

- Gain a broad understanding of computer science fundamentals, spanning a substantial portion of the following core areas: artificial intelligence and data science, human-centered computing, software, systems, and theory
- Gain significant expertise in at least one research area in computer science
- Produce and defend original research in an area of computer science
- Be able to communicate research results effectively in both oral and written forms

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

Course work  
 Paper requirement  
 Admission to candidacy  
 Residency  
 Teaching requirement  
 Comprehensive examination/dissertation proposal  
 Doctoral dissertation  
 Doctoral committee

Dissertation defense

## Core Requirements

A grade of B or higher is required in each course. A cumulative 3.500 GPA is required for the core requirement.

Students should refer to the course numbering table for graduate course leveling (<http://catalog.northeastern.edu/graduate/academic-policies-procedures/records-transcripts/>).

Code	Title	Hours
<b>Breadth Areas</b>		
Complete one course from four of the five following breadth areas:		16
<i>Artificial Intelligence and Data Science</i>		
CS 6140	Machine Learning	
CS 7240	Principles of Scalable Data Management: Theory, Algorithms, and Database Systems	
<i>Human-Centered Computing</i>		
CS 7340	Theory and Methods in Human Computer Interaction	
CS 7250	Information Visualization: Theory and Applications	
<i>Software</i>		
CS 7400	Intensive Principles of Programming Languages	
CS 6410	Compilers	
<i>Systems</i>		
CS 7600	Intensive Computer Systems	
CS 7610	Foundations of Distributed Systems	
<i>Theory</i>		
CS 7800	Advanced Algorithms	
CS 7805	Theory of Computation	
<b>Specialization Courses</b>		
Complete 8 semester hours from the specialization course lists. (p. 99)		8
<b>Electives</b>		
Complete 24 semester hours in the following:		24
Note: Consult faculty advisor for the other acceptable courses.		
CS 5100 to CS 5850, except CS 5340		
CS 6110 to CS 6810		
CS 7340	Theory and Methods in Human Computer Interaction	
CS 8982	Readings	
<b>Dissertation</b>		
Upon achieving PhD candidacy, complete the following (repeatable) courses for two consecutive semesters:		
CS 9990	Dissertation	
CS 8982	Readings	

For remaining semester(s), complete the following (repeatable) course until graduation:

CS 9996 Dissertation Continuation

### Specialization Course Lists

Code	Title	Hours
<b>Artificial Intelligence</b>		
CS 5100	Foundations of Artificial Intelligence	
CS 5335	Robotic Science and Systems	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	
CS 7140	Advanced Machine Learning	
CS 7180	Special Topics in Artificial Intelligence	
<b>Computer-Human Interface</b>		
CS 5520	Mobile Application Development	
CS 6350	Empirical Research Methods	
CS 7260	Visualization for Network Science	
CS 7295	Special Topics in Data Visualization	
CS 7340	Theory and Methods in Human Computer Interaction	
<b>Data Science</b>		
CS 5200	Database Management Systems	
CS 6140	Machine Learning	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 6240	Large-Scale Parallel Data Processing	
CS 7140	Advanced Machine Learning	
CS 7280	Special Topics in Database Management	
CS 7290	Special Topics in Data Science	
<b>Graphics</b>		
CS 5310	Computer Graphics	
CS 5330	Pattern Recognition and Computer Vision	
<b>Information Security</b>		
CS 6760	Privacy, Security, and Usability	
CS 7580	Special Topics in Software Engineering	
CS 7810	Foundations of Cryptography	
CY 5770	Software Vulnerabilities and Security	
CY 6740	Network Security	
CY 6750	Cryptography and Communications Security	
<b>Networks</b>		
CS 5700	Fundamentals of Computer Networking	
CS 6710	Wireless Network	
CS 6760	Privacy, Security, and Usability	
CS 7775	Seminar in Computer Security	
CS 7780	Special Topics in Networks	
CY 6740	Network Security	
CY 6750	Cryptography and Communications Security	
<b>Programming Languages</b>		
CS 5400	Principles of Programming Language	
CS 6410	Compilers	
CS 6510	Advanced Software Development	

CS 7400	Intensive Principles of Programming Languages
CS 7480	Special Topics in Programming Language
CS 7485	Special Topics in Formal Methods
<b>Software Engineering</b>	
CS 5610	Web Development
CS 6510	Advanced Software Development
CS 7580	Special Topics in Software Engineering
<b>Systems</b>	
CS 6620	Fundamentals of Cloud Computing
CS 6650	Building Scalable Distributed Systems
CS 7600	Intensive Computer Systems
CS 7610	Foundations of Distributed Systems
CS 7680	Special Topics in Computer Systems
CY 6740	Network Security
<b>Theory</b>	
CS 6800	Application of Information Theory
CS 7485	Special Topics in Formal Methods
CS 7800	Advanced Algorithms
CS 7805	Theory of Computation
CS 7880	Special Topics in Theoretical Computer Science
CY 6750	Cryptography and Communications Security
<b>Game Design</b>	
CS 5150	Game Artificial Intelligence
CS 5310	Computer Graphics
CS 5340	Computer/Human Interaction
CS 5850	Building Game Engines
CS 7140	Advanced Machine Learning

### Program Credit/GPA Requirements

48 total semester hours required  
 Minimum overall 3.000 GPA required

### Plan of Study Sample Curriculum

Year 1			
Fall	Hours	Spring	Hours
Breadth course	4	Breadth course	4
Core elective	4	Core elective	4
		8	8
Year 2			
Fall	Hours	Spring	Hours
Breadth course	4	Breadth course	4
Open elective	4	Open elective	4
		8	8
Year 3			
Fall	Hours	Spring	Hours
CS 9990	0	CS 9990	0
CS 8982	8	CS 8982	8
		8	8

Year 4			
Fall	Hours	Spring	Hours
CS 9996	0	CS 9996	0
	0		0
Year 5			
Fall	Hours	Spring	Hours
CS 9996	0	CS 9996	0
	0		0
Year 6			
Fall	Hours	Spring	Hours
CS 9996	0	CS 9996	0
	0		0

Total Hours: 48

## Computer Science, PhD—Advanced Entry

The PhD in Computer Science seeks to prepare students for careers in academia and industry—from conducting research to developing systems to publishing and presenting papers. The rigorous curriculum provides a broad background in the fundamentals of computer science and advanced courses in a wide range of focus areas.

The past decade has witnessed a dramatic increase in Northeastern's international reputation for research and innovative educational programs. Since 2012, the Khoury College of Computer Sciences has hired 30 outstanding faculty members and plans to continue this strategic growth in the coming years, advancing its position among the nation's top research universities. Today, the college has a diverse faculty of 62 working in a wide range of research areas. Seventeen faculty members have joint appointments with other colleges and schools, including engineering, science, business, social sciences and humanities, health sciences and arts, media and design.

Northeastern University is located in the heart of Boston, a city with one of the richest research environments in the world, with thousands of researchers and graduate students and a top startup community. Every week there are numerous talks and lectures on cutting-edge research, either at Northeastern or at other universities and research labs easily accessible from Northeastern.

Students with a Master of Science in Computer Science may petition to the PhD CS curriculum committee for an exemption from the core program courses.

### Course Work

A minimum of 16 semester hours of course work beyond the master's degree is required of all students. Completion of the program core courses may also be required and will be determined upon enrollment in the program. Students with a Master of Science in Computer Science may petition to the PhD CS curriculum committee for an exemption from these courses. Petition forms are available on the college website.

Students should work with their faculty advisor on completing required course work. Students must maintain a minimum GPA of 3.500 as well as earn a grade of B or better in each course.

### Paper Requirement

Refer to the Computer Science, PhD, overview (p. 97), for research/survey paper requirements.

### Admission to Candidacy

Refer to the Computer Science, PhD, overview, (p. 97) for admission to candidacy requirements.

### Residency

Refer to the Computer Science, PhD, overview, (p. 97) for residency requirements.

### Teaching Requirement

Refer to the Computer Science, PhD, overview, (p. 97) for the teaching requirement.

### Comprehensive Examination/Dissertation Proposal

Refer to the Computer Science, PhD, overview, (p. 97) for comprehensive examination requirements.

### Learning Outcomes

- Gain a broad understanding of computer science fundamentals, spanning a substantial portion of the following core areas: artificial intelligence and data science, human-centered computing, software, systems, and theory
- Gain significant expertise in at least one research area in computer science
- Produce and defend original research in an area of computer science
- Be able to communicate research results effectively in both oral and written forms

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

Annual review  
 Course requirements  
 Paper requirement  
 Comprehensive exam  
 Teaching requirement  
 Doctoral candidacy  
 Dissertation committee  
 Dissertation proposal  
 Dissertation defense

### Core Requirements

Students must maintain a minimum GPA of 3.500 as well as earn a grade of B or better in each course.

Code	Title	Hours
	Consult your faculty advisor for acceptable courses.	16

### Dissertation

Code	Title	Hours
	Upon achieving PhD candidacy, complete the following (repeatable) courses for two consecutive semesters:	
CS 9990	Dissertation	
CS 8982	Readings	
	For any remaining semester(s), complete the following (repeatable) course until graduation:	
CS 9996	Dissertation Continuation	

## Program Credit/GPA Requirements

16 total semester hours required  
Minimum overall 3.500 GPA required

### Artificial Intelligence, MS

#### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirements

A cumulative GPA of 3.000 or higher is required in the following core courses:

Code	Title	Hours
<b>Intelligence</b>		
CS 5100	Foundations of Artificial Intelligence	4
TBA	(Intelligent Interaction)	4
<b>Programing &amp; Algorithms</b>		
CS 5010	Programming Design Paradigm	4
CS 5800	Algorithms	4
<b>Machine Learning</b>		
CS 6140	Machine Learning	4

#### Electives

Code	Title	Hours
<b>Specialization</b>		
Complete two courses from one of the following specializations:		8
<i>Vision</i>		
CS 5330	Pattern Recognition and Computer Vision	
CS 7180	Special Topics in Artificial Intelligence	
EECE 5639	Computer Vision	
<i>Intelligent Interaction</i>		
CS 5150	Game Artificial Intelligence	
CS 7340	Theory and Methods in Human Computer Interaction	
<i>Robotics</i>		
CS 5335	Robotic Science and Systems	
EECE 5550	Mobile Robotics	
EECE 5554	Robotics Sensing and Navigation	
<i>Machine Learning</i>		
CS 7140	Advanced Machine Learning	
or EECE 7397	Advanced Machine Learning	
DS 5230	Unsupervised Machine Learning and Data Mining	
<i>Knowledge Management</i>		
CS 6120	Natural Language Processing	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
<b>Additional Elective</b>		
Complete one elective from the following:		4
CS 6800	Application of Information Theory	
CS 7180	Special Topics in Artificial Intelligence	
EECE 7337	Information Theory	

GSND 5110	Game Design and Analysis
LAW 7639	Internet Law

## Program Credit/GPA Requirements

32 total semester hours required  
Minimum 3.000 GPA required

### Data Science, MS

Khoury College of Computer Sciences and the Department of Electrical and Computer Engineering (ECE) jointly offer a new interdisciplinary Master of Science program in data science. This program is designed to give students a comprehensive framework for reasoning about data. Students will engage in extensive course work intended to develop depth in data collection, storage, retrieval, manipulation, visualization, modeling and interpretation. Students will also be able to choose elective courses from a variety of offerings in Khoury, the College of Engineering (COE), and throughout the campus to explore areas that generate data, or specialized data science applications. Successful program graduates will be well positioned to attain data scientist and data engineer positions in a fast-growing field or to progress into doctoral degrees in related disciplines.

#### Prerequisite Courses

The Master of Science in Data Science curriculum is tailored toward technically or mathematically trained students. To ensure that all students have the foundation necessary to be successful in this program, each incoming student, regardless of his or her background, must take two introductory courses in programming and mathematics. The introductory courses are not counted as credit towards the degree, but are included in the student's cumulative GPA. The two introductory courses are Introduction to Programming for Data Science (DS 5010) and Introduction to Linear Algebra and Probability for Data Science (DS 5020)

If a student believes that he or she has sufficient academic or professional experience in these areas, they may opt to take two placement exams administered one week prior to the beginning of the semester. The two exams cover fundamentals of computer science and programming skills and basic statistics, probability, and linear algebra. If a student scores a B or higher, he or she is waived out of the corresponding course.

#### Learning Outcomes

Students who successfully complete the MS degree will be able to:

- Collect data from numerous sources (databases, files, XML, JSON, CSV, and Web APIs) and integrate them into a form in which the data is fit for analysis
- Use R and Python to explore data, produce summary statistics, perform statistical analyses; use standard data mining and machine-learning models for effective analysis
- Select, plan, and implement storage, search, and retrieval components of large-scale structure and unstructured repositories
- Retrieve data for analysis, which requires knowledge of standard retrieval mechanisms such as SQL and XPath, but also retrieval of unstructured information such as text, image, and a variety of alternate formats
- Manage, process, analyze, and visualize data at scale. This outcome allows students to handle data where the conventional information technology fail
- Match the methodological principles and limitations of machine learning and data mining methods to specific applied problems and

communicate the applicability and the advantages/disadvantages of the methods in the specific problem to nondata experts

- Carry out the full data analysis workflow, including unsupervised class discovery, supervised class comparison, and supervised class prediction; Summarize, interpret, and communicate the analysis of results
- Organize visualization of data for analysis, understanding, and communication; choose appropriate visualization method for a given data type using effective design and human perception principle
- Develop methods for modeling, analyzing, and reasoning about data arising in one or more application domains such as social science, health informatics, web and social media, climate informatics, urban informatics, geographical information systems, business analytics, bioinformatics, complex networks, public health, and game design

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Students should refer to the course numbering table for graduate course leveling (p. 29).

## Core Requirements

A cumulative GPA of 3.000 or higher is required in the following core courses:

Code	Title	Hours
<b>Algorithms</b>		
Complete 4 semester hours from the following:		4
CS 5800	Algorithms	
EECE 7205	Fundamentals of Computer Engineering	
<b>Data Management and Processing</b>		
DS 5110	Introduction to Data Management and Processing	4
<b>Machine Learning and Data Mining</b>		
DS 5220	Supervised Machine Learning and Learning Theory	4
DS 5230	Unsupervised Machine Learning and Data Mining	4
<b>Presentation and Visualization</b>		
DS 5500	Information Visualization: Applications in Data Science	4
<b>Electives <sup>1</sup></b>		
Complete 12 semester hours from the following:		12
<b>College of Computer and Information Science</b>		
CS 5100	Foundations of Artificial Intelligence	
CS 5200	Database Management Systems	
CS 5340	Computer/Human Interaction	
CS 5610	Web Development	
CS 6120	Natural Language Processing	
CS 6200	Information Retrieval	
CS 6240	Large-Scale Parallel Data Processing	
CS 6350	Empirical Research Methods	
CS 6620	Fundamentals of Cloud Computing	
CS 7180	Special Topics in Artificial Intelligence	
CS 7280	Special Topics in Database Management	

## College of Engineering

CIVE 7100	Time Series and Geospatial Data Sciences
CIVE 7388	Special Topics in Civil Engineering
EECE 5639	Computer Vision
EECE 5640	High-Performance Computing
EECE 7337	Information Theory
EECE 7370	Advanced Computer Vision
EECE 7397	Advanced Machine Learning
IE 7280	Statistical Methods in Engineering

## College of Social Sciences and Humanities

ECON 5140	Applied Econometrics
PPUA 5261	Dynamic Modeling for Environmental Decision Making
PPUA 5262	Big Data for Cities
PPUA 5263	Geographic Information Systems for Urban and Regional Policy
PPUA 5266	Urban Theory and Science
PPUA 7237	Advanced Spatial Analysis of Urban Systems
POLS 7200	Perspectives on Social Science Inquiry
POLS 7201	Research Design
POLS 7202	Quantitative Techniques

## D'Amore-McKim School of Business

BUSN 6320	Business Analytics Fundamentals
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## College of Science

PHYS 5116	Complex Networks and Applications
PHYS 7305	Statistical Physics
PHYS 7321	Computational Physics
PHYS 7331	Network Science Data

## Bouvé College of Health Sciences

PHTH 5202	Introduction to Epidemiology
PHTH 5210	Biostatistics in Public Health
PHTH 6224	Social Epidemiology

## College of Arts, Media and Design

GSND 5110	Game Design and Analysis
GSND 6350	Data-Driven Player Modeling

## Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

<sup>1</sup> Students taking electives worth less than 4 credits (i.e., Bouvé, CSSH courses) should enroll for an accompanying data science project course in the same semester to bring the cumulative credits to 4. In order to earn this additional credit, students are expected to work with faculty to design an additional project in line with the curricular aims of their chosen elective and the data science core learning outcomes.

## Health Data Analytics, MS

The digitization of healthcare systems in clinical settings, in combination with the explosion of personal data collection devices, provides the opportunity of using data for revolutionizing approaches to care at all levels with an emphasis on precision medicine and person-centered care. The ability to take advantage of this "Big Data" opportunity, however, requires expertise at the intersection of health informatics,

data science, and computational modeling. The Master of Science in Health Data Analytics is designed to prepare students to succeed in this emerging field. This program offers a strong, competency-based curriculum that addresses data analytics ranging from data acquisition from traditional and emerging data streams, data aggregation methods, data mining algorithms, predictive computational modeling, and visualization techniques. Students can expect to amass a broad and deep understanding of the various methods, software tools, and topical expertise needed to discover meaningful patterns in health-related data and effectively communicate their implications to a number of diverse stakeholders. Successful graduates of the Master of Science in Health Data Analytics will be effective practitioners and leaders in the rapidly developing domain of data analytics with a focus on health and healthcare.

The interdisciplinary Master of Science in Health Data Analytics consists of 12 courses, drawn from the Khoury College of Computer Sciences and the Bouvé College of Health Science; a capstone project; and an ongoing series of seminars on topics in health data analytics. Two tracks will be available to matriculating students: standard and research based.

### LEARNING OUTCOMES

- Proficiency in the health and healthcare ecosystem, including stakeholder roles such as payers, providers, and government; social determinants of health; wellness promotion; acute vs. chronic care
- Ability to acquire, store, and validate data; familiarity with common health-related data sources and formats
- Proficiency in analyzing data using statistical, epidemiological, and data-mining methods along with appropriate software tools and programming languages
- Ability to interpret and present analytical results to nontechnical stakeholders using visualization and accessible narrative structures

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirements

Code	Title	Hours
<b>Analytics/Modeling/Statistics</b>		
DA 5020	Collecting, Storing, and Retrieving Data	4
DA 5030	Introduction to Data Mining/Machine Learning	4
HINF 6400	Introduction to Health Data Analytics	3
INSH 5301	Introduction to Computational Statistics	4
INSH 5302	Information Design and Visual Analytics	4
<b>Healthcare</b>		
HINF 5102	Data Management in Healthcare	3
HINF 5105	The American Healthcare System	3
HINF 6500	Predictive Analytics and Modeling	3

#### Thesis/Capstone

Code	Title	Hours
Complete either Thesis or Capstone:		3
<i>Thesis</i>		
HINF 6101	Health Informatics Thesis	3
<i>Capstone</i>		
HINF 7701	Health Informatics Capstone Project	3

### Electives

At least one course must be chosen from the methods list.

Code	Title	Hours
<b>Methods</b>		
Complete 3–6 semester hours from the following:		3-6
PHTH 6202	Intermediate Epidemiology	
PHTH 6210	Applied Regression Analysis	
PHTH 6440	Advanced Methods in Biostatistics	
CS 6350	Empirical Research Methods	
CAEP 7712	Intermediate Statistical Data Analysis Techniques	
CAEP 7716	Advanced Research and Data Analyses 2	
<b>Other Electives</b>		
Complete 0–4 semester hours from the following:		0-4
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 6320	Design of Information-Rich Environments	
HINF 5200	Theoretical Foundations in Personal Health Informatics	
HINF 5300	Personal Health Interface Design and Development	
HINF 6215	Project Management	
HINF 6220	Database Design, Access, Modeling, and Security	
PHTH 5226	Strategic Management and Leadership in Healthcare	
PHTH 5232	Evaluating Healthcare Quality	
PHTH 5234	Economic Perspectives on Health Policy	

### Program Credit/GPA Requirements

37 total semester hours required  
Minimum 3.000 GPA required

### Computer Science, MSCS

Northeastern University's Master of Science in Computer Science is designed to prepare students for a variety of careers in computer science. The program combines both computing and important application domains—enabling you to increase your broad-based knowledge in the field while focusing on one curricular concentration selected from a range of options including artificial intelligence, computer-human interaction, graphics, programming languages, software engineering, data science, networks, theory, game design, systems, and information security.

#### Learning Outcomes

- Exhibit proficiency in the design, implementation, and testing of software
- Demonstrate skills and experience working in small teams
- Apply algorithmic and theoretical computer science principles to solve computing problems from a variety of application areas
- Demonstrate the ability to learn and develop competencies in specialized or emerging computer science fields

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Students should refer to the course numbering table for graduate course leveling (p. 29).

## Core Requirements

A cumulative 3.000 GPA is required for the three core courses:

Code	Title	Hours
<b>Programming</b>		
CS 5010	Programming Design Paradigm	4
<b>Development</b>		
CS 5500 or CS 5600	Foundations of Software Engineering Computer Systems	4
<b>Algorithms</b>		
CS 5800	Algorithms	4

## Electives

Code	Title	Hours
Complete 20 semester hours from the following. A minimum of 8 semester hours must be taken from the same specialization.		20

CS 5100 to CS 5850
CS 6110 to CS 6810
CS 7140 to CS 7380
CS 7470 to CS 7580
CS 7670 to CS 7785
CS 7810 to CS 7880
CS 8674 Master's Project
CS 8982 Readings
CS 7990 Thesis

### Specializations

<i>Artificial Intelligence</i>		
CS 5100	Foundations of Artificial Intelligence	
CS 5335	Robotic Science and Systems	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	
CS 7140	Advanced Machine Learning	
CS 7180	Special Topics in Artificial Intelligence	
<i>Computer-Human Interface</i>		
CS 5340	Computer/Human Interaction	
CS 6350	Empirical Research Methods	
CS 7140	Advanced Machine Learning	
<i>Data Science</i>		
CS 5200	Database Management Systems	
CS 6140	Machine Learning	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 6240	Large-Scale Parallel Data Processing	
CS 7280	Special Topics in Database Management	
CS 7290	Special Topics in Data Science	
CS 7295	Special Topics in Data Visualization	
<i>Game Design</i>		

CS 5150	Game Artificial Intelligence
CS 5310	Computer Graphics
CS 5340	Computer/Human Interaction
CS 5850	Building Game Engines
CS 7140	Advanced Machine Learning
<i>Graphics</i>	
CS 5310	Computer Graphics
CS 5330	Pattern Recognition and Computer Vision
CS 5520	Mobile Application Development
<i>Information Security</i>	
CS 6760	Privacy, Security, and Usability
CS 7485	Special Topics in Formal Methods
CS 7580	Special Topics in Software Engineering
CS 7810	Foundations of Cryptography
CY 5770	Software Vulnerabilities and Security
CY 6740	Network Security
CY 6750	Cryptography and Communications Security
<i>Networks</i>	
CS 5700	Fundamentals of Computer Networking
CS 6710	Wireless Network
CS 6760	Privacy, Security, and Usability
CS 7775	Seminar in Computer Security
CS 7780	Special Topics in Networks
CY 6740	Network Security
CY 6750	Cryptography and Communications Security
<i>Programming Languages</i>	
CS 5400	Principles of Programming Language
CS 6410	Compilers
CS 6510	Advanced Software Development
CS 7480	Special Topics in Programming Language
<i>Software Engineering</i>	
CS 5610	Web Development
CS 6510	Advanced Software Development
CS 6650	Building Scalable Distributed Systems
CS 7580	Special Topics in Software Engineering
<i>Systems</i>	
CS 7680	Special Topics in Computer Systems
CY 6740	Network Security
<i>Theory</i>	
CS 6800	Application of Information Theory
CS 7805	Theory of Computation
CS 7880	Special Topics in Theoretical Computer Science
CY 6750	Cryptography and Communications Security

## Program Credit/GPA Requirements

32 total semester hours required  
Minimum 3.000 GPA required



## Computer Science, MSCS–ALIGN Program

MSCS-Align students come from a wide variety of backgrounds—with undergraduate majors ranging from math, biology, history, engineering, and classics. In this program, students have an opportunity to acquire both the knowledge needed to transition into a new career and the practical skills to build the next great app. In this program, students may learn to:

### Learning Outcomes

- Exhibit proficiency in the design, implementation and testing of software
- Demonstrate skills and experience working in small teams
- Apply algorithmic and theoretical computer-science principles to solve computing problems from a variety of application areas
- Demonstrate the ability to learn and develop competencies in specialized or emerging computer science fields

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### ALIGN Bridge Coursework

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

Code	Title	Hours
<i>Fundamentals</i>		
CS 5001 and CS 5003	Intensive Foundations of Computer Science and Recitation for CS 5001	4
<i>Discrete Structures</i>		
CS 5002	Discrete and Data Structures	4
<i>Object-Oriented Design</i>		
CS 5004 and CS 5005	Object-Oriented Design and Recitation for CS 5004	4
<i>Additional ALIGN courses</i>		
CS 5006	Algorithms	2
CS 5007	Computer Systems	2

### Core Requirements

A cumulative 3.000 GPA is required for the core courses:

Code	Title	Hours
<b>Development</b>		
CS 5500 or CS 5600	Foundations of Software Engineering Computer Systems	4
<b>Algorithms</b>		
CS 5800	Algorithms	4

### Electives

Complete 20 semester hours from the following. A minimum of 8 semester hours must be taken from the same specialization. 20

CS 5100 to CS 5850
CS 6110 to CS 6810
CS 7140 to CS 7380
CS 7470 to CS 7580

CS 7670 to CS 7785	
CS 7810 to CS 7880	
CS 8674	Master's Project
CS 8982	Readings
CS 7990	Thesis
<b>Specializations</b>	
<i>Artificial Intelligence</i>	
CS 5100	Foundations of Artificial Intelligence
CS 5335	Robotic Science and Systems
CS 6120	Natural Language Processing
CS 6140	Machine Learning
CS 7140	Advanced Machine Learning
CS 7180	Special Topics in Artificial Intelligence
<i>Computer-Human Interface</i>	
CS 5340	Computer/Human Interaction
CS 6350	Empirical Research Methods
CS 7140	Advanced Machine Learning
<i>Data Science</i>	
CS 5200	Database Management Systems
CS 6140	Machine Learning
CS 6200	Information Retrieval
CS 6220	Data Mining Techniques
CS 6240	Large-Scale Parallel Data Processing
CS 7280	Special Topics in Database Management
CS 7290	Special Topics in Data Science
CS 7295	Special Topics in Data Visualization
<i>Game Design</i>	
CS 5150	Game Artificial Intelligence
CS 5310	Computer Graphics
CS 5340	Computer/Human Interaction
CS 5850	Building Game Engines
CS 7140	Advanced Machine Learning
<i>Graphics</i>	
CS 5310	Computer Graphics
CS 5330	Pattern Recognition and Computer Vision
CS 5520	Mobile Application Development
<i>Information Security</i>	
CS 6760	Privacy, Security, and Usability
CS 7485	Special Topics in Formal Methods
CS 7580	Special Topics in Software Engineering
CS 7810	Foundations of Cryptography
CY 5770	Software Vulnerabilities and Security
CY 6740	Network Security
CY 6750	Cryptography and Communications Security
<i>Networks</i>	
CS 5700	Fundamentals of Computer Networking
CS 6710	Wireless Network
CS 6760	Privacy, Security, and Usability
CS 7775	Seminar in Computer Security
CS 7780	Special Topics in Networks
CY 6740	Network Security

CY 6750	Cryptography and Communications Security
<b>Programming Languages</b>	
CS 5400	Principles of Programming Language
CS 6410	Compilers
CS 6510	Advanced Software Development
CS 7480	Special Topics in Programming Language
<b>Software Engineering</b>	
CS 5610	Web Development
CS 6510	Advanced Software Development
CS 6650	Building Scalable Distributed Systems
CS 7580	Special Topics in Software Engineering
<b>Systems</b>	
CS 7680	Special Topics in Computer Systems
CY 6740	Network Security
<b>Theory</b>	
CS 6800	Application of Information Theory
CS 7805	Theory of Computation
CS 7880	Special Topics in Theoretical Computer Science
CY 6750	Cryptography and Communications Security

### Program Credit/GPA Requirements

44 total semester hours required  
Minimum 3.000 GPA required

### Computer Science, Graduate Certificate

The postbaccalaureate certificate is designed to give students a solid foundation in the mathematical and theoretical underpinnings of computer science, including the areas of discrete mathematics, basic programming, data structures, object-oriented programming, algorithms, and computer systems. The goal of the certificate is to provide foundational knowledge in computer science that is valuable in both the workplace for career advancement, as well as to those looking to move into graduate programs within the discipline.

The Postbaccalaureate Certificate in Computer Science will serve as the foundational premasters' courses in the ALIGN program. Students that successfully complete the five certificate courses with a B in each course or better will be eligible to matriculate into the Master of Science in Computer Science program.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
CS 5001 and CS 5003	Intensive Foundations of Computer Science and Recitation for CS 5001	4
CS 5002	Discrete and Data Structures	4
CS 5004 and CS 5005	Object-Oriented Design and Recitation for CS 5004	4

CS 5006	Algorithms	2
CS 5007	Computer Systems	2

### Program Credit/GPA Requirements

16 total semester hours required  
Minimum 3.000 GPA required

### Data Analytics, Graduate Certificate

The interdisciplinary Graduate Certificate in Data Analytics is offered through a collaboration between the Khoury College of Computer Sciences and the College of Social Sciences and Humanities. The certificate curriculum emphasizes the skills needed to bridge between emerging technological capacities and traditional policymaking processes. The program is designed to provide students with foundational knowledge in data science—including data management, machine learning, data mining, statistics, and visualizing and communicating data—that can be applied to data-driven decision making in any discipline.

For more information on the certificate, refer to the program's website (<http://www.northeastern.edu/datascience/>).

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
DA 5020	Collecting, Storing, and Retrieving Data	4
DA 5030	Introduction to Data Mining/Machine Learning	4
INSH 5301	Introduction to Computational Statistics	4
INSH 5302	Information Design and Visual Analytics	4

### Program Credit/GPA Requirements

16 total semester hours required  
Minimum 3.000 GPA required

### Cybersecurity

Students can apply for admission to two distinct degree programs:

#### Doctor of Philosophy (PhD) in Cybersecurity

A research-based, interdisciplinary PhD in cybersecurity combines a strong security technical foundation with a security policy and social sciences perspective. It seeks to prepare graduates to advance the state-of-the-art of security in systems, networks, and the internet in industry, academia, and government. The interdisciplinary nature of the program distinguishes it from traditional doctoral degree programs in computer science, engineering, or social sciences and makes it unique in the Boston area.

#### Master of Science (MS) in Cybersecurity

An industry-focused, interdisciplinary Master of Science in Cybersecurity combines knowledge of information security technology and cybersecurity hands-on tools with relevant knowledge from law, the social sciences, criminology, and management. The Master of Science in Cybersecurity is designed for students focused on cybersecurity careers

in companies or government agencies, thus applying their knowledge to their workplaces to assess security threats and manage information security risks and technical and policy controls.

Northeastern University designations by the National Security Agency (NSA) and the Department of Homeland Security (DHS):

- Center of Academic Excellence in Information Assurance/Cyber Defense Education, with focus area in Cyber Investigations
- Center of Academic Excellence in Information Assurance Research
- Center of Academic Excellence in Cyber Operations

## Programs

### Doctor of Philosophy (PhD)

- Cybersecurity (p. 107)
- Cybersecurity—Advanced Entry (p. 108)

### Master of Science

- Cybersecurity (p. 109)

### Graduate Certificate

- Cybersecurity (p. 110)

## Cybersecurity, PhD

A research-based, interdisciplinary Doctor of Philosophy (PhD) in Cybersecurity combines a strong security technical foundation with a security policy and social sciences perspective. It seeks to prepare graduates to advance the state-of-the-art of security in systems, networks, and the internet in industry, academia, and government. The interdisciplinary nature of the program distinguishes it from traditional doctoral degree programs in computer science, engineering, or social sciences and makes it unique in the Boston area.

Students who choose the PhD in cybersecurity program have a strong desire to pursue academic research solving critical cybersecurity challenges facing today's society. The PhD program is a natural path for students in the college's Master of Science in Cybersecurity (<http://www.ccs.neu.edu/graduate/degree-programs/m-s-in-information-assurance/>) program who want to pursue research and students with bachelor's degrees and an interest in research-focused careers. Students who pursue careers in advancing the state-of-the-art of cybersecurity have an opportunity to gain:

- A strong technical foundation in cybersecurity and an interdisciplinary perspective based on policy and social science
- A path to a research-focused career coupled with depth in information assurance research at a leading institution, one of the earliest designees by NSA/DHS as a National Center of Academic Excellence in Information Assurance Research, Information Assurance/Cyber Defense, and Cyber Operations
- The opportunity to work with and learn from faculty who are recognized internationally for their expertise and contributions in information assurance from Northeastern's Khoury College of Computer Sciences, the Department of Electrical and Computer Engineering, and the College of Social Sciences and Humanities
- Access to research projects at Northeastern's research centers focused on security.

- The Cybersecurity and Privacy Institute (<https://cyber.ccis.northeastern.edu/about/>): The mission of Northeastern's Cybersecurity and Privacy Institute is to safeguard critical technology. Forging partnerships with experts in industry, government, and academia worldwide, the Institute's faculty and students develop, protect, and enhance technologies on which the world relies—from mobile devices and “smart” IoT applications to tomorrow's self-driving cars and delivery drones. Their expertise spans algorithm auditing, cloud security, cryptography, differential privacy, embedded device security, Internet-scale security measurements, machine learning, big data, and security, malware and advanced threats, network protocols and security, Web and mobile security, wireless network security.
- The International Secure Systems Lab (<http://www.iseclab.org/>), affiliated with Northeastern, a collaborative effort of European and U.S. researchers focused on web security, malware and vulnerability analysis, intrusion detection, and other computer security issues
- The ALERT Center (<http://www.northeastern.edu/alert/>), where Northeastern is the lead institution, a multiuniversity Department of Homeland Security Center of Excellence involved in research, education, and technology related to threats from explosives

The benefits of the Boston area:

- World-renowned for academic and research excellence, the Boston area is also home to some of the nation's largest Department of Defense contractors and government and independent labs such as MIT Lincoln Lab, MITRE, and Draper Lab

## Degree Requirements

The PhD in Cybersecurity degree requires completion of at least 48 semester credit hours beyond a bachelor's degree. Students who enter with an undergraduate degree will typically need four to five years to complete the program, and they will be awarded a master's degree en route to the PhD.

## Doctoral Degree Candidacy

A student is considered a PhD degree candidate after completing the core courses with at least a 3.400 grade-point average (GPA) and either publishing a paper in a strong conference or journal or passing an oral exam that is conducted by a committee of three information assurance faculty members and based on paper(s) written by the student.

### RESIDENCY

One year of continuous full-time study is required after admission to the PhD candidacy. During this period, the student will be expected to make substantial progress in preparing for the comprehensive examination.

### DISSERTATION ADVISING

The doctoral dissertation advising team for each student consists of two Cybersecurity faculty members, one in a technical area. When appropriate, the second faculty advisor will be from the policy/social science area.

### DISSERTATION COMMITTEE

A PhD student's dissertation committee consists of the two members of the dissertation advising team plus two others: One is a member of the Cybersecurity faculty, and the other is an external examiner who is knowledgeable about the student's research topic.

**COMPREHENSIVE EXAMINATION**

A PhD student must submit a written dissertation proposal and present it to the dissertation committee. The proposal should identify the research problem, the research plan, and the potential impact of the research on the field. The presentation of the proposal will be made in an open forum, and the student must successfully defend it before the dissertation committee after the public presentation.

**DISSERTATION DEFENSE**

A PhD student must complete and defend a dissertation that involves original research in information assurance.

**AWARDING OF MASTER'S DEGREES**

Students who enter the PhD in Cybersecurity program with a bachelor's degree have the option of obtaining a master's degree from one of the departments participating in the program. To do so, they must meet all of the department's degree requirements.

**Program Requirements****Bachelor's Degree Entrance**

Complete all courses and requirements listed below unless otherwise indicated.

**Milestones**

Qualifying exam and area exam  
Annual review  
Dissertation proposal  
Dissertation committee  
Dissertation defense

**Core Requirements**

A cumulative 3.400 GPA is required for the core requirement.

Code	Title	Hours
<b>Fundamentals</b>		
CS 5700	Fundamentals of Computer Networking	4
or EECE 7336	Digital Communications	
<b>Software</b>		
CY 5770	Software Vulnerabilities and Security	4
<b>Security and Cyberlaw</b>		
CY 6740	Network Security	4
or CY 6750	Cryptography and Communications Security	
CY 5200	Security Risk Management and Assessment	4
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	4

**Electives and Specializations**

Code	Title	Hours
Complete 28 semester hours from the following:		28
Consult faculty advisor for other acceptable courses.		
<i>Track 1: Network/Communication Security</i>		
CS 6710	Wireless Network	
EECE 5666	Digital Signal Processing	
<i>Track 2: System Security</i>		
CS 5600	Computer Systems	
or EECE 7352	Computer Architecture	
CY 6120	Software Security Practices	
<i>Track 3 Policy/Society</i>		
CRIM 7246		

POLS 7341	Security and Resilience Policy
<i>General Electives</i>	
CS 5500	Foundations of Software Engineering
CS 6140	Machine Learning
CS 6200	Information Retrieval
EECE 7204	Applied Probability and Stochastic Processes
EECE 7205	Fundamentals of Computer Engineering
EECE 7337	Information Theory
CS 6350	Empirical Research Methods

**Dissertation**

Code	Title	Hours
Complete the following (repeatable) course twice:		
CY 9990	Dissertation	
Complete the following (repeatable) course until graduation:		
CY 9996	Dissertation Continuation	

**Program Credit/GPA Requirements**

48 total semester hours required  
Minimum 3.000 GPA required

**Cybersecurity, PhD—Advanced Entry**

A research-based, interdisciplinary Doctor of Philosophy (PhD) in Cybersecurity combines a strong security technical foundation with a security policy and social sciences perspective. It seeks to prepare graduates to advance the state of the art of security in systems networks and the internet in industry, academia, and government. The interdisciplinary nature of the program distinguishes it from traditional doctoral degree programs in computer science, engineering, or social sciences and makes it unique in the Boston area.

Students who choose the PhD in Cybersecurity program have a strong desire to pursue academic research solving critical cybersecurity challenges facing today's society. The PhD program is a natural path for students in the college's Master of Science in Information Assurance and Cybersecurity program who want to pursue research and students with bachelor's degrees and an interest in research-focused careers. Students who pursue careers in advancing the state of the art of cybersecurity have an opportunity to gain:

- A strong technical foundation in cybersecurity and an interdisciplinary perspective based on policy and social science
- A path to a research-focused career coupled with depth in information assurance research at a leading institution, one of the earliest designees by NSA/DHS as a National Center of Academic Excellence in Information Assurance Research, Information Assurance/Cyber Defense, and Cyber Operations
- The opportunity to work with and learn from faculty who are recognized internationally for their expertise and contributions in information assurance from Northeastern's Khoury College of Computer Sciences, the Department of Electrical and Computer Engineering, and the College of Social Sciences and Humanities
- Access to research projects at Northeastern's research centers focused on security:
  - The Institute of Information Assurance (IIA), an interdisciplinary research center overseen by both the Khoury College of Computer

Sciences and the department of Electrical and Computer Engineering in the College of Engineering and the recipient of a National Science Foundation grant to train the country's next generation of cybercorps

- The International Secure Systems Lab, affiliated with Northeastern, a collaborative effort of European and U.S. researchers focused on web security, malware and vulnerability analysis, intrusion detection, and other computer security issues
- The ALERT Center, where Northeastern is the lead institution, a multiuniversity Department of Homeland Security Center of Excellence involved in research, education, and technology related to threats from explosives

The benefits of the Boston area:

- World renowned for academic and research excellence, the Boston area is also home to some of the nation's largest Department of Defense contractors and government and independent labs such as MIT Lincoln Lab, MITRE, and Draper Lab

## Degree Requirements

The PhD in Cybersecurity master entry degree requires completion of at least 16 semester credit hours beyond a bachelor's degree. Students also must complete the required core courses.

## Doctoral Degree Candidacy

Refer to the Cybersecurity, PhD, overview for admission to candidacy requirements.

### RESIDENCY

Refer to the Cybersecurity, PhD, overview for residency requirements.

### DISSERTATION ADVISING

Refer to the Cybersecurity, PhD, overview for dissertation advising requirements.

### DISSERTATION COMMITTEE

Refer to the Cybersecurity, PhD, overview for dissertation committee requirements.

### COMPREHENSIVE EXAMINATION

Refer to the Cybersecurity, PhD, overview for comprehensive examination requirements.

### DISSERTATION DEFENSE

Refer to the Cybersecurity, PhD, overview for dissertation defense and completion requirements.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

Qualifying exam and area exam  
Annual review  
Dissertation proposal  
Dissertation committee  
Dissertation defense

### Core Requirement

Complete 16 semester hours of approved course work. A cumulative 3.400 GPA is required for the core requirement. Consult your faculty advisor for acceptable courses.

## Dissertation

Code	Title	Hours
Complete the following (repeatable) course twice:		
CY 9990	Dissertation	
Complete the following (repeatable) course until graduation:		
CY 9996	Dissertation Continuation	

## Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

## Cybersecurity, MS

Our Master of Science in Cybersecurity combines a solid understanding of information security technology with relevant knowledge from law, the social sciences, criminology, and management. The MS program is designed for working professionals and also recent graduates who want knowledge they can apply in workplaces to assess and manage information security risks effectively.

## Learning Outcomes:

- Building core knowledge surrounding computer system security and network security theory, processes, and practices
- Planning and implementing security strategies to reduce risk and enhance protection of information assets and systems
- Identifying and addressing legal and ethical issues associated with information security, privacy, and digital rights and identifying how they affect specific cybersecurity decisions and planning
- Communicating effectively, verbally and in writing, with corporate management on cyber-related issues

## Gordon Institute of Engineering Leadership

### Master's Degree in Cybersecurity with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Cybersecurity in addition to earning a Graduate Certificate in Engineering Leadership. Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The certificate program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour master's degree and certificate require 24 hours from the MS in Cybersecurity (MS required courses, technical track and contextual track).

Engineering Leadership (p. 225)

## Program Requirements

### Core Requirement

Code	Title	Hours
<b>Foundations</b>		
CY 5010	Foundations of Information Assurance	4
<b>Technical Track</b>		
Complete 8 semester hours from the following:		
CY 5120	Applied Cryptography	
CY 5130	Computer System Security	
CY 5150	Network Security Practices	
CY 6120	Software Security Practices	

**Contextual Track**

Complete 8 semester hours from the following:		8
CY 5200	Security Risk Management and Assessment	
CY 5210	Information System Forensics	
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
CY 5250	Decision Making for Critical Infrastructure	

**Capstone**

CY 7900	Capstone Project	4
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**Electives**

Code	Title	Hours
Complete 8 semester hours from the following:		
CS 5200	Database Management Systems	
CS 5500	Foundations of Software Engineering	
CS 5600	Computer Systems	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 6710	Wireless Network	
CS 7580	Special Topics in Software Engineering	
CS 7805	Theory of Computation	
CY 5040	Introduction to Cyberspace Programming 2	
CY 5120	Applied Cryptography	
CY 5130	Computer System Security	
CY 5150	Network Security Practices	
CY 5200	Security Risk Management and Assessment	
CY 5210	Information System Forensics	
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
CY 5770	Software Vulnerabilities and Security <sup>1</sup>	
CY 6120	Software Security Practices	
CY 6720	Machine Learning in Cybersecurity and Privacy	
CY 6740	Network Security <sup>1</sup>	
CY 6750	Cryptography and Communications Security	
CRIM 7200	Criminology	
CRIM 7202	The Criminal Justice Process	
CRIM 7262	Evidence-Based Crime Policy	
CRIM 7312	Special Topics in Criminology and Public Policy	
PPUA 6503	Managing People in Public and Nonprofit Sectors	
PPUA 6505	Public Budgeting and Financial Management	
PPUA 6507	Institutional Leadership and the Public Manager	
POLS 7341	Security and Resilience Policy	
POLS 7441	Cyberconflict	

**Program Credit/GPA Requirements**

32 total semester hours required

Minimum 3.000 GPA required

<sup>1</sup> Students interested in taking Network Security (CY 6740) or Software Vulnerabilities and Security (CY 5770) as a technical track course need to inform the director/associate director of MSCY.

**Cybersecurity, Graduate Certificate**

The certificate is designed to give students a solid foundation in cybersecurity. In the course work, students have the opportunity to be exposed to fundamental cybersecurity principles and information security concepts related to information systems, to explore issues involved in the security of computer systems, and to explore the techniques used in computer forensic examination. The goal of the certificate is to provide prospective cybersecurity professionals with an entry point to industry positions within eight months from admission and with reduced financial investment.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Core Requirements**

Code	Title	Hours
CY 5010	Foundations of Information Assurance	4
CY 5130	Computer System Security	4
CY 5210	Information System Forensics	4

**Elective**

Code	Title	Hours
Complete one of the following:		
CY 5200	Security Risk Management and Assessment	4
CY 5150	Network Security Practices	
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	

**Program Credit/GPA Requirements**

16 total semester hours required

Minimum 3.000 GPA required

**Health Informatics**

*Meet the demand for health informatics professionals*

Professionals who understand the relationship between information technology, people, health, and the healthcare system are in short supply. With Northeastern University's interdisciplinary graduate programs in health informatics, you have an opportunity to gain the knowledge and skills needed to use information technology to improve healthcare delivery and outcomes—and to advance your career in this growing field.

Northeastern's health informatics master's degree and certificate programs seek to provide:

- The expertise of both the Khoury College of Computer Sciences (<http://www.ccs.neu.edu/about/>) and Bouvé College of Health Sciences (<http://www.northeastern.edu/bouve/>)
- Faculty (<http://www.ccs.neu.edu/graduate/degree-programs/m-s-in-health-informatics/faculty/>) who are senior leaders in the field

- The ability to communicate effectively with clinicians, administrators, and IT professionals and to understand each of their needs and constraints
- Strong industry connections
- The opportunity to learn from students with backgrounds in healthcare or technology—nurses, pharmacists, physicians, programmers, project managers, analysts, and others
- Flexible course schedules and formats designed to meet the needs of both working professionals and full-time students
- Research opportunities and an academic lead-in to the PhD in Personal Health Informatics (<http://phi.ccs.neu.edu/>)

Whether you want to take on new responsibilities in your current workplace or to launch a new career, Northeastern's graduate degree and certificate programs in health informatics are designed to prepare you for leadership and specialist roles in a variety of health-related organizations. And you're ready to make an immediate impact on healthcare.

### Learning Outcomes

In the program, students will study data management and analysis; business implementation and management; and how to apply the technical and business knowledge to improving the health care system.

## Programs

### Doctor of Philosophy (PhD)

- Personal Health Informatics (p. 111)

### Master of Science (MS)

- Health Data Analytics (p. 102)
- Health Informatics (p. 114)

### Graduate Certificate

- Health Informatics Management and Exchange (p. 244)
- Health Informatics Privacy and Security (p. 245)
- Health Informatics Software Engineering (p. 245)

## Personal Health Informatics, PhD

Northeastern's Doctor of Philosophy (PhD) in Personal Health Informatics (PHI) is a transdisciplinary doctoral program focused on educating top researchers in the theoretical underpinnings, design, evaluation, and dissemination of consumer- and patient-focused health systems. Personal health technologies are those that non-health professionals interact with *directly*, both in and out of a clinical setting and in various life stages of illness and wellness.

Examples include:

- Assistive technologies that aid persons with disabilities
- Consumer wellness promotion technologies
- Patient education and counseling systems
- Interfaces for reviewing personal health records
- Advanced ambulatory monitoring for supporting health
- Automated elder care systems that monitor health and support independent living
- Social networking systems connecting families and their social and medical support networks

Developing personal health interface technologies requires that professionals have skills and experience designing systems for individual patients and consumers with a wide range of backgrounds in different contexts using a variety of media, while ensuring that fielded

technologies are effective, reliable, and responsive to the needs of at-risk and patient populations. Critical skills and knowledge include needs assessment, theories of interface design and health behavior, rapid prototyping and implementation, experimental design with human subjects in challenging settings, and statistical data analysis and validation. Moreover, these skills must be deployed while working with, or leading, transdisciplinary teams.

The interdisciplinary nature of the program targets students who are interested in improving health and wellness using novel technologies that directly impact the lives of consumers and patients. This is a program for students who are not only technically strong but also socially conscious, design oriented, and interested in rigorously evaluating the technologies they imagine and build. The program provides a path for technical students to acquire more experience in the deployment and evaluation of health technologies in the field but also a path for students with health backgrounds to develop the technical skills needed to prototype and assess creative ideas they envision for improving care. The expected length of study is five years after the bachelor's degree.

## Admission Requirements

Students will be accepted with either of the following:

- A bachelor's or higher degree in a technical discipline (e.g., computer science or information science, computer systems engineering) with either academic or work experience demonstrating a commitment to working in health.
- A bachelor's or higher degree in a health science discipline (e.g., nursing, medicine, physical therapy, pharmacy, public health) with either some academic 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 grade-point average (GPA)
- A minimum total GRE score of 300 or equivalent
- A minimum GRE academic writing score of 3.5
- For international applicants, a minimum TOEFL score of 105

## Minimum Academic Standards and Requirements

### RESIDENCY REQUIREMENT

The residency requirement will follow the University Graduate Council By-Law policy.

### 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 personal health informatics doctoral program faculty members, each overseeing one part of the exam. The research core of the exam is fulfilled with submission of a high-quality paper to a strong peer-reviewed conference or journal. The health component of the exam is fulfilled when the student passes a written exam developed by a faculty member with a health sciences background, and the technical component of the exam is fulfilled when the student passes an exam developed by a faculty member with a technical background. The content of the written exams and the paper topic are developed in consultation with each faculty member.

**DEGREE CANDIDACY**

A student is considered a PhD degree candidate upon meeting these conditions:

- Completion of core courses with a minimum GPA of 3.000 overall on the core courses
- Completion of the qualifying examination

**COMPREHENSIVE EXAM**

A PhD student must submit a written dissertation proposal to the dissertation committee. The proposal should identify the research problem, the research plan, and its potential impact on the field. A presentation of the proposal will be made in an open forum, and the student must successfully defend it before the dissertation committee.

**DISSERTATION DEFENSE**

A PhD student must complete and defend a dissertation that involves original research in personal health informatics.

**Curriculum Requirements****REQUIRED AND ELECTIVE COURSES**

The curriculum is designed to provide all PhD students with a strong foundation in principles critical to the design and evaluation of personal health interfaces. All students take six core courses (24 semester hours) and the user-interface practicum (1 semester hour). 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, or 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.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Milestones**

Qualifying examinations (3)  
Annual review  
Dissertation proposal  
Dissertation committee  
Dissertation defense

**Core Requirements**

Code	Title	Hours
<b>Foundations</b>		
HINF 5200	Theoretical Foundations in Personal Health Informatics	4
<b>Program Design and Development</b>		
CS 5010	Programming Design Paradigm	4
CS 5340	Computer/Human Interaction	4
HINF 5300	Personal Health Interface Design and Development	4
<b>Methods and Statistics</b>		
CS 6350	Empirical Research Methods	4
PHTH 5210	Biostatistics in Public Health	3
<b>Evaluation</b>		
HINF 8982	Readings	1-8
HINF 5301	Personal Health Technologies: Field Deployment and System Evaluation	4

**Electives**

Code	Title	Hours
Complete 6 to 8 semester hours in the following subject area:		6-8
(Note: Please see faculty advisor for other acceptable elective courses.)		
HINF		

**Dissertation**

Code	Title	Hours
Complete the following (repeatable) course twice:		
CS 9990	Dissertation	

**Program Credit/GPA Requirements**

48 total semester hours required  
Minimum 3.000 GPA required

**Plan of Study****Sample Curriculum**

Year 1			
Fall	Hours	Spring	Hours
HINF 5200	4	CS 5010 or 5520	4
CS 5340	4	CS 6350	4



	Additionally, students should participate in the Personal Health Informatics Usability Evaluation Practicum	1	
		8	9
<b>Year 2</b>			
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>
HINF 5300	4	HINF 5301	4
PHTH 5210 (or PHTH 6210 or CAEP 7712 or CAEP 7716)	3	PHI elective	3-4
		7	7-8
<b>Year 3</b>			
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>
HINF 9990	2-4	HINF 9990	2-4
HINF 8982	1-8	PHI elective	3-4
		3-12	5-8
<b>Year 4</b>			
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>
HINF 9996	0	HINF 9996	0
		0	0
<b>Year 5</b>			
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>
HINF 9996	0	HINF 9996	0
		0	0
Total Hours: 39-52			

## Health Data Analytics, MS

The digitization of healthcare systems in clinical settings, in combination with the explosion of personal data collection devices, provides the opportunity of using data for revolutionizing approaches to care at all levels with an emphasis on precision medicine and person-centered care. The ability to take advantage of this "Big Data" opportunity, however, requires expertise at the intersection of health informatics, data science, and computational modeling. The Master of Science in Health Data Analytics is designed to prepare students to succeed in this emerging field. This program offers a strong, competency-based curriculum that addresses data analytics ranging from data acquisition from traditional and emerging data streams, data aggregation methods, data mining algorithms, predictive computational modeling, and visualization techniques. Students can expect to amass a broad and deep understanding of the various methods, software tools, and topical expertise needed to discover meaningful patterns in health-related data and effectively communicate their implications to a number of diverse stakeholders. Successful graduates of the Master of Science in Health Data Analytics will be effective practitioners and leaders in the rapidly developing domain of data analytics with a focus on health and healthcare.

The interdisciplinary Master of Science in Health Data Analytics consists of 12 courses, drawn from the Khoury College of Computer Sciences and the Bouvé College of Health Science; a capstone project; and an ongoing

series of seminars on topics in health data analytics. Two tracks will be available to matriculating students: standard and research based.

### LEARNING OUTCOMES

- Proficiency in the health and healthcare ecosystem, including stakeholder roles such as payers, providers, and government; social determinants of health; wellness promotion; acute vs. chronic care
- Ability to acquire, store, and validate data; familiarity with common health-related data sources and formats
- Proficiency in analyzing data using statistical, epidemiological, and data-mining methods along with appropriate software tools and programming languages
- Ability to interpret and present analytical results to nontechnical stakeholders using visualization and accessible narrative structures

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
<b>Analytics/Modeling/Statistics</b>		
DA 5020	Collecting, Storing, and Retrieving Data	4
DA 5030	Introduction to Data Mining/Machine Learning	4
HINF 6400	Introduction to Health Data Analytics	3
INSH 5301	Introduction to Computational Statistics	4
INSH 5302	Information Design and Visual Analytics	4
<b>Healthcare</b>		
HINF 5102	Data Management in Healthcare	3
HINF 5105	The American Healthcare System	3
HINF 6500	Predictive Analytics and Modeling	3

### Thesis/Capstone

Code	Title	Hours
Complete either Thesis or Capstone:		3
<i>Thesis</i>		
HINF 7701	Health Informatics Thesis	3
<i>Capstone</i>		
HINF 7701	Health Informatics Capstone Project	3

### Electives

At least one course must be chosen from the methods list.

Code	Title	Hours
<b>Methods</b>		
Complete 3–6 semester hours from the following:		3-6
PHTH 6202	Intermediate Epidemiology	
PHTH 6210	Applied Regression Analysis	
PHTH 6440	Advanced Methods in Biostatistics	
CS 6350	Empirical Research Methods	
CAEP 7712	Intermediate Statistical Data Analysis Techniques	
CAEP 7716	Advanced Research and Data Analyses	2

### Other Electives

Complete 0–4 semester hours from the following: 0-4

ARTG 5330	Visualization Technologies 1: Fundamentals
ARTG 6320	Design of Information-Rich Environments
HINF 5200	Theoretical Foundations in Personal Health Informatics
HINF 5300	Personal Health Interface Design and Development
HINF 6215	Project Management
HINF 6220	Database Design, Access, Modeling, and Security
PHTH 5226	Strategic Management and Leadership in Healthcare
PHTH 5232	Evaluating Healthcare Quality
PHTH 5234	Economic Perspectives on Health Policy

### Program Credit/GPA Requirements

37 total semester hours required  
Minimum 3.000 GPA required

### Health Informatics, MS

Northeastern's interdisciplinary Master of Science in Health Informatics was the first MS in the field. The program seeks to prepare students to address the combined clinical, technical, and business needs of health-related professionals. Successful students graduate with the knowledge of how technology, people, health, and the healthcare system interrelate; the ability to use technology and information management to improve healthcare delivery and outcomes; and the skills to communicate effectively among healthcare practitioners, administrators, and information technology professionals.

With approval from the health informatics program director, selected students can substitute one course from the Graduate Certificate in Data Analytics for a technical core requirement in the MS in Health Informatics degree, and up to two more courses from the Graduate Certificate in Data Analytics can be counted as electives for the MS in Health Informatics degree.

Northeastern also offers graduate certificate programs in health informatics. Three certificate programs enable you to choose the one that addresses your specific goals. These programs are listed separately in this catalog:

- Graduate Certificate in Health Informatics Management and Exchange
- Graduate Certificate in Health Informatics Privacy and Security
- Graduate Certificate in Health Informatics Software Engineering

Courses in the certificate program also apply toward master's degree requirements. This gives you the flexibility to complete a certificate and be well on your way to earning a degree if you decide later to continue your education.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

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

Code	Title	Hours
<b>Required Core</b>		
HINF 5101	Introduction to Health Informatics and Health Information Systems	3
HINF 5105	The American Healthcare System	3
HINF 7701	Health Informatics Capstone Project	3
<b>Business Management</b>		
Complete two courses from the following:		6
HINF 6201	Organizational Behavior, Work Flow Design, and Change Management	
HINF 6202	Business of Healthcare Informatics	
HINF 6215	Project Management	
HINF 6335	Management Issues in Healthcare Information Technology	
HINF 6240	Improving the Patient Experience through Informatics	
PHTH 5226	Strategic Management and Leadership in Healthcare	

### Health Informatics

Complete two courses from the following:		6
HINF 5102	Data Management in Healthcare	
HINF 5110	Global Health Information Management	
HINF 5200	Theoretical Foundations in Personal Health Informatics	
HINF 6205	Creation and Application of Medical Knowledge	
HINF 6350	Public Health Surveillance and Informatics	
HINF 6404	Patient Engagement Informatics and Analytics	
HINF 6405	Quantifying the Value of Informatics	
PHTH 5232	Evaluating Healthcare Quality	

### Technical

Complete two courses from the following:		6
HINF 6220	Database Design, Access, Modeling, and Security	
HINF 6355	Key Standards in Health Informatics Systems	
HINF 6400	Introduction to Health Data Analytics	
PHTH 5202	Introduction to Epidemiology	
PHTH 5210	Biostatistics in Public Health	
PHTH 6210	Applied Regression Analysis	
PHTH 6400	Principles of Population Health 1	
PHTH 6440	Advanced Methods in Biostatistics	

One course from the following may count toward the technical core requirement:

DA 5020	Collecting, Storing, and Retrieving Data
DA 5030	Introduction to Data Mining/Machine Learning
INSH 5301	Introduction to Computational Statistics
INSH 5302	Information Design and Visual Analytics

## Electives

Code	Title	Hours
Complete two courses from the following. Any course not taken to complete a core requirement may be taken as an elective.		
HINF 6345	Design for Usability in Healthcare	6
DA 5020	Collecting, Storing, and Retrieving Data	
DA 5030	Introduction to Data Mining/Machine Learning	
INSH 5301	Introduction to Computational Statistics	
INSH 5302	Information Design and Visual Analytics	

## Program Credit/GPA Requirements

Minimum 33 total semester hours required  
 Minimum 3.000 GPA required

### Interdisciplinary

## Master of Science

- Data Science (p. 101)
- Game Science and Design (p. 57)
- Health Data Analytics (p. 102)
- Robotics (p. 118)

## Graduate Certificate

- Data Analytics (p. 106)

### Data Science, MS

Khoury College of Computer Sciences and the Department of Electrical and Computer Engineering (ECE) jointly offer a new interdisciplinary Master of Science program in data science. This program is designed to give students a comprehensive framework for reasoning about data. Students will engage in extensive course work intended to develop depth in data collection, storage, retrieval, manipulation, visualization, modeling and interpretation. Students will also be able to choose elective courses from a variety of offerings in Khoury, the College of Engineering (COE), and throughout the campus to explore areas that generate data, or specialized data science applications. Successful program graduates will be well positioned to attain data scientist and data engineer positions in a fast-growing field or to progress into doctoral degrees in related disciplines.

## Prerequisite Courses

The Master of Science in Data Science curriculum is tailored toward technically or mathematically trained students. To ensure that all students have the foundation necessary to be successful in this program, each incoming student, regardless of his or her background, must take two introductory courses in programming and mathematics. The introductory courses are not counted as credit towards the degree, but are included in the student's cumulative GPA. The two introductory courses are Introduction to Programming for Data Science (DS 5010) and Introduction to Linear Algebra and Probability for Data Science (DS 5020)

If a student believes that he or she has sufficient academic or professional experience in these areas, they may opt to take two placement exams administered one week prior to the beginning of the semester. The two exams cover fundamentals of computer science

and programming skills and basic statistics, probability, and linear algebra. If a student scores a B or higher, he or she is waived out of the corresponding course.

## Learning Outcomes

Students who successfully complete the MS degree will be able to:

- Collect data from numerous sources (databases, files, XML, JSON, CSV, and Web APIs) and integrate them into a form in which the data is fit for analysis
- Use R and Python to explore data, produce summary statistics, perform statistical analyses; use standard data mining and machine-learning models for effective analysis
- Select, plan, and implement storage, search, and retrieval components of large-scale structure and unstructured repositories
- Retrieve data for analysis, which requires knowledge of standard retrieval mechanisms such as SQL and XPath, but also retrieval of unstructured information such as text, image, and a variety of alternate formats
- Manage, process, analyze, and visualize data at scale. This outcome allows students to handle data where the conventional information technology fail
- Match the methodological principles and limitations of machine learning and data mining methods to specific applied problems and communicate the applicability and the advantages/disadvantages of the methods in the specific problem to nondata experts
- Carry out the full data analysis workflow, including unsupervised class discovery, supervised class comparison, and supervised class prediction; Summarize, interpret, and communicate the analysis of results
- Organize visualization of data for analysis, understanding, and communication; choose appropriate visualization method for a given data type using effective design and human perception principle
- Develop methods for modeling, analyzing, and reasoning about data arising in one or more application domains such as social science, health informatics, web and social media, climate informatics, urban informatics, geographical information systems, business analytics, bioinformatics, complex networks, public health, and game design

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Students should refer to the course numbering table for graduate course leveling (p. 29).

## Core Requirements

A cumulative GPA of 3.000 or higher is required in the following core courses:

Code	Title	Hours
<b>Algorithms</b>		
Complete 4 semester hours from the following:		4
CS 5800	Algorithms	
EECE 7205	Fundamentals of Computer Engineering	
<b>Data Management and Processing</b>		
DS 5110	Introduction to Data Management and Processing	4
<b>Machine Learning and Data Mining</b>		
DS 5220	Supervised Machine Learning and Learning Theory	4

DS 5230	Unsupervised Machine Learning and Data Mining	4
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**Presentation and Visualization**

DS 5500	Information Visualization: Applications in Data Science	4
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**Electives**<sup>1</sup>

Code	Title	Hours
Complete 12 semester hours from the following:		12

**College of Computer and Information Science**

CS 5100	Foundations of Artificial Intelligence
CS 5200	Database Management Systems
CS 5340	Computer/Human Interaction
CS 5610	Web Development
CS 6120	Natural Language Processing
CS 6200	Information Retrieval
CS 6240	Large-Scale Parallel Data Processing
CS 6350	Empirical Research Methods
CS 6620	Fundamentals of Cloud Computing
CS 7180	Special Topics in Artificial Intelligence
CS 7280	Special Topics in Database Management

**College of Engineering**

CIVE 7100	Time Series and Geospatial Data Sciences
CIVE 7388	Special Topics in Civil Engineering
EECE 5639	Computer Vision
EECE 5640	High-Performance Computing
EECE 7337	Information Theory
EECE 7370	Advanced Computer Vision
EECE 7397	Advanced Machine Learning
IE 7280	Statistical Methods in Engineering

**College of Social Sciences and Humanities**

ECON 5140	Applied Econometrics
PPUA 5261	Dynamic Modeling for Environmental Decision Making
PPUA 5262	Big Data for Cities
PPUA 5263	Geographic Information Systems for Urban and Regional Policy
PPUA 5266	Urban Theory and Science
PPUA 7237	Advanced Spatial Analysis of Urban Systems
POLS 7200	Perspectives on Social Science Inquiry
POLS 7201	Research Design
POLS 7202	Quantitative Techniques

**D'Amore-McKim School of Business**

BUSN 6320	Business Analytics Fundamentals
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**College of Science**

PHYS 5116	Complex Networks and Applications
PHYS 7305	Statistical Physics
PHYS 7321	Computational Physics
PHYS 7331	Network Science Data

**Bouvé College of Health Sciences**

PHTH 5202	Introduction to Epidemiology
PHTH 5210	Biostatistics in Public Health

PHTH 6224	Social Epidemiology
<b>College of Arts, Media and Design</b>	
GSND 5110	Game Design and Analysis
GSND 6350	Data-Driven Player Modeling

**Program Credit/GPA Requirements**

32 total semester hours required  
Minimum 3.000 GPA required

<sup>1</sup> Students taking electives worth less than 4 credits (i.e., Bouvé, CSSH courses) should enroll for an accompanying data science project course in the same semester to bring the cumulative credits to 4. In order to earn this additional credit, students are expected to work with faculty to design an additional project in line with the curricular aims of their chosen elective and the data science core learning outcomes.

**Game Science and Design, MS**

The **Master of Science (MS) in Game Science and Design** is a program that seeks to give students a comprehensive understanding of how successful game products are created in a player-centric environment. Focusing on the science of game development, students have an opportunity to learn the design and technological skills needed to build a game and develop a deep understanding of playability and analytics that make products successful in an increasingly competitive marketplace.

The game industry has expanded to include social and mobile gaming; games in health, education, and training; and innovations in play psychology, middleware, graphics tools, game mechanics, game evaluation methods, and advanced artificial intelligence and narrative techniques. It has become an increasingly competitive space.

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

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

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

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Core Requirements**

Code	Title	Hours
<b>Foundations</b>		
GSND 5110 and GSND 5111	Game Design and Analysis and Seminar for GSND 5110	5
GSND 5122	Business Models in the Game Industry	1
<b>Research and Statistics</b>		

GSND 5130	Mixed Research Methods for Games	4
GSND 6330	Player Experience	4
<b>Thesis</b>		
GSND 7990	Thesis	4

### Restricted Electives

Code	Title	Hours
<b>Game Design or Development</b>		
Complete one from the following:		4
CS 5150	Game Artificial Intelligence	
CS 5850	Building Game Engines	
GSND 6240	Exploratory Concept Design	
GSND 6250	Spatial and Temporal Design	

### Research or Analytics

Complete one from the following:		4
CS 5340	Computer/Human Interaction	
GSND 6320	Psychology of Play	
GSND 6340	Biometrics for Design	
GSND 6350	Data-Driven Player Modeling	

### Electives

Note: Choose electives in consultation with your faculty advisor.

Code	Title	Hours
Complete two from the following:		8
<b>Game Design and Development</b>		
ARTG 5610	Design Systems	
ARTG 5640	Prototyping for Experience Design	
CS 5520	Mobile Application Development	
CS 5610	Web Development	
<b>User Research and Analytics</b>		
ARTG 5130	Visual Communication for Information Design	
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 6110	Information Design Theory and Critical Thinking	
ARTG 6310	Design for Behavior and Experience	
DA 5020	Collecting, Storing, and Retrieving Data	
DA 5030	Introduction to Data Mining/Machine Learning	
INSH 5302	Information Design and Visual Analytics	
JRNL 6341	Telling Your Story with Data	

### Program Credit/GPA Requirements

34 total semester hours required  
Minimum 3.000 GPA required

### Plan of Study

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

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
GSND 5110	4	Elective	4	Co-op (Optional)	0
GSND 5111	1	Elective	4		

GSND 5130	4			
	9		8	0
<b>Year 2</b>				
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>	
GSND 5122	1	General elective	4	
Elective	4	GSND 7990	4	
General elective	4			
	9		8	

Total Hours: 34

#### Sample Two Years, No Co-op Plan of Study

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
GSND 5110	4	Concentration elective	4	Vacation	0
GSND 5111	1	Concentration elective	4		
GSND 5130	4				
	9		8		0

Year 2					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
GSND 5122	1	General elective	4		
Concentration elective	4	GSND 7990	4		
General elective	4				
	9		8		

Total Hours: 34

### Health Data Analytics, MS

The digitization of healthcare systems in clinical settings, in combination with the explosion of personal data collection devices, provides the opportunity of using data for revolutionizing approaches to care at all levels with an emphasis on precision medicine and person-centered care. The ability to take advantage of this “Big Data” opportunity, however, requires expertise at the intersection of health informatics, data science, and computational modeling. The Master of Science in Health Data Analytics is designed to prepare students to succeed in this emerging field. This program offers a strong, competency-based curriculum that addresses data analytics ranging from data acquisition from traditional and emerging data streams, data aggregation methods, data mining algorithms, predictive computational modeling, and visualization techniques. Students can expect to amass a broad and deep understanding of the various methods, software tools, and topical expertise needed to discover meaningful patterns in health-related data and effectively communicate their implications to a number of diverse stakeholders. Successful graduates of the Master of Science in Health Data Analytics will be effective practitioners and leaders in the rapidly developing domain of data analytics with a focus on health and healthcare.

The interdisciplinary Master of Science in Health Data Analytics consists of 12 courses, drawn from the Khoury College of Computer Sciences and

the Bouvé College of Health Science; a capstone project; and an ongoing series of seminars on topics in health data analytics. Two tracks will be available to matriculating students: standard and research based.

### LEARNING OUTCOMES

- Proficiency in the health and healthcare ecosystem, including stakeholder roles such as payers, providers, and government; social determinants of health; wellness promotion; acute vs. chronic care
- Ability to acquire, store, and validate data; familiarity with common health-related data sources and formats
- Proficiency in analyzing data using statistical, epidemiological, and data-mining methods along with appropriate software tools and programming languages
- Ability to interpret and present analytical results to nontechnical stakeholders using visualization and accessible narrative structures

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirements

Code	Title	Hours
<b>Analytics/Modeling/Statistics</b>		
DA 5020	Collecting, Storing, and Retrieving Data	4
DA 5030	Introduction to Data Mining/Machine Learning	4
HINF 6400	Introduction to Health Data Analytics	3
INSH 5301	Introduction to Computational Statistics	4
INSH 5302	Information Design and Visual Analytics	4
<b>Healthcare</b>		
HINF 5102	Data Management in Healthcare	3
HINF 5105	The American Healthcare System	3
HINF 6500	Predictive Analytics and Modeling	3

#### Thesis/Capstone

Code	Title	Hours
Complete either Thesis or Capstone:		3
<i>Thesis</i>		
HINF 6400	Health Informatics Thesis	3
<i>Capstone</i>		
HINF 7701	Health Informatics Capstone Project	3

### Electives

At least one course must be chosen from the methods list.

Code	Title	Hours
<b>Methods</b>		
Complete 3–6 semester hours from the following:		3-6
PHTH 6202	Intermediate Epidemiology	
PHTH 6210	Applied Regression Analysis	
PHTH 6440	Advanced Methods in Biostatistics	
CS 6350	Empirical Research Methods	
CAEP 7712	Intermediate Statistical Data Analysis Techniques	
CAEP 7716	Advanced Research and Data Analyses	2

### Other Electives

Complete 0–4 semester hours from the following:		0-4
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 6320	Design of Information-Rich Environments	
HINF 5200	Theoretical Foundations in Personal Health Informatics	
HINF 5300	Personal Health Interface Design and Development	
HINF 6215	Project Management	
HINF 6220	Database Design, Access, Modeling, and Security	
PHTH 5226	Strategic Management and Leadership in Healthcare	
PHTH 5232	Evaluating Healthcare Quality	
PHTH 5234	Economic Perspectives on Health Policy	

### Program Credit/GPA Requirements

37 total semester hours required

Minimum 3.000 GPA required

## Robotics, MS

MS Robotics is a multidisciplinary Master of Science program offered by the College of Engineering (COE) and the Khoury College of Computer Sciences. The program is designed to provide students comprehensive training in algorithms, sensors, control systems, and mechanisms used in robotics.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirements

Code	Title	Hours
<b>Mechanical Engineering</b>		
Complete one of the following:		4
ME 5659	Control Systems Engineering	
ME 5250	Robot Mechanics and Control	
<b>Electrical and Computer Engineering</b>		
Complete one of the following:		4
EECE 5550	Mobile Robotics	
EECE 5554	Robotics Sensing and Navigation	
<b>Computer Science</b>		
Complete one of the following:		4
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5335	Robotic Science and Systems	

### Concentrations

Complete one of the following concentrations:

- Mechanical Engineering (p. 119)
- Electrical and Computer Engineering (p. 119)
- Computer Science (p. 119)

**MECHANICAL ENGINEERING**

Code	Title	Hours
<b>Required Course</b>		
Complete additional ME course not used to fulfill the core requirements:		4
ME 5659	Control Systems Engineering	
ME 5250	Robot Mechanics and Control	
<b>Options</b>		
Complete one of the following options:		16
<i>Course Work Option</i>		
Complete four of the following from the mechanical engineering course list. (p. 119)		
<i>Thesis Option</i>		
ME 7990	Thesis	
Complete two of the following from the mechanical engineering course list. (p. 119)		
<i>Project Option</i>		
ME 7945	Master's Project	
Complete three of the following from the mechanical engineering course list. (p. 119)		

**ELECTRICAL AND COMPUTER ENGINEERING**

Code	Title	Hours
<b>Required Course</b>		
Complete additional EECE course not used to fulfill the core requirements:		4
EECE 5698	Special Topics in Electrical and Computer Engineering	
EECE 5698	Special Topics in Electrical and Computer Engineering	
<b>Options</b>		
Complete one of the following options:		16
<i>Course Work Option</i>		
Complete four of the following from the electrical and computer engineering course list. (p. 119)		
<i>Thesis Option</i>		
EECE 7990	Thesis	
Complete two of the following from the electrical and computer engineering course list. (p. 119)		
<i>Project Option</i>		
EECE 7674	Master's Project	
Complete three of the following from the electrical and computer engineering course list. (p. 119)		

**COMPUTER SCIENCE**

Code	Title	Hours
<b>Required Course</b>		
Complete additional CS course not used to fulfill the core requirements:		4
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5335	Robotic Science and Systems	
<b>Options</b>		
Complete one of the following options:		16
<i>Course Work Option</i>		
Complete four of the following from the computer science course list. (p. 120)		

*Thesis Option*

CS 7990	Thesis (complete twice for a total of 8 credits)
Complete three of the following from the computer science course list. (p. 120)	

*Project Option*

CS 8674	Master's Project
Complete three of the following from the computer science course list. (p. 120)	

**Program Credit/GPA Requirements**

32 total semester hours required  
Minimum 3.000 GPA required

**Course Lists****MECHANICAL ENGINEERING COURSE LIST**

Code	Title	Hours
ME 5240	Computer Aided Design and Manufacturing	
ME 5245	Mechatronic Systems	
ME 5250	Robot Mechanics and Control	
ME 5655	Dynamics and Mechanical Vibration	
ME 5659	Control Systems Engineering	
ME 5665	Musculoskeletal Biomechanics	
ME 6200	Mathematical Methods for Mechanical Engineers 1	
ME 6201	Mathematical Methods for Mechanical Engineers 2	
ME 7210	Elasticity and Plasticity	
ME 7247	Advanced Control Engineering	
ME 7253	Advanced Vibrations	
IE 5630	Biosensor and Human Behavior Measurement	
IE 7280	Statistical Methods in Engineering	
IE 7315	Human Factors Engineering	

**ELECTRICAL AND COMPUTER ENGINEERING COURSE LIST**

Code	Title	Hours
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
EECE 5580	Classical Control Systems	
EECE 5639	Computer Vision	
EECE 5642	Data Visualization	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7150	Autonomous Field Robotics	
EECE 7263	Humanoid Robotics	
EECE 7323	Numerical Optimization Methods	
EECE 7337	Information Theory	
EECE 7370	Advanced Computer Vision	
EECE 7397	Advanced Machine Learning	

**COMPUTER SCIENCE COURSE LIST**

<b>Code</b>	<b>Title</b>	<b>Hours</b>
CS 5006	Algorithms	
CS 5100	Foundations of Artificial Intelligence	
CS 5320	Digital Image Processing	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 6110	Knowledge-Based Systems	
CS 6120	Natural Language Processing	
CS 6130	Affective Computing	
CS 6140	Machine Learning	
CS 6350	Empirical Research Methods	
CS 7140	Advanced Machine Learning	
CS 7170	Seminar in Artificial Intelligence	
DS 5220	Supervised Machine Learning and Learning Theory	

**Data Analytics, Graduate Certificate**

The interdisciplinary Graduate Certificate in Data Analytics is offered through a collaboration between the Khoury College of Computer Sciences and the College of Social Sciences and Humanities. The certificate curriculum emphasizes the skills needed to bridge between emerging technological capacities and traditional policymaking processes. The program is designed to provide students with foundational knowledge in data science—including data management, machine learning, data mining, statistics, and visualizing and communicating data—that can be applied to data-driven decision making in any discipline.

For more information on the certificate, refer to the program's website (<http://www.northeastern.edu/datascience/>).

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Core Requirements**

<b>Code</b>	<b>Title</b>	<b>Hours</b>
DA 5020	Collecting, Storing, and Retrieving Data	4
DA 5030	Introduction to Data Mining/Machine Learning	4
INSH 5301	Introduction to Computational Statistics	4
INSH 5302	Information Design and Visual Analytics	4

**Program Credit/GPA Requirements**

16 total semester hours required

Minimum 3.000 GPA required



# College of Engineering

Website (<http://www.coe.neu.edu/academics/graduate-school-engineering/>)

**Jacqueline Isaacs**, PhD, Interim Dean

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617.373.2711

The Graduate School of Engineering (GSE) offers research and professional degree programs organized around a core curriculum that equips students with a solid foundation for technical and leadership positions in industry organizations, government laboratories, research laboratories, and educational institutions. By involving students in many levels of research, encouraging collaboration across departments, and partnering with outside institutions and organizations globally, Northeastern engineering graduate students have the opportunity to gain a rich and experiential education in their chosen discipline.

Master of Science and doctoral degree programs are offered, as well as numerous graduate certificate programs that can be applied toward master's degree programs for lifelong learning. GSE offers traditional full-time day and part-time evening master's and doctoral degree programs and part-time evening certificate programs. Programs are offered in Boston and at regional campuses. A number of courses and degree programs are also available in a flexible online or hybrid format, which are well suited for distance learners. Innovative programs, such as interdisciplinary degrees, business/entrepreneurship pathways, and the Academic Link (AL) program for students without an undergraduate engineering degree (or who need additional preparatory course work), enable students to personalize their learning experience.

## Academic Policies and Procedures

- Course Registration (p. 121)
- Academic Standards and Degree Requirements (p. 122)
- Reenrollment Policy for Full-time Students (p. 123)

## Course Registration

### Overview

Students must follow the program requirements as published in this University Graduate Catalog (2012 and beyond), or the Graduate School of Engineering Student Guide and Catalog (prior to 2012), for the year in which they matriculate. Any change in the program requirements must be approved by the student's faculty advisor and/or the department and the Graduate School of Engineering. Additionally, students must complete any preparatory courses stipulated at the time of admission within the stated time frame.

Registration in classes is mandatory to maintain an active status with the university. Students must be registered in all courses for a given term prior to the university course add deadline. Students should not register for an excessive number of courses or for multiple sections of the same course with the intention of dropping half or more of the courses during the first week of classes.

Students must be registered in their last semester of study. Students finishing their requirements in the summer semester must be registered either in the full summer, summer 1, or summer 2 term.

Any student who is financially withdrawn by Student Accounts prior to the start of any given semester will not be permitted to register for that semester until he or she rectifies the outstanding financial obligation.

Due to last-minute scheduling changes, the Graduate School of Engineering must occasionally substitute faculty or change class schedules after the registration period has begun. Any student registered for the original course will automatically be registered for the updated section should no major schedule conflicts be apparent. Otherwise, the graduate school or the department will contact all affected students for alternatives.

Northeastern University reserves the right to cancel, postpone, combine, or modify any class.

### Attendance Policy

In each term, continuing students are expected to be on campus by the first day of classes and online students are expected to log in and stay attentive starting from the first class of each term. Course instructors are not expected to make accommodations for students who arrive after the first day of classes. Students who do not attend their class during the first week of a semester risk being dropped from the course. Students should not expect that they will be added to a class after the university course add deadline.

### Course Selection

Full-time students (domestic and international) in the Graduate School of Engineering must register for classes on an ongoing basis and carry a minimum of 8 semester hours of course work per semester. Any student who is appointed to a stipended graduate assistantship (SGA) is considered full-time for the term(s) of appointment if enrolled for a minimum of 6 semester hours.

All graduate students who are registered for Dissertation, Dissertation Continuation, Thesis Continuation, PhD Candidacy Preparation, PhD Exam Preparation, or a zero-semester-hour Research course are considered full-time. Registration in these courses is restricted to students who qualify for registration in these courses.

The graduate school does not require part-time students to be enrolled for a certain minimum number of semester hours in any term. However, part-time students who are not enrolled for more than one term (excluding summer terms) should take a leave of absence from the university to maintain active student status to keep their student account active.

The maximum number of semester hours approved for a student in each term varies by the degree program. However, a student can petition his or her faculty advisor to request permission to register for more than the allowed maximum number of semester hours for a given term. Normally, no more than 9 semester hours (inclusive of transfer credits and advanced standing for MS programs) may be taken outside the College of Engineering.

Students should formulate a program of study in consultation with their assigned faculty advisor at the beginning of their program, during fall or spring orientation. Students should preselect courses whenever possible

and plan to take them when offered, maintaining flexibility with alternate courses in mind. Courses other than the required courses are offered based on demand and are subject to faculty availability. Not all courses are offered every year; however, the graduate school will do everything possible to assure continuity of programs and permit students to make continuous progress toward earning their degrees.

Students who need assistance with course selection, course sequencing, waivers, and/or transfer credits should contact their academic advisor in the Graduate School of Engineering.

### **Dissertation and Dissertation Continuation**

Once program requirements are met for the PhD candidacy, PhD candidates must register for two consecutive semesters (may include the summer term) of Dissertation (XXXX 9990). Candidates must then register for Dissertation Continuation in each subsequent semester (excluding the summer term) until the dissertation is complete and approved by the Graduate School of Engineering. Students completing their dissertation in the summer term must register for Dissertation Continuation. There is a 1-credit-hour tuition charge for Dissertation Continuation.

The Graduate School of Engineering will correct registration errors. Corrections may generate a new tuition bill.

### **MS Thesis and Thesis Continuation**

Master's degree students who are completing a thesis must register for a total of 8 semester hours of Thesis. Students who have not completed their thesis but have already registered for the required number of thesis hours, and have no remaining course work to complete the degree, may register for Thesis Continuation in their last semester (including summer term) to maintain full-time status. There is a 1-credit-hour tuition charge for Thesis Continuation. Thesis Continuation may be taken only once.

The Graduate School of Engineering will correct registration errors. Corrections may generate a new tuition bill.

### **Petitions**

Petitions are required in all cases where a student is requesting a change or exception to their current program or student status for the Graduate School of Engineering to maintain a complete and accurate record for all students. All petitions, unless otherwise noted, must be formally made on a Graduate School of Engineering petition form and approved by a student's faculty advisor, department graduate program director (if applicable), and by the Graduate School of Engineering. Other approvals may be required as stipulated by the graduate school upon petition review. Students should refer to the Graduate School of Engineering (<http://www.coe.neu.edu/academics/graduate-school-engineering/>) website for specific instructions on each petition type.

### **Prerequisite Courses/Undergraduate Courses**

Students are not awarded credit toward graduate degree requirements for prerequisite courses unless expressly stated by the student's academic department. Students may occasionally be permitted by their advisor to take undergraduate courses. However, undergraduate courses do not count toward a graduate degree and may affect a student's eligibility to receive federal financial aid. Undergraduate courses do not count toward the graduate-level course load requirement for full-time students.

## **Academic Standards and Degree Requirements**

### **Academic Requirements**

In order to earn a degree in the graduate program in which a student is enrolled, a student must complete all program and departmental requirements in a satisfactory manner.

A student must attain a cumulative grade-point average (GPA) of 3.000 or higher with no more than 8 semester hours below the grade of B- in all courses applied toward that degree and exclusive of any prerequisite courses required of students admitted provisionally to their program. A student must also earn a grade of C or higher in all required core courses. Please note that individual programs may have additional requirements.

### **Academic Probation (Full-Time Students)**

#### **STUDENT'S ACADEMIC STANDING**

Academic standing at Northeastern University is determined by a student's cumulative 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.

#### **ACADEMIC PROBATION POLICY**

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. Academic probation is a period of time when a student must address and remediate academic deficiencies.

A student placed on academic probation will receive a written notification by the Graduate School of Engineering (hereafter referred to as the graduate school) and it will also be noted on the student's unofficial transcript. The student's faculty 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 faculty advisor. It is the student's responsibility to complete an action plan (with input from the faculty advisor) that documents how the deficiency will be remediated. This action plan must be signed by the faculty advisor and the student, and a copy must be submitted to the graduate school as soon as possible and no later than the add deadline of the next academic term of enrollment. If the action plan is not received by this deadline, the graduate school will place a hold on the student's account. The graduate school reserves the right to reject or change the action plan.

#### **DISMISSAL FROM PROGRAM**

A student placed on academic probation for a cumulative GPA of less than 3.000 will have one academic term to raise the cumulative GPA greater than or equal to 3.000. Students whose cumulative GPA is below 3.000 for **two consecutive** terms in which they took courses for credit (excluding (ENCP 6000) or (ENCP 6100), if taken) will automatically be dismissed from their degree program at the end of the second term. Students in this situation may submit an academic dismissal appeal form to the graduate school to request a final one-term extension. The appeal will be reviewed by the student's department. If no appeal is submitted, the dismissal decision is upheld.

Students whose cumulative GPA is below 3.000 for **three consecutive** terms will automatically be dismissed from their degree program. In this case, the student may submit an appeal to the associate dean of the graduate school per the graduate appeals process.

Students dismissed from their program will receive a written notification from the Graduate School of Engineering.

## Academic Probation and Dismissal (Part-Time Students)

Students in official part-time status with the university are considered on academic probation if the cumulative GPA is below 3.000 after completion of 8 semester hours. Part-time students must raise the cumulative GPA to 3.000 or higher after completion of 8 additional semester hours to regain good academic standing status.

An academic probation action plan to clear the deficiency must be developed by the student and the student's faculty advisor. It is the student's responsibility to complete an action plan (with input from the faculty advisor) that documents how the deficiency will be remediated. This action plan must be signed by the faculty advisor and the student, and a copy must be submitted to the graduate school as soon as possible and no later than the add deadline of the next academic term of enrollment. If the action plan is not received by this deadline, the graduate school will place a hold on the student's account. The graduate school reserves the right to reject or change the action plan.

If the student's cumulative GPA remains below 3.000 after completion of 16 semester hours, the student will be dismissed from the degree program. Students in this situation may submit an academic dismissal appeal form to the graduate school to request an additional final 8 semester hours to raise the cumulative GPA to 3.000 or higher. The appeal will be reviewed by the student's department.

Students whose cumulative GPA is below a 3.000 after completion of 24 semester hours will automatically be dismissed from their degree program. In this case, the student may submit an appeal to the associate dean of the graduate school per the graduate appeals process.

Students dismissed from their program will receive a written notification from the Graduate School of Engineering.

## Graduate Appeals Process

To initiate an appeal, a student may submit a written request to the associate dean responsible for the Graduate School of Engineering (or other dean of engineering designee providing oversight of the graduate school) detailing the reasons for the appeal of the academic dismissal decision, grade, reentry after graduate student academic dismissal, or other academic dispute involving graduate students that cannot be resolved by the academic unit with which the student is affiliated. This request should include relevant facts related to the case and any supporting documentation and shall be submitted at least three business days prior to the committee meeting in which the appeal is to be considered.

The student shall be offered the opportunity to meet with the committee to make a statement, present relevant facts of the case, and respond to clarifying questions the committee may have regarding the case. The chair of the committee reserves the right to end this meeting after 10 minutes if no further relevant facts are forthcoming.

Upon approval of the committee's decision by the associate dean (or their designee), the decision shall be binding unless the student chooses to continue the appeal process beyond the college level.

## Course Repeat/Course Substitution Policy for Students on Academic Probation

The Graduate School of Engineering allows students to repeat (or substitute) a total of up to 8 semester hours of course work beyond stated minimum degree requirements in order to attain the required cumulative 3.000 GPA for good academic standing.

### COURSE REPEAT

When the appropriate course is available, courses may be repeated once in order to earn a better grade. In all cases, the most recent grade earned in a course is the one used in calculating the overall GPA; however, previous grades remain on the transcript with a note that the grade is "excluded." This means that the course is excluded from the GPA and earned credit calculation. Students must obtain approval from their academic advisor and the Graduate School of Engineering prior to repeating a course. Students are required to pay normal tuition charges for all repeated course work.

Within the above limitations for extra or repeated courses, a student must repeat any required core course in which he or she earns a grade below C. Individual programs may have additional requirements.

### COURSE SUBSTITUTION

In cases where repeating a course is not possible, a student may petition to substitute one course for another they have already taken, as long as the course content is significantly similar and is not a core required course.

The student's department and graduate school in conjunction with the Office of the University Registrar must approve of the substitution. If approved, the grade in the new course taken will be included in the GPA calculation, and the first course taken will remain on the transcript with a note that the grade is "excluded" from the GPA and earned credit calculation. Students are required to pay normal tuition charges for all substituted course work.

**Course substitution is not an option for students in good academic standing.**

## Course Repeat Policy for Students in Good Academic Standing

Students who are in good academic standing may repeat up to 8 semester hours of course work in order to earn a better grade. A course may only be repeated once.

In all cases, the most recent grade earned in a course is the one used in calculating the overall GPA; however, previous grades remain on the transcript with a note that the grade is "excluded." This means that the course is excluded from the GPA and earned credit calculation. Students must obtain approval from their department and the Graduate School of Engineering prior to repeating a course. Students are required to pay normal tuition charges for all repeated course work.

## Online and Video Streaming Examination Policy

Students who are enrolled in online and video-streaming sections may be required to have their exams proctored. If a proctor is required, it is the student's responsibility to find a proctor and then have the proctor approved by the Graduate School of Engineering. Students must make arrangements for an exam proctor following the proctor application guidelines. The Graduate School of Engineering reserves the right to reject any proctor application if the guidelines are not followed.

## Pass/Fail Grading Policy

The Graduate School of Engineering does not allow College of Engineering (COE) graduate students to elect a pass/fail grading scheme for courses normally letter graded.

## Reenrollment Policy for Full-time Students

Students who enroll and complete at least one graduate engineering course can apply to their academic department to take an official leave of

absence from the time they complete said course(s) and be automatically readmitted without department review. Automatic readmission applies only to the original program and concentration (if applicable), and only for students who took an official approved leave of absence. Catalog year of entry does not change and students must complete the curriculum requirements outlined in the *University Graduate Catalog* for their original academic year of admission.

If a student without official leave of absence approval does not enroll in classes for two consecutive fall/spring semesters, they will be declared inactive. To return from inactive status, a student must submit an updated application to refresh their student record, and this application will be approved provided the student was in good standing at the time their absence started.

If a student without official leave of absence approval does not enroll in classes for three consecutive fall/spring semesters, or does not indicate their intent in writing to the Graduate School of Engineering by the end of the third consecutive semester, they will be withdrawn from the program. In the case of withdrawal, a student will be required to submit a new admission application for graduate studies without guarantee of readmission. If the student is admitted after being withdrawn, they will be admitted into the current catalog year and must meet the curriculum requirements in the current *University Graduate Catalog*.

In cases where the student has seven or more years of nonenrollment, the student's previous course work completed at the university will first undergo departmental review for technical content and relevance to current degree, followed by institutional review mapping courses completed to the current degree program requirements. The institutional review will determine how many credits, if any, completed more than seven years prior will be applied to the current degree.

## Bioengineering

Website (<http://www.bioe.neu.edu>)

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The Department of Bioengineering is driven by the conviction that the interface of engineering and medicine will be one of the great intellectual adventures of the 21st century. To prepare students for this adventure, the department strives to create an atmosphere of innovation and creativity that fosters excellence in instruction and research and provides a foundation for programs that drive forward the cutting edge of knowledge while establishing translational collaborations with clinical and industrial researchers.

Bioengineering is a relatively new field built on the recognition that engineering of biological systems or systems that interface with living systems requires a multidisciplinary approach that takes into account the mechanical, electrical, chemical, and materials properties of the biological system. Students with backgrounds from biochemistry to computer science and many fields in between are attracted to bioengineering as a field with the potential to make a great impact on human health. The MS and PhD programs are designed to integrate students with very different backgrounds and provide them with the course work and research experience that will take advantage of their unique backgrounds and, where appropriate, fill in gaps in their backgrounds to help them grow into a more broadly informed student.

Recognizing the breadth of disciplines that contribute to bioengineering projects, the MS program allows students to choose one of four concentrations (bioimaging and signal processing, cell and tissue engineering, biomechanics, or biomedical devices) to develop deep expertise in an area of particular interest and encourages individual research through a one-semester master's project or two-semester master's thesis.

The PhD program spans four core research areas for which the department has particular strengths: imaging, instrumentation and signal processing; biomechanics, biotransport, and mechanobiology; molecular, cell, and tissue engineering; and computational and systems biology. Course work is designed to strengthen student backgrounds in those areas most relevant to the interests of each student.

## Mission of the Department

The mission of the Department of Bioengineering is the education of students in the fundamental principles and practice of bioengineering and, through basic and applied research, the creation of new knowledge at the interface of engineering and medicine to support development of new technologies for improvement of human health and healthcare.

## Overview of Programs Offered

The Department of Bioengineering offers a Master of Science (MS) and a Doctor of Philosophy (PhD) in Bioengineering. The MS and PhD degree programs are only offered as full-time programs.

Candidates pursuing an MS or PhD are able to select thesis topics from a diverse range of faculty research. New graduate students may learn about ongoing research topics from individual faculty members, faculty websites, and bioengineering seminars.

## Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 230).

### GORDON INSTITUTE OF ENGINEERING LEADERSHIP OPTION

Students have the opportunity to pursue the Gordon Engineering Leadership Program (p. 224) in combination with the MS degree.

## Programs

### Doctor of Philosophy (PhD)

- Bioengineering (p. 125)
- Bioengineering—Advanced Entry (p. 128)

### Master of Science in Bioengineering (MSBioE)

- Bioengineering (p. 129)

## Bioengineering, PhD

The interdisciplinary Bioengineering Doctor of Philosophy program reflects departmental research strengths in multiple areas. Students accepted to the bioengineering program will undertake a rigorous core curriculum in basic bioengineering science, followed by a flexible selection of electives tailored to their dissertation research. There are four key areas of research strength in our department.

Area 1—Imaging, Instrumentation, and Signal Processing

Area 2—Biomechanics, Biotransport, and Mechanobiology

Area 3—Molecular, Cell, and Tissue Engineering

Area 4—Computational and Systems Biology

Biology can inspire engineering. Increasingly, discoveries in the life sciences reveal processes, complexity, and control without analogy in the world of traditional engineering. Current methods of producing nanoscale control over molecules cannot reproduce the organization found in even the simplest organisms. Energy capture, robust control, remediation, and self-assembly are all employed by biosystems with efficiency unparalleled by anything in today's laboratories. At the same time, traditional engineering disciplines struggle to find new approaches to the complex challenges of 21st-century technology. The last 50 years of basic life science research have gradually revealed the layers of complexity intrinsic to biological processes, unmasking the fundamental underpinnings on which biological systems are constructed. Bioinspired engineering has the potential to transform the technological landscape of the 21st century. Astonishingly, it represents merely one of the myriad opportunities presented at the interface of biology and engineering.

The field of bioengineering is broad and includes all research at the interface of engineering and biology—this includes bioprocesses, environmental microbiology, biomaterials and tissue engineering, bioelectricity, biomechanics, biomedical and biological imaging, nanotechnology in medicine and the environment, and engineering design for human interfacing. At Northeastern, bioengineering PhD students have an opportunity to be trained to appreciate advances in bioengineering across a wide range of disciplines while they perform highly focused and cutting-edge bioengineering research with one of our faculty members.

### Degree Requirements

Completion of the PhD degree requires students to successfully complete the following requirements:

- **Curriculum:** The curriculum comprises a strong core of fundamental courses that is coupled with a flexible choice of restricted and unrestricted technical electives to provide depth in a particular field of study. The detailed course requirements are outlined below.
- **Qualifying exam (written and oral):** To qualify to continue in the PhD program, students must pass the bioengineering comprehensive qualifying examination in the most relevant of the four department research areas. Students will prepare a six-page written document that will be distributed to the committee no later than 14 calendar days before the oral examination. Details of the formal qualification exam procedure and timing are available in the bioengineering office and may be requested electronically from the graduate director. In addition, satisfactory research progress and satisfactory academic standing is required to pass the exam. The qualifying exam is normally taken in the fall semester of the student's second year. Students who fail the qualifying exam on the first attempt may retake

the exam once in the following spring semester. Students may not take the qualifying exam more than twice.

- **Qualifying exam committee:** The qualifying examination committee is composed of three members of the Department of Bioengineering faculty. At least two of three committee members will be from the student's research area. The student's primary research advisor may not sit on the qualifying exam committee.
- **PhD dissertation committee:** Students normally form their dissertation committee within two years of joining the PhD program. The dissertation committee is composed of a minimum of three members, two of whom must be core faculty from the Department of Bioengineering. The student's primary advisor will be a member of and chair the dissertation committee. This advisor must be a member of the core bioengineering faculty or a faculty member from another department who has an affiliation with the bioengineering department. Students are required to meet annually with their PhD dissertation committee to ensure satisfactory research progress.
- **Annual committee meetings and dissertation proposals:** PhD students must hold their first committee meeting no later than their third year. The first committee meeting requires the student to write a dissertation proposal in the form of an NIH-style R21 proposal research plan that will be distributed to their dissertation committee at least one week prior to the meeting. Thereafter, students are expected to hold annual progress updates with their committee. At the penultimate committee meeting (which must be held at least four months prior to the dissertation defense), the student will prepare and present a final proposal document to the committee. Successful defense of this proposal will allow the student to progress to the PhD dissertation defense.
- **PhD dissertation defense:** PhD candidates must satisfactorily complete and defend a dissertation describing original research in bioengineering in an open presentation to the Northeastern bioengineering community, followed by a closed meeting with their dissertation committee in which they are expected to defend their work and answer all relevant questions regarding that work, its significance, and its relationship to ongoing work across the broader research community.
- **Dissertation course requirements:** After achieving PhD candidacy by passing the qualifying exam, the doctoral candidate, in consultation with his or her research advisor, must register in two consecutive semesters (may include full summer term) for Dissertation (BIOE 9990). Upon completion of this sequence, the student must then register for Dissertation Continuation (BIOE 9996) in every semester (in each fall and spring term and also in the summer term if summer is the student's last semester) until the dissertation is completed. Students may not register for Dissertation Continuation (BIOE 9996) until they fulfill the two-semester sequence of Dissertation (BIOE 9990).

To meet the full-time registration requirement for PhD students who have completed the majority of their course work and not yet reached PhD candidacy, a zero-credit course, Exam Preparation—Doctoral (BIOE 8960 (<http://catalog.northeastern.edu/search/?P=BIOE%208960/>)), can be taken if needed to fulfill the full-time course registration requirement. Exam Preparation—Doctoral (BIOE 8960 (<http://catalog.northeastern.edu/search/?P=BIOE%208960/>)) is an individual instruction course, billed at 1 semester hour, and graded S or U. Exam Preparation—Doctoral (BIOE 8960 (<http://catalog.northeastern.edu/search/?P=BIOE%208960/>)) does not have any course content, and students must register in a section for which their research advisor is listed as the "instructor."

For students possessing a baccalaureate in a suitable quantitative or technical field, the required course distribution is shown in the table below.

Requirements	Credits
Required core courses	12
Restricted technical electives	8
Unrestricted technical electives	12
Advanced seminar (four semesters)	
Dissertation	
Minimum semester hours required	32

The core department research areas are as follows. More details, associated core, and affiliated faculty can be found on the bioengineering department website.

#### Area 1—Imaging, Instrumentation, and Signal Processing

The Imaging, Instrumentation, and Signal Processing track reflects Northeastern University's outstanding research profile in developing new technologies for visualizing biological processes and disease. Our department has active federally funded research spanning a broad spectrum of relevant areas in instrument design, contrast agent development, and advanced computational modeling and reconstruction methods. Example research centers include the Chemical Imaging of Living Systems Institute, the Translational Biophotonics Cluster, and the B-SPIRAL signal processing group.

#### Area 2—Biomechanics, Biotransport, and Mechanobiology

Motion, deformation, and flow of biological systems in response to applied loads elicit biological responses at the molecular and cellular levels that support the physiological function of tissues and organs and drive their adaptation and remodeling. To study these complex interactions, principles of solid, fluid, and transport mechanics must be combined with measures of biological function. The Biomechanics, Biotransport, and Mechanobiology track embraces this approach and leverages the strong expertise of Northeastern faculty attempting to tie applied loads to biological responses at multiple length and time scales.

#### Area 3—Molecular, Cell, and Tissue Engineering

Principles for engineering living cells and tissues are essential to address many of the most significant biomedical challenges facing our society today. These application areas include engineering biomaterials to coax and enable stem cells to form functional tissue or to heal damaged tissue; designing vehicles for delivering genes and therapeutics to reach specific target cells to treat a disease; and uncovering therapeutic strategies to curb pathological cell behaviors and tissue phenotypes. At a more fundamental level, the field is at the nascent stages of understanding how cells make decisions in complex microenvironments and how cells interact with each other and their surrounding environment to organize into complex three-dimensional tissues. Advances will require multiscale experimental, computational, and theoretical approaches spanning molecular-cellular-tissue levels and integration of molecular and physical mechanisms, including the role of mechanical forces.

#### Area 4—Computational and Systems Biology

We aim to understand the rules governing emergent systems-level behavior and to use these rules to rationally engineer biological systems. We make quantitative measurements, often at the single-cell level, to test different conceptual frameworks and discriminate among different classes of models. Our faculty are leaders in developing and applying both theoretical methods, e.g., control theory, and experimental methods,

e.g., single-cell proteomics by mass-spec, to biological systems. At the organ and tissue levels, 3D scans acquired through medical imaging methods (e.g., US, CT, MRI, etc.) may be used to reconstruct virtual models of targeted systems. Noninvasive measures of the physiological function can then inform numerical simulations to predict the behavior of biological systems over time, with the goal of estimating the progression toward pathological endpoints or to test the efficacy of targeted surgical procedures and pharmaceutical treatments (e.g., drug delivery).

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Milestones

Annual review  
 Qualifying examination (within two years of entry)  
 Dissertation committee  
 Area examination (dissertation prospectus/proposal)  
 Dissertation defense

### Core Requirements

Code	Title	Hours
<b>Seminar</b>		
BIOE 7390	Seminar (Register and complete four semesters)	0
<b>Required Core</b>		
BIOE 6100	Medical Physiology	4
BIOE 6200	Mathematical Methods in Bioengineering	4
BIOE 7000	Principles of Bioengineering	4
<b>Restricted Bioengineering Technical Electives</b>		
Complete 8 semester hours from the following:		8
BIOE 5235	Biomedical Imaging	
BIOE 5410	Molecular Bioengineering	
BIOE 5420	Cellular Engineering	
BIOE 5430	Principles and Applications of Tissue Engineering	
BIOE 5440	The Cell as a Machine	
BIOE 5630	Physiological Fluid Mechanics	
BIOE 5650	Multiscale Biomechanics	
BIOE 5656	Fields, Forces, and Flows in Biological Systems	
BIOE 5810	Design of Biomedical Instrumentation	
BIOE 5820	Biomaterials	
ME 5665	Musculoskeletal Biomechanics	
<b>Technical Electives</b>		
Complete 12 semester hours from the Elective Course List.		12

### Elective Course List

Code	Title	Hours
BIOE 5235	Biomedical Imaging	
BIOE 5250	Design, Manufacture, and Evaluation of Medical Devices	
BIOE 5320	Advanced Biomedical Measurements and Instrumentation	
BIOE 5410	Molecular Bioengineering	
BIOE 5420	Cellular Engineering	

BIOE 5430	Principles and Applications of Tissue Engineering	EECE 7205	Fundamentals of Computer Engineering
BIOE 5440	The Cell as a Machine	EECE 7211	Nonlinear Control
BIOE 5450	Stem Cell Engineering	EECE 7213	System Identification and Adaptive Control
BIOE 5630	Physiological Fluid Mechanics	EECE 7214	Optimal and Robust Control
BIOE 5640	Computational Biomechanics	EECE 7271	Computational Methods in Electromagnetics
BIOE 5648	Biomedical Optics	EECE 7310	Modern Signal Processing
BIOE 5650	Multiscale Biomechanics	EECE 7323	Numerical Optimization Methods
BIOE 5656	Fields, Forces, and Flows in Biological Systems	EECE 7337	Information Theory
BIOE 5810	Design of Biomedical Instrumentation	EECE 7352	Computer Architecture
BIOE 5820	Biomaterials	EECE 7353	VLSI Design
BIOE 7100	Special Topics in Biomedical Imaging and Signal Processing	EECE 7364	Mobile and Wireless Networking
BIOE 7200	Special Topics in Cell and Tissue Engineering	EECE 7368	High-Level Design of Hardware-Software Systems
BIOE 7300	Special Topics in Biomechanics	IE 7315	Human Factors Engineering
BIOL 5307	Biological Electron Microscopy	ME 5650	Advanced Mechanics of Materials
BIOL 5543	Stem Cells and Regeneration	ME 5655	Dynamics and Mechanical Vibration
BIOL 5601	Multidisciplinary Approaches in Motor Control	ME 5657	Finite Element Method
BIOL 6300	Biochemistry	ME 5659	Control Systems Engineering
BIOL 6301	Molecular Cell Biology	ME 5665	Musculoskeletal Biomechanics
BIOL 6401	Research Methods and Critical Analysis in Molecular Cell Biology	ME 6200	Mathematical Methods for Mechanical Engineers 1
CAEP 6202	Research, Evaluation, and Data Analysis	ME 6260	Introduction to Microelectromechanical Systems (MEMS)
CHEM 5612	Principles of Mass Spectrometry	ME 7210	Elasticity and Plasticity
CHEM 5620	Protein Chemistry	ME 7238	Advanced Finite Element Method
CHEM 5621	Principles of Chemical Biology for Chemists	ME 7245	Fracture Mechanics and Failure Analysis
CHEM 5638	Molecular Modeling	ME 7255	Continuum Mechanics
CHEM 5660	Analytical Biochemistry	ME 7275	Essentials of Fluid Dynamics
CHEM 7247	Advances in Nanomaterials	ME 7280	Statistical Thermodynamics
CHEM 7317	Analytical Biotechnology	NNMD 5470	Nano/Biomedical Commercialization: Concept to Market
CHME 5630	Biochemical Engineering	OR 6205	Deterministic Operations Research
CS 5100	Foundations of Artificial Intelligence	PHSC 5100	Concepts in Pharmaceutical Science
CS 5200	Database Management Systems	PHSC 6210	Drug Design, Evaluation, and Development
CS 5310	Computer Graphics	PHSC 6218	Biomedical Chemical Analysis
CS 5330	Pattern Recognition and Computer Vision	PHSC 6290	Biophysical Methods in Drug Discovery
CS 5335	Robotic Science and Systems	PHYS 7301	Classical Mechanics/Math Methods
CS 5400	Principles of Programming Language	PHYS 7321	Computational Physics
CS 5600	Computer Systems	PHYS 7741	Biological Physics 2
CS 5800	Algorithms	PMST 6250	Advanced Physical Pharmacy
CS 6140	Machine Learning	PMST 6252	Pharmacokinetics and Drug Metabolism
CS 6200	Information Retrieval	PMST 6254	Advanced Drug Delivery System
CS 6410	Compilers	PT 5138	Neuroscience
EECE 5606	Micro- and Nanofabrication	PT 5139	Lab for PT 5138
EECE 5642	Data Visualization	PT 5150	Motor Control, Development, and Learning
EECE 7200	Linear Systems Analysis	PT 5151	Lab for PT 5150
EECE 7202	Electromagnetic Theory 1	SLPA 5111	Anatomy and Physiology of the Auditory System
EECE 7203	Complex Variable Theory and Differential Equations	SLPA 6301	Speech Science
EECE 7204	Applied Probability and Stochastic Processes		

## Dissertation

Code	Title	Hours
BIOE 9990	Dissertation	

Complete the following (repeatable) course twice:

## Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

### Bioengineering, PhD—Advanced Entry

The interdisciplinary Bioengineering Doctor of Philosophy program reflects departmental research strengths in multiple areas. Students accepted to the bioengineering program will undertake a rigorous core curriculum in basic bioengineering science, followed by a flexible selection of electives tailored to their dissertation research. There are four key areas of research strength in our department:

Area 1—Imaging, Instrumentation, and Signal Processing

Area 2—Biomechanics, Biotransport, and Mechanobiology

Area 3—Molecular, Cell, and Tissue Engineering

Area 4—Computational and Systems Biology

Biology can inspire engineering. Increasingly, discoveries in the life sciences reveal processes, complexity, and control without analogy in the world of traditional engineering. Current methods of producing nanoscale control over molecules cannot reproduce the organization found in even the simplest organisms. Energy capture, robust control, remediation, and self-assembly are all employed by biosystems with efficiency unparalleled by anything in today's laboratories. At the same time, traditional engineering disciplines struggle to find new approaches to the complex challenges of 21st-century technology. The last 50 years of basic life science research have gradually revealed the layers of complexity intrinsic to biological processes, unmasking the fundamental underpinnings on which biological systems are constructed. Bioinspired engineering has the potential to transform the technological landscape of the 21st century. Astonishingly, it represents merely one of the myriad opportunities presented at the interface of biology and engineering.

The field of bioengineering is broad and includes all research at the interface of engineering and biology—this includes bioprocesses, environmental microbiology, biomaterials and tissue engineering, bioelectricity, biomechanics, biomedical and biological imaging, nanotechnology in medicine and the environment, and engineering design for human interfacing. At Northeastern, bioengineering PhD students have an opportunity to be trained to appreciate advances in bioengineering across a wide range of disciplines while they perform highly focused and cutting-edge bioengineering research with one of our faculty members.

## Degree Requirements

Completion of the PhD degree requires students to successfully complete the following requirements:

- **Curriculum:** The curriculum comprises a strong core of fundamental courses that is coupled with a flexible choice of restricted and unrestricted technical electives to provide depth in a particular field of study. The detailed course requirements are outlined below.
- **Qualifying exam (written and oral):** To qualify to continue in the PhD program, students must pass the bioengineering comprehensive qualifying examination in the most relevant of the four department

research areas. Students will prepare a six-page written document that will be distributed to the committee no later 14 calendar days before the oral examination. Details of the formal qualification exam procedure and timing are available in the bioengineering office and may be requested electronically from the graduate director. In addition, satisfactory research progress and satisfactory academic standing are required to pass the exam. The qualifying exam is normally taken in the fall semester of the student's second year. Students who fail the qualifying exam on the first attempt may retake the exam once in the following spring semester. Students may not take the qualifying exam more than twice.

- **Qualifying exam committee:** The qualifying examination committee is composed of three members of the Department of Bioengineering faculty. At least two of three committee members will be from the student's research area. The student's primary research advisor may not sit on the qualifying exam committee.
- **PhD dissertation committee:** Students normally form their dissertation committee within two years of joining the PhD program. The dissertation committee is composed of a minimum of three members, two of whom must be core faculty from the Department of Bioengineering. The student's primary advisor will be a member of, and chair, the dissertation committee. This advisor must be a member of the core bioengineering faculty or a faculty member from another department who has an affiliation with the bioengineering department. Students are required to meet annually with their PhD dissertation committee to ensure satisfactory research progress.
- **Annual committee meetings and dissertation proposals:** PhD students must hold their first committee meeting no later than their third year. The first committee meeting requires the student to write a dissertation proposal in the form of an NIH-style R21 proposal research plan that will be distributed to their dissertation committee at least one week prior to the meeting. Thereafter, students are expected to hold annual progress updates with their committee. At the penultimate committee meeting (which must be held at least four months prior to the dissertation defense), the student will prepare and present a final proposal document to the committee. Successful defense of this proposal will allow the student to progress to the PhD dissertation defense.
- **PhD dissertation defense:** PhD candidates must satisfactorily complete and defend a dissertation describing original research in bioengineering in an open presentation to the Northeastern bioengineering community, followed by a closed meeting with their dissertation committee in which they are expected to defend their work and answer all relevant questions regarding that work, its significance, and its relationship to ongoing work across the broader research community.
- **Dissertation course requirements:** After achieving PhD candidacy by passing the qualifying exam, the doctoral candidate, in consultation with his or her research advisor, must register in two consecutive semesters (may include full summer term) for Dissertation (BIOE 9990). Upon completion of this sequence, the student must then register for Dissertation Continuation (BIOE 9996) in every semester (in each fall and spring term and also in the summer term if summer is the student's last semester) until the dissertation is completed. Students may not register for Dissertation Continuation (BIOE 9996) until they fulfill the two-semester sequence of Dissertation (BIOE 9990).

To meet the full-time registration requirement for PhD students who have completed the majority of their course work and not yet reached PhD candidacy, a zero-credit course, Exam Preparation—Doctoral (BIOE 8960), can be taken if needed to fulfill the full-time course registration requirement. Exam Preparation—Doctoral (BIOE 8960) is an



individual instruction course, billed at one semester hour, and graded S or U. Exam Preparation—Doctoral (BIOE 8960) does not have any course content, and students must register in a section for which their research advisor is listed as the “instructor.”

The curriculum for PhD students with advanced standing will be selected from the available core and elective courses under the guidance of the program director and the student’s primary advisor. The advanced standing PhD degree requires a minimum of 16 semester hours of course work to be approved by the graduate director and a completed PhD dissertation. Advanced standing constitutes receipt of a relevant and accepted master’s degree at a qualified institution.

Requirements	Credits
Advisor-approved course work	16
Advanced seminar (four semesters)	
Dissertation	
Minimum semester hours required	16

The core department research areas are as follows. More details, associated core, and affiliated faculty can be found on the bioengineering department website.

### Area 1—Imaging, Instrumentation, and Signal Processing

The imaging, instrumentation, and signal processing track reflects Northeastern University’s outstanding research profile in developing new technologies for visualizing biological processes and disease. Our department has active federally funded research spanning a broad spectrum of relevant areas in instrument design, contrast agent development, and advanced computational modeling and reconstruction methods. Example research centers include the Chemical Imaging of Living Systems Institute, the Translational Biophotonics Cluster, and the B-SPIRAL signal processing group.

### Area 2—Biomechanics, Biotransport, and Mechanobiology

Motion, deformation, and flow of biological systems in response to applied loads elicit biological responses at the molecular and cellular levels that support the physiological function of tissues and organs and drive their adaptation and remodeling. To study these complex interactions, principles of solid, fluid, and transport mechanics must be combined with measures of biological function. The biomechanics, biotransport, and mechanobiology track embraces this approach and leverages the strong expertise of Northeastern faculty attempting to tie applied loads to biological responses at multiple length and time scales.

### Area 3—Molecular, Cell, and Tissue Engineering

Principles for engineering living cells and tissues are essential to address many of the most significant biomedical challenges facing our society today. These application areas include engineering biomaterials to coax and enable stem cells to form functional tissue or to heal damaged tissue; designing vehicles for delivering genes and therapeutics to reach specific target cells to treat a disease; and uncovering therapeutic strategies to curb pathological cell behaviors and tissue phenotypes. At a more fundamental level, the field is at the nascent stages of understanding how cells make decisions in complex microenvironments and how cells interact with each other and their surrounding environment to organize into complex three-dimensional tissues. Advances will require multiscale experimental, computational, and theoretical approaches spanning molecular-cellular-tissue levels and integration of molecular and physical mechanisms, including the role of mechanical forces.

### Area 4—Computational and Systems Biology

We aim to understand the rules governing emergent systems-level behavior and to use these rules to rationally engineer biological systems. We make quantitative measurements, often at the single-cell level, to test different conceptual frameworks and discriminate among different classes of models. Our faculty are leaders in developing and applying both theoretical methods (e.g., control theory) and experimental methods (e.g., single-cell proteomics by mass-spec) to biological systems. At the organ and tissue levels, 3D scans acquired through medical imaging methods (e.g., US, CT, MRI, etc.) may be used to reconstruct virtual models of targeted systems. Noninvasive measures of the physiological function can then inform numerical simulations to predict the behavior of biological systems over time, with the goal of estimating the progression toward pathological endpoints or to test the efficacy of targeted surgical procedures and pharmaceutical treatments (e.g., drug delivery).

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Milestones

Annual review  
 Qualifying examination (within two years of entry)  
 Dissertation committee  
 Area examination (dissertation prospectus/proposal)  
 Dissertation defense

#### Core Requirements

Code	Title	Hours
<b>Seminar</b>		
BIOE 7390	Seminar (Register and complete four semesters)	0

#### Approved Course Work

Select courses in consultation with faculty advisor.	16
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#### Dissertation

Code	Title	Hours
Complete the following (repeatable) course twice:		
BIOE 9990	Dissertation	

#### Program Credit/GPA Requirements

16 total semester hours required  
 Minimum 3.000 GPA required

### Bioengineering, MSBioE

Students accepted to the Master of Science in Bioengineering program have three concentrations from which to choose:

- Concentration 1: Biomedical Devices and Bioimaging
- Concentration 2: Cell and Tissue Engineering
- Concentration 3: Biomechanics

#### Concentrations

A concentration is required. Each concentration has between two and three required courses and a list of technical electives. Students should select two to five courses, depending on the concentration and whether he or she selects the thesis option, project option, or course-only option (please consult the detailed requirements for each concentration).

**CONCENTRATION IN BIOMEDICAL DEVICES AND BIOIMAGING**

The biomedical devices and bioimaging concentration is appropriate for students interested in the design of biomedical devices, as well as biomedical imaging and signal processing. Three courses are required for all students in this concentration, Design of Biomedical Instrumentation (BIOE 5810), Design, Manufacture, and Evaluation of Medical Devices (BIOE 5250), and Biomedical Imaging (BIOE 5235).

**CONCENTRATION IN CELL AND TISSUE ENGINEERING**

The cell and tissue engineering concentration is appropriate for students interested in molecular, cell, and tissue engineering. Two courses Molecular Bioengineering (BIOE 5410) and Cellular Engineering (BIOE 5420) are required of all cell and tissue engineering students. There is an extensive list of approved technical electives to choose from to complete the degree.

**CONCENTRATION IN BIOMECHANICS**

Students who join the biomechanics concentration will cover multiscale mechanics, including whole-body movement, mechanical properties of biomaterials, and fluid mechanics of physiological fluids. The two courses required of all biomechanics concentration students are Multiscale Biomechanics (BIOE 5650) and Musculoskeletal Biomechanics (ME 5665).

**Graduate Certificate Options**

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 230).

**GORDON INSTITUTE OF ENGINEERING LEADERSHIP****Master's Degree in Bioengineering with Graduate Certificate in Engineering Leadership**

Students may complete a Master of Science in Bioengineering in addition to earning a Graduate Certificate in Engineering Leadership. Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour-curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 33-semester-hour degree and certificate will require 17 hours of advisor-approved bioengineering technical courses.

Engineering Leadership (p. 225)

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated. Note: This major requires a concentration: biomedical devices and bioimaging, cell and tissue engineering, or biomechanics. Consult your college administrator.

**Core Requirements**

Code	Title	Hours
<b>Seminar</b>		
BIOE 7390	Seminar <sup>1</sup>	0
<b>Required Core</b>		
A grade of C or higher is required in each course:		
BIOE 6100	Medical Physiology	4
BIOE 6000	Principles of Bioengineering <sup>1</sup>	1

**Concentrations**

Complete one of the following three concentrations:

- Biomedical Devices and Bioimaging (p. )
- Cell and Tissue Engineering (p. )
- Biomechanics (p. 131)

**BIOMEDICAL DEVICES AND BIOIMAGING**

Code	Title	Hours
<b>Required Course Work</b>		
A grade of C or higher is required.		
BIOE 5235	Biomedical Imaging	4
BIOE 5250	Design, Manufacture, and Evaluation of Medical Devices	4
BIOE 5810	Design of Biomedical Instrumentation	4
<b>Course Work Option</b>		
Complete 16 semester hours from the course list.		16
<b>Project Option</b>		
BIOE 7890	Master's Project	4
Complete 12 semester hours from the course list.		12
<b>Thesis Option</b>		
Complete the following (repeatable) course twice:		8
BIOE 7990	Thesis	
Complete 8 semester hours from the course list.		8
<b>Course List</b>		
BIOE 5115	Dynamical Systems in Biological Engineering	
BIOE 5320	Advanced Biomedical Measurements and Instrumentation	
BIOE 5648	Biomedical Optics	
BIOE 5820	Biomaterials	
BIOE 5850	Design of Implants	
BIOE 7100	Special Topics in Biomedical Imaging and Signal Processing	
BIOE 7400	Special Topics in Biomedical Devices	
EECE 5606	Micro- and Nanofabrication	
EECE 7105	Optics for Engineers	
EECE 7200	Linear Systems Analysis	
EECE 7203	Complex Variable Theory and Differential Equations	
EECE 7204	Applied Probability and Stochastic Processes	
ME 5657	Finite Element Method	
NNMD 5370	Nanomedicine Research Techniques	

**CELL AND TISSUE ENGINEERING**

Code	Title	Hours
<b>Required Course Work</b>		
A grade of C or higher is required.		
BIOE 5410	Molecular Bioengineering	4
BIOE 5420	Cellular Engineering	4
<b>Course Work Option</b>		
Complete 19-20 semester hours from the course list.		19-20
<b>Project Option</b>		
BIOE 7890	Master's Project	4
Complete 15-16 semester hours from the course list.		15-16
<b>Thesis Option</b>		
Complete the following (repeatable) course twice:		8
BIOE 7990	Thesis	

Complete 11-12 semester hours from the course list. 11-12

#### Course List

BIOE 5115	Dynamical Systems in Biological Engineering
BIOE 5250	Design, Manufacture, and Evaluation of Medical Devices
BIOE 5430	Principles and Applications of Tissue Engineering
BIOE 5440	The Cell as a Machine
BIOE 5450	Stem Cell Engineering
BIOE 5820	Biomaterials
BIOL 5543	Stem Cells and Regeneration
BIOL 6301	Molecular Cell Biology
NNMD 5370	Nanomedicine Research Techniques
NNMD 5470	Nano/Biomedical Commercialization: Concept to Market

#### BIOMECHANICS

Code	Title	Hours
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##### Required Course Work

A grade of C or higher is required.

ME 5665	Musculoskeletal Biomechanics	4
BIOE 5650	Multiscale Biomechanics	4

##### Course Work Option

Complete 20 semester hours from the course list. 20

##### Project Option

BIOE 7890	Master's Project	4
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Complete 16 semester hours from the course list. 16

##### Thesis Option

Complete the following (repeatable) course twice: 8

BIOE 7990	Thesis	8
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Complete 12 semester hours from the course list. 12

#### Course List

BIOE 5115	Dynamical Systems in Biological Engineering
BIOE 5440	The Cell as a Machine
BIOE 5630	Physiological Fluid Mechanics
BIOE 5820	Biomaterials
BIOE 7300	Special Topics in Biomechanics
BIOL 5601	Multidisciplinary Approaches in Motor Control
EECE 7200	Linear Systems Analysis
EECE 7203	Complex Variable Theory and Differential Equations
ME 5650	Advanced Mechanics of Materials
ME 5655	Dynamics and Mechanical Vibration
ME 5657	Finite Element Method
ME 5659	Control Systems Engineering
ME 7210	Elasticity and Plasticity
ME 7238	Advanced Finite Element Method
ME 7245	Fracture Mechanics and Failure Analysis
ME 7255	Continuum Mechanics

#### PROGRAM CREDIT/GPA REQUIREMENTS

32 total semester hours required

Minimum 3.000 GPA required

<sup>1</sup> Seminar and Principles of Bioengineering are not required for students in the BSMS or PlusOne Bioengineering programs.

### Chemical Engineering

Website (<http://www.che.neu.edu>)

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617.373.2989

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The department offers a Master of Science and a Doctor of Philosophy in Chemical Engineering. The MS degree is offered as either a thesis MS or a course work (nonthesis) MS degree. Most courses are in the late afternoon or early evening to make them accessible to part-time students with full-time industrial careers. A full-time MS student may apply for participation in the cooperative (co-op) education plan. MS students pursuing the thesis MS option should first gain the consent of their advisors prior to participating in the co-op plan. The course work MS may be taken part-time, but the thesis MS and PhD degrees are only offered as a full-time program. Any deviations from the curriculum must be addressed by petition to the graduate committee and will be considered on a case-by-case basis.

Candidates pursuing a thesis MS or a PhD degree can select thesis topics from a diverse range of faculty research interests. New graduate students can learn about ongoing research from individual faculty members, faculty websites, and graduate student seminars. Graduate student seminars are held on a regular basis and provide an interactive forum for learning and exchanging research ideas.

#### Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 230).

#### GORDON INSTITUTE OF ENGINEERING LEADERSHIP OPTION

Students have the opportunity to pursue the Gordon Engineering Leadership Program (p. 224) in combination with the MS degree.

#### Programs

##### Doctor of Philosophy (PhD)

- Chemical Engineering (p. 132)
- Chemical Engineering—Advanced Entry (p. 133)

##### Master of Science in Chemical Engineering (MSCHE)

- Chemical Engineering (p. 135)

##### Graduate Certificate

- Process Safety Engineering (p. 137)

## Chemical Engineering, PhD

Each student admitted to the PhD program in chemical engineering will initially be designated a doctoral student. Upon successful completion of the requirements for doctoral candidacy as described below, a student is reclassified as a doctoral candidate. After establishing candidacy, a student must complete a program of academic course work and a dissertation under the direction of a dissertation advisor. All doctoral candidates must also pass a final oral examination.

### Qualifying for Doctoral Candidacy

To qualify for doctoral candidacy, the student must demonstrate mastery of four core courses of chemical engineering (thermodynamics or statistical thermodynamics, kinetics, transport, and mathematics). To become a doctoral candidate, students must maintain a grade-point average (GPA) of 3.500 or above in the four core courses and have no individual grade below a B in the four core courses.

In addition, each student must complete 4 semester hours (SH) of research (Research (CHME 8984)) and demonstrate critical thinking, analysis, and experimental planning skills related to their dissertation research topic through a written candidacy proposal and an oral defense of this proposal, within a year of completing the four core courses. The student must pass, as determined by the student's dissertation committee, this oral candidacy proposal defense in order to advance to doctoral candidacy. The student earns the classification of doctoral candidate upon successful completion of these requirements.

### Course Requirements

A minimum of 32 SH of academic course work, **not including any independent study credits**, beyond the bachelor's degree is required. The 32 SH must include at least 24 SH of academic course work (exclusive of thesis or dissertation) taken at Northeastern University. All four of the core courses (see table under Program Requirements), the 4 SH of research, and the 4 SH of professional development courses must be included in the student's academic graduate 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, Candidacy Preparation—Doctoral (CHME 8960), can be taken if needed to fulfill full-time course registration. The course is an individual instruction course, billed at 1 SH, and graded S or U. There is no course content, and students must register in a section with their research or academic advisor as the "instructor."

After obtaining PhD candidacy, students are required to register for Dissertation (CHME 9990) for two consecutive semesters. This is then followed by registration for Dissertation Continuation (CHME 9996) in each semester thereafter until the dissertation has been completed and defended. **Note: No course credits are awarded for Dissertation (CHME 9990) or Dissertation Continuation (CHME 9996); however, a student is considered full-time if registered for either of these courses.**

All students pursuing a doctoral degree must enroll in the department's seminar course (CHME 7390) for each semester they are working toward their degree.

Students will be advised on their courses for the first semester by the associate chair for graduate studies. After the first semester, students will work with their dissertation 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 dissertation advisors should keep in mind that the university

residency requirement requires two semesters of academic studies after becoming a doctoral candidate.

### Language Requirement

There is no foreign language requirement for the PhD degree. However, each candidate must be proficient in technical writing and oral presentation in the English language. The graduate committee may require additional 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, they must complete a dissertation that embodies the results of extended original research and includes material suitable for publication. The student is responsible for proposing a dissertation committee to be approved by the dissertation advisor at least one month prior to the dissertation defense. The committee must have a minimum of four members, in addition to the primary advisor. The primary dissertation advisor and at least one other committee member must be faculty members in the Department of Chemical Engineering. Additionally, one of the committee members must be external to the Department of Chemical Engineering. Committee membership is not limited to faculty at Northeastern University, 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. The graduate school requirements for dissertation formatting and electronic submittal instructions can be found on the College of Engineering's webpage (<http://www.coe.neu.edu/student-services/dissertation/thesis-instructions/>). Students are responsible for contacting the Graduate School of Engineering for any updates to dissertation requirements and appropriate deadlines.

### Dissertation Defense and Final Oral Examination

This comprehensive examination includes the public dissertation defense as well as a final oral examination to include the subject matter of the doctoral dissertation and significant developments in the field of the dissertation work. The oral presentation will be open to the public, including students, faculty, and the student's committee.

### Departure Prior to Dissertation Completion

Occasionally, students have to leave the Department of Chemical Engineering prior to completion of all degree requirements. In such instances, a student cannot submit a dissertation for credit beyond three years after he or she stops actively pursuing the research. Exceptions may be granted upon petition to the departmental graduate committee. Petitions must demonstrate extenuating circumstances and prove that the research is still of value to the profession.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

Biannual review  
Dissertation committee  
Dissertation proposal  
Dissertation defense

## Core Requirements

A minimum of 32 semester hours of academic course work is required, plus 2 optional semester hours for cooperative education and mentoring in chemical engineering. Independent study credits do not count toward the 32 required semester hours.

Code	Title	Hours
<b>Core Courses</b>		
A cumulative 3.500 GPA is required for the four core classes:		
CHME 7320	Chemical Engineering Mathematics	4
CHME 7330	Chemical Engineering Thermodynamics (Statistical Thermodynamics may be taken in the place of Thermodynamics )	4
or CHME 7235	Introduction to Statistical Thermodynamics	
CHME 7340	Chemical Engineering Kinetics	4
CHME 7350	Transport Phenomena	4
<b>Research</b>		
CHME 8984	Research	4
<b>Professional Development</b>		
CHME 7391	Professional Development and Communication in Chemical Engineering 1	1
CHME 7392	Professional Development and Communication in Chemical Engineering 2	1
CHME 7393	Professional Development and Communication in Chemical Engineering 3	1
CHME 7394	Professional Development and Communication in Chemical Engineering 4	1

### Seminar

Complete the following (repeatable) course each semester:

CHME 7390	Seminar
Recommended but optional:	
ENCP 6100	Introduction to Cooperative Education
CHME 7395	Mentoring in Chemical Engineering

## Electives

Code	Title	Hours
Complete 8 semester hours. Consult your faculty advisor for acceptable courses:		
CHME 5101	Fundamentals of Chemical Engineering Analysis	8
CHME 5105	Materials Characterization Techniques	
CHME 5137	Computational Modeling in Chemical Engineering	
CHME 5160	Drug Delivery: Engineering Analysis	
CHME 5185	Design of Experiments and Ethical Research (DOEER)	
CHME 5510	Fundamentals in Process Safety Engineering	

CHME 5520	Process Safety Engineering—Chemical Reactivity, Reliefs, and Hazards Analysis
CHME 5621	Electrochemical Engineering
CHME 5630	Biochemical Engineering
CHME 5631	Biomaterials Principles and Applications
CHME 5632	Advanced Topics in Biomaterials
CHME 5683	Introduction to Polymer Science
CHME 5699	Special Topics in Chemical Engineering
CHME 6610	Computational Programs in Process Safety for Relief and Scenario Modeling
CHME 7235	Introduction to Statistical Thermodynamics
CHME 7240	Polymer Science
CHME 7260	Special Topics in Chemical Engineering
CHME 7262	Special Topics in Process Safety
CHME 7978	Independent Study
BIOE 5410	Molecular Bioengineering
EMGT 5220	Engineering Project Management
EMGT 6225	Economic Decision Making
EMGT 6305	Financial Management for Engineers
ENGR 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage
ME 5620	Fundamentals of Advanced Materials
NNMD 5270	Introduction to Nanomedicine
NNMD 5370	Nanomedicine Research Techniques
NNMD 5470	Nano/Biomedical Commercialization: Concept to Market

## Dissertation

Code	Title	Hours
Complete the following (repeatable) course twice:		
CHME 9990	Dissertation	

## Program Credit/GPA Requirements

32 total semester hours required  
Minimum 3.000 GPA required

## Chemical Engineering, PhD—Advanced Entry

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.

## Qualifying for Doctoral Candidacy

To qualify for doctoral candidacy, the student must demonstrate mastery of the four core areas of chemical engineering (thermodynamics or statistical thermodynamics, kinetics, transport, and mathematics) through course performance. To become a doctoral candidate, "Advanced Entry" students who have already completed a graduate degree in chemical engineering or a closely related discipline must petition the Graduate Committee of the Department of Chemical Engineering and demonstrate that the mastery has been attained through course work

either at Northeastern or during a previous graduate degree from another institution (typically granted when the student has achieved a grade of at least A– in an equivalent course). The Graduate Committee may require a student to take or retake any or all of the core courses before achieving doctoral candidacy. Incoming "Advanced Entry" students should form a plan of course work in consultation with the associate chair for graduate studies and have this approved by the Graduate Committee. For the core courses taken at Northeastern, students should maintain a grade-point average (GPA) of 3.500 or above and have no individual grade below a B.

In addition, each student must complete 4 SH of Research (CHME 8984) and demonstrate critical thinking, analysis, and experimental planning skills related to their dissertation research topic through a written candidacy proposal and an oral defense of this proposal. The student must pass, as determined by the student's dissertation committee, this oral candidacy proposal defense in order to advance to doctoral candidacy. The student earns the classification of *doctoral candidate* upon successful completion of these requirements.

### Course Requirements

A **minimum** of 20 SH of academic course work, **not including any independent study credits**, beyond the master's degree is required. At least 16 SH of academic course work (exclusive of thesis or dissertation) must be taken at Northeastern University. At least one of the core courses (see table under Program Requirements tab), 4 SH Research (CHME 8984) and 4 SH of professional development courses must be included in the student's academic graduate course work. At least 8 SH of noncore electives must also be included. If the Graduate Committee requires additional core courses to achieve Doctoral Candidacy, these are in addition to the 20 SH minimum.

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, Candidacy Preparation—Doctoral (CHME 8960), can be taken if needed to fulfill full-time course registration. The course is an individual instruction course, billed at 1 SH, and graded S or U. There is no course content, and students must register in a section with their research or academic advisor as the "instructor."

After obtaining PhD candidacy, students are required to register for Dissertation (CHME 9990) for two consecutive semesters. This is then followed by registration for Dissertation Continuation (CHME 9996) in each semester thereafter until the dissertation has been completed and defended. **Note: No course credits are awarded for Dissertation (CHME 9990) or Dissertation Continuation (CHME 9996); however, a student is considered full-time if registered for either of these courses.**

All students pursuing a doctoral degree must enroll in the department's seminar course (CHME 7390) for each semester they are working toward their degree.

Students will be advised on their courses for the first semester by the associate chair for graduate studies. After the first semester, students will work with their dissertation 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 dissertation advisors should keep in mind that the university residency requirement requires two semesters of academic studies after becoming a doctoral candidate.

### Language Requirement

There is no foreign language requirement for the PhD degree. However, each candidate must be proficient in technical writing and oral presentation in the English language. The graduate committee may

require additional 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, they must complete a dissertation that embodies the results of extended original research and includes material suitable for publication. The student is responsible for proposing a dissertation committee to be approved by the dissertation advisor at least one month prior to the dissertation defense. The committee must have a minimum of four members, in addition to the primary advisor. The primary dissertation advisor and at least one other committee member must be faculty members in the Department of Chemical Engineering. Additionally, one of the committee members must be external to the Department of Chemical Engineering. Committee membership is not limited to faculty at Northeastern University, 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. The graduate school requirements for dissertation formatting and electronic submittal instructions can be found on the College of Engineering's webpage (<http://www.coe.neu.edu/student-services/dissertation/thesis-instructions/>). Students are responsible for contacting the Graduate School of Engineering for any updates to dissertation requirements and appropriate deadlines.

### Dissertation Defense and Final Oral Examination

This comprehensive examination includes the public dissertation defense as well as a final oral examination to include the subject matter of the doctoral dissertation and significant developments in the field of the dissertation work. The oral presentation will be open to the public, including students, faculty, and the student's committee.

### Departure Prior to Dissertation Completion

Occasionally, students have to leave the Department of Chemical Engineering prior to completion of all degree requirements. In such instances, a student cannot submit a dissertation for credit beyond three years after he or she stops actively pursuing the research. Exceptions may be granted upon petition to the departmental graduate committee. Petitions must demonstrate extenuating circumstances and prove that the research is still of value to the profession.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Milestones

Biannual review  
Dissertation committee  
Dissertation proposal  
Dissertation defense

### Core Requirements

A minimum of 20 semester hours (SH) of academic course work is required, plus 2 optional semester hours for cooperative education and

mentoring in chemical engineering. Independent study credits do not count toward the 20 required semester hours.

Code	Title	Hours
<b>Core Courses</b>		
Complete at least one of the four core classes. A cumulative 3.500 GPA is required for core classes taken: <sup>1</sup>		4
CHME 7320	Chemical Engineering Mathematics	
CHME 7330	Chemical Engineering Thermodynamics	
or CHME 7235	Introduction to Statistical Thermodynamics	
CHME 7340	Chemical Engineering Kinetics	
CHME 7350	Transport Phenomena	
<b>Research</b>		
CHME 8984	Research	4
<b>Seminar and Professional Development</b>		
CHME 7391	Professional Development and Communication in Chemical Engineering 1	1
CHME 7392	Professional Development and Communication in Chemical Engineering 2	1
CHME 7393	Professional Development and Communication in Chemical Engineering 3	1
CHME 7394	Professional Development and Communication in Chemical Engineering 4	1
Complete the following (repeatable) course each semester:		
CHME 7390	Seminar	
Recommended but optional:		
ENCP 6100	Introduction to Cooperative Education	
CHME 7395	Mentoring in Chemical Engineering	

## Electives

Code	Title	Hours
Complete a minimum of 8 semester hours. Consult your faculty advisor for acceptable courses:		
CHME 5101	Fundamentals of Chemical Engineering Analysis	4
CHME 5105	Materials Characterization Techniques	4
CHME 5137	Computational Modeling in Chemical Engineering	4
CHME 5160	Drug Delivery: Engineering Analysis	4
CHME 5185	Design of Experiments and Ethical Research (DOEER)	4
CHME 5510	Fundamentals in Process Safety Engineering	4
CHME 5520	Process Safety Engineering—Chemical Reactivity, Reliefs, and Hazards Analysis	4
CHME 5621	Electrochemical Engineering	4
CHME 5630	Biochemical Engineering	4
CHME 5631	Biomaterials Principles and Applications	4
CHME 5632	Advanced Topics in Biomaterials	4
CHME 5683	Introduction to Polymer Science	4
CHME 5699	Special Topics in Chemical Engineering	4

CHME 6610	Computational Programs in Process Safety for Relief and Scenario Modeling	4
CHME 7235	Introduction to Statistical Thermodynamics	4
CHME 7240	Polymer Science	4
CHME 7260	Special Topics in Chemical Engineering	4
CHME 7262	Special Topics in Process Safety	4
CHME 7978	Independent Study	1-4
BIOE 5410	Molecular Bioengineering	4
EMGT 5220	Engineering Project Management	4
EMGT 6225	Economic Decision Making	4
EMGT 6305	Financial Management for Engineers	4
ENGR 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage	4
ME 5620	Fundamentals of Advanced Materials	4
NNMD 5270	Introduction to Nanomedicine	3
NNMD 5370	Nanomedicine Research Techniques	4
NNMD 5470	Nano/Biomedical Commercialization: Concept to Market	3

## Dissertation

Code	Title	Hours
Complete the following (repeatable) course twice:		
CHME 9990	Dissertation	

## Program Credit/GPA Requirements

Minimum 20 total semester hours required

Minimum 3.000 GPA required

<sup>1</sup> Additional core classes may be required by the chemical engineering graduate committee to achieve PhD candidacy, which would not count toward the 20 SH minimum for the PhD.

## Chemical Engineering, MSCHE

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 associate chair for graduate studies. If admission is granted, then the student must satisfy all the requirements of the doctoral degree program, including the requirements for doctoral candidacy.

## Course Requirements

A minimum of 32 semester hours of academic work is required to qualify for the Master of Science degree in chemical engineering.

**If pursuing a thesis option**, at least 8 semester hours of thesis credit must be included as part of these 32 semester hours of credits. In addition, each student pursuing a thesis option must enroll in the department's seminar course for each semester they are working toward their degree. Students enrolled in the department's seminar course

are encouraged to participate in the seminar by providing a research presentation regarding their research project under the guidance of their advisor. The faculty advisor and the student establish the sequence of courses that students take to pursue the Master of Science in Chemical Engineering.

**If pursuing a nonthesis option**, students must complete a minimum of 32 semester hours of course work and no enrollment in the seminar course is required. See required core courses and example elective courses for all graduate students (p. 136).

Degree Requirements	Thesis Option	Nonthesis Option
Required core courses	16 SH	16 SH
Master of Science proposal	Required	N/A
Master of Science thesis	8 SH	N/A
Seminar	0 SH	N/A
Elective courses <sup>1</sup>	8 SH	16 SH
<b>Minimum semester hours required <sup>2</sup></b>	<b>32 SH</b>	<b>32 SH</b>

<sup>1</sup> Students may complete a maximum of 8 semester hours (thesis option) or 12 semester hours (nonthesis options) of course work for credit outside the Department of Chemical Engineering under the guidance of their advisor and approval of the chemical engineering graduate program director. Exceptions to this policy are the Gordon Engineering Leadership program and the Engineering Business Certificate. Normally, no more than 9 semester hours (inclusive of transfer credits) may be taken outside the College of Engineering.

<sup>2</sup> Exclusive of any preparatory undergraduate courses.

## Thesis Requirements

Students pursuing a Master of Science in Chemical Engineering with thesis must submit to the Graduate School of Engineering a written thesis that is approved by the thesis committee and department chair. For details, see the graduate school requirements and electronic submittal instructions (<http://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 must leave the chemical engineering department prior to completion of all degree requirements. In such instances,

long time intervals have often elapsed before thesis or manuscript submission. Accordingly, the department has adopted the guideline that a student cannot submit a thesis for credit beyond three years after the student stops actively pursuing the research. Exceptions may be granted upon petition to the departmental graduate committee. Petitions must demonstrate extenuating circumstances and prove that the research is still of value to the profession.

## Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 230).

### GORDON INSTITUTE OF ENGINEERING LEADERSHIP

#### Master's Degree in Chemical Engineering with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Chemical Engineering in addition to earning a Graduate Certificate in Engineering Leadership. Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors and 16 semester hours of required chemical engineering course work.

Engineering Leadership (p. 225)

### ENGINEERING BUSINESS

#### Master's Degree in Chemical Engineering with Graduate Certificate in Engineering Business

Students may complete a Master of Science in Chemical Engineering in addition to earning a Graduate Certificate in Engineering Business. Students must apply and be admitted to the Galante Engineering Business Program in order to pursue this option. The program requires the applicant to have earned or be in a program to earn a Bachelor of Science in Engineering from Northeastern University. The integrated 32-semester-hour degree and certificate will require 16 semester hours of the chemical engineering core courses and 16 semester hours from the outlined business-skill curriculum. The course work, along with participation in cocurricular professional development elements, earn the Graduate Certificate in Engineering Business. (p. 213)

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
CHME 7320	Chemical Engineering Mathematics	4
CHME 7330	Chemical Engineering Thermodynamics (Statistical Thermodynamics can be substituted for Thermodynamics )	4
or CHME 7235	Introduction to Statistical Thermodynamics	
CHME 7340	Chemical Engineering Kinetics	4
CHME 7350	Transport Phenomena	4

## Options

Complete one of the following options:



**COURSE WORK OPTION**

Code	Title	Hours
Complete 16 semester hours from the course list below. (p. 137)		16

**THESIS OPTION**

Code	Title	Hours
<b>Thesis</b>		
Complete 8 semester hours from the following (CHME 7990 is repeatable):		8
CHME 7390	Seminar	
CHME 7990	Thesis	

**Electives**

Complete 8 semester hours from the course list below. (p. 137)	8
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**Course List**

Code	Title	Hours
CHME 5101	Fundamentals of Chemical Engineering Analysis	4
CHME 5105	Materials Characterization Techniques	4
CHME 5137	Computational Modeling in Chemical Engineering	4
CHME 5160	Drug Delivery: Engineering Analysis	4
CHME 5185	Design of Experiments and Ethical Research (DOEER)	4
CHME 5510	Fundamentals in Process Safety Engineering	4
CHME 5520	Process Safety Engineering—Chemical Reactivity, Reliefs, and Hazards Analysis	4
CHME 5621	Electrochemical Engineering	4
CHME 5630	Biochemical Engineering	4
CHME 5631	Biomaterials Principles and Applications	4
CHME 5632	Advanced Topics in Biomaterials	4
CHME 5683	Introduction to Polymer Science	4
CHME 5699	Special Topics in Chemical Engineering	4
CHME 6610	Computational Programs in Process Safety for Relief and Scenario Modeling	4
CHME 7235	Introduction to Statistical Thermodynamics	4
CHME 7240	Polymer Science	4
CHME 7260	Special Topics in Chemical Engineering	4
CHME 7262	Special Topics in Process Safety	4
CHME 7978	Independent Study	1-4
BIOE 5410	Molecular Bioengineering	4
EMGT 5220	Engineering Project Management	4
EMGT 6225	Economic Decision Making	4
EMGT 6305	Financial Management for Engineers	4
ENGR 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage	4
ME 5620	Fundamentals of Advanced Materials	4
NNMD 5270	Introduction to Nanomedicine	3
NNMD 5272	Nanomedicine Seminar 1	1
NNMD 5274	Nanomedicine Seminar 2	1
NNMD 5370	Nanomedicine Research Techniques	4

NNMD 5470	Nano/Biomedical Commercialization: Concept to Market	3
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**Program Credit/GPA Requirements**

32 total semester hours required  
Minimum 3.000 GPA required

**Process Safety Engineering, Graduate Certificate**

The Graduate Certificate in Process Safety Engineering focuses on the integration of chemical engineering skills with the knowledge of process safety and regulation with specific attention on designing and developing solutions for industrial firms with the goal of creating environments that are safer and in compliance with regulatory rules and regulations.

This four-course graduate certificate seeks to provide students with opportunities to apply the fundamentals of chemical engineering knowledge and skills to lead efforts within companies to plan and implement process safety designs that assist in meeting the regulatory requirements and confirming code compliance within an industrial firm in order to maintain the safety, health, and welfare of their employees and the public as well as making industrial firms safer and profitable.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Core Requirements**

Code	Title	Hours
<b>Process Safety</b>		
CHME 5510	Fundamentals in Process Safety Engineering	4
CHME 5520	Process Safety Engineering—Chemical Reactivity, Reliefs, and Hazards Analysis	4
<b>Relief and Scenario Modeling</b>		
CHME 6610	Computational Programs in Process Safety for Relief and Scenario Modeling	4
<b>Special Topics</b>		
CHME 7262	Special Topics in Process Safety	4

**Program Credit/GPA Requirements**

16 total semester hours required  
Minimum 3.000 GPA required

**Civil and Environmental Engineering**

Website (<http://www.civ.neu.edu>)

**Jerome F. Hajjar, PhD, PE**  
CDM Smith Professor and Chair

**Haris N. Koutsopoulos, PhD**  
Professor and Associate Chair for Graduate Studies

400 Snell Engineering Center  
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## Overview

With a strategic focus in urban engineering and through a range of teaching and research strengths, anchored by several multidisciplinary, multi-institutional centers and programs, our academic programs are designed to prepare professionals to address the global, complex, and ever-evolving engineering challenges of our time by building on current department strengths and expanding into vital areas. We give our future master's and PhD graduates the opportunity to make real-world impact on and long-lasting contributions to the well-being and development of society.

## Mission of the Department

Advancing innovative civil and environmental solutions for society and creating globally oriented engineering leaders by integrating experiential education and use-inspired interdisciplinary research.

## Academic Programs

Within our graduate programs, students work alongside world-class faculty on advanced research and courses, developing a solid base for their careers. Three overarching themes are emphasized in our programs: environmental health, civil infrastructure security, and sustainable resource engineering. These themes are aligned with the department's premier strengths in simulation (both computational and experimental), smart sensing, data and network science, and urban informatics and are all reflected in the courses offered in our graduate programs.

### MASTER OF SCIENCE DEGREE

The department offers four MS degree programs in the following areas: civil engineering (students can choose one out of five concentrations); environmental engineering; engineering and public policy (students can choose one out of two concentrations); and sustainable building systems. Options for a master's thesis or report in place of course work are available. All civil and environmental engineering master's programs are available on a full-time or part-time basis. For a full list of the department's academic program offerings, please refer to the Programs (<http://catalog.northeastern.edu/graduate/engineering/civil-environmental/#programstext>) tab.

### DOCTOR OF PHILOSOPHY (PHD) DEGREE

The department offers the following PhD degrees: PhD in Civil Engineering and Interdisciplinary PhD. The doctoral program is designed to be flexible with respect to subject area and may be adapted to any subject area in civil and environmental engineering, including interdisciplinary options within the department or across departments or colleges.

The PhD is awarded to students who demonstrate high academic achievement and research competence in the selected field. Students must pursue the PhD program on a basis consistent with the residence requirements for the degree that may be found under the Program Requirements (<http://catalog.northeastern.edu/graduate/engineering/civil-environmental/civil-engineering-phd/#text>) tab.

## Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 230).

### GORDON INSTITUTE OF ENGINEERING LEADERSHIP OPTION

Students have the opportunity to pursue the Gordon Engineering Leadership Program (p. 224) in combination with the MS degree.

## Programs

### Doctor of Philosophy (PhD)

- Civil Engineering (p. 138)
- Civil Engineering—Advanced Entry (p. 139)

### Master of Science (MS)

- Engineering and Public Policy with Concentration in Energy and Environment (p. 140)
- Engineering and Public Policy with Concentration in Infrastructure Resilience (p. 142)

### Master of Science in Civil Engineering (MSCivE)

- Civil Engineering with Concentration in Construction Management (p. 144)
- Civil Engineering with Concentration in Water, Environmental, and Coastal Systems (p. 143)
- Civil Engineering with Concentration in Geotechnical/Geoenvironmental Engineering (p. 146)
- Civil Engineering with Concentration in Structures (p. 147)
- Civil Engineering with Concentration in Transportation (p. 148)

### Master of Science in Environmental Engineering (MSENVE)

- Environmental Engineering (p. 149)

### Master of Science in Sustainable Building Systems (MSSBS)

- Sustainable Building Systems (p. 150)

## Civil Engineering, PhD

Awarding 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
2. The dissertation, an extended independent research effort on a relevant technical problem resulting in an original contribution to the field

Upon acceptance into the program, an applicant is designated as a doctoral student. This designation is changed to doctoral candidate upon successful completion of the doctoral qualifying examinations (both written and oral area exams) and all the required course work.

Each student's mastery of subject matter is measured by a qualifying examination covering a subset of topics selected from the major field. A doctoral dissertation committee periodically monitors research progress, and the candidate is required to present and defend his or her research results before the doctoral dissertation committee upon completion of the work.

## Course Work Requirement

The academic program must include at least 52 semester hours of graduate-level 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, Exam Preparation—Doctoral (CIVE 8960), 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 faculty 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 Dissertation (CIVE 9990). Upon completion of this sequence, the candidate must register for Dissertation Continuation (CIVE 9996) in every semester until the dissertation is complete. Students may not register for Continuation until they fulfill the two-semester dissertation sequence.

### Qualifying Examination and Degree Candidacy

The 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 more time with the permission of the qualifying examination committee.

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 and all required course work, the student is classified as a doctoral candidate.

### Comprehensive Examination

The comprehensive exam is a defense of the doctoral research work and an examination on subject matter related to the dissertation area.

### 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 (CEE) faculty member as the dissertation advisor. A doctoral dissertation committee formed by the student and his or her dissertation advisor will monitor progress and approve the final document. The doctoral dissertation committee shall have no fewer than four members, at least two of whom must be full-time faculty from the CEE department.

Each student, along with a faculty advisor, must jointly develop a proposal defining the content of the academic program, subject to review by the dissertation committee. Intellectual rigor, connectivity of subject matter, and compatibility with departmental interests are critical issues. The doctoral dissertation committee’s approval of the proposal represents a mutual agreement between the student and the committee. 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.

Each doctoral candidate must defend his or her dissertation within seven years from the start of the PhD program.

### 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.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

Qualifying examination and comprehensive examination  
Annual review  
Dissertation proposal  
Dissertation committee  
Dissertation defense

### Core Requirements

Complete 52 semester hours of approved course work. Consult your faculty advisor for acceptable courses. Please note that a maximum of 4 semester hours of Independent Study (CIVE 7978) will be accepted toward the 52-semester-hour requirement.

### Dissertation

Code	Title	Hours
Complete the following (repeatable) course twice:		
CIVE 9990	Dissertation	

### Program Credit/GPA Requirements

52 total semester hours required  
Minimum 3.000 GPA required

### Civil Engineering, PhD—Advanced Entry

Awarding 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
2. The dissertation, an extended independent research effort on a relevant technical problem resulting in an original contribution to the field

Upon acceptance into the program, an applicant is designated as a doctoral student. This designation is changed to doctoral candidate upon successful completion of the doctoral qualifying examinations (both written and oral area exams) and all the required course work.

Each student’s mastery of subject matter is measured by a qualifying examination covering a subset of topics selected from the major field. A doctoral dissertation committee periodically monitors research progress,

and the candidate is required to present and defend his or her research results before the doctoral dissertation committee upon completion of the work.

### Course Work Requirement

The academic program for students with a master's degree in civil engineering must include 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.

To meet the full-time registration requirement for PhD students who have completed the majority of their course work and not yet reached PhD candidacy, a zero-credit course, Exam Preparation—Doctoral (CIVE 9960), 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 faculty 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 Dissertation (CIVE 9990). Upon completion of this sequence, the candidate must register for Dissertation Continuation (CIVE 9996) in every semester until the dissertation is complete. Students may not register for Continuation until they fulfill the two-semester dissertation sequence.

### Qualifying Examination and Degree Candidacy

The 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 more time with the permission of the qualifying examination committee.

Students must take the qualifying exam during the first 18 months of their PhD program. Upon successful completion of the exam and all required course work, the student is classified as a doctoral candidate.

### Comprehensive Examination

The comprehensive exam is a defense of the doctoral research work and an examination on subject matter related to the dissertation area.

### 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 doctoral dissertation committee formed by the student and his or her dissertation advisor will monitor progress and approve the final document. The doctoral dissertation committee shall have no fewer than four members, at least two of whom must be full-time faculty from the Department of Civil and Environmental Engineering (CEE).

Each student, along with a faculty advisor, must jointly develop a proposal defining the content of the academic program, subject to review by the dissertation committee. Intellectual rigor, connectivity of subject matter, and compatibility with departmental interests are critical issues. The doctoral dissertation committee's approval of the proposal represents a mutual agreement between the student and the committee. 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.

Each doctoral candidate must defend his or her dissertation within seven years from the start of the PhD program.

### 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.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

Qualifying examination and comprehensive examination  
Annual review  
Dissertation proposal  
Dissertation committee  
Dissertation defense

### Core Requirements

Complete 20 semester hours of approved course work. Consult your faculty advisor for acceptable courses. Please note that a maximum of 4 semester hours of Independent Study (CIVE 7978) will be accepted toward the 20-semester-hour requirement.

### Dissertation

Code	Title	Hours
Complete the following (repeatable) course twice:		
CIVE 9990	Dissertation	

### Program Credit/GPA Requirements

20 total semester hours required  
Minimum 3.000 GPA required

## Engineering and Public Policy with Concentration in Energy & Environment, MS

The purpose of this degree is to provide students with a background in engineering with the tools necessary to conduct robust policy analysis. It includes required core courses from the Department of Civil and Environmental Engineering and the School of Public Policy, complemented by electives in engineering and public policy, which can be met by two courses and a master's report (recommended), or by one course and a thesis, or by three courses. A minimum of 16 semester hours must be taken in the College of Engineering.

Degree Requirements	With Report	With Thesis	Course Work Only
Required core courses	20 SH	20 SH	20 SH
Other electives	8 SH	4 SH	12 SH
Master of Science report/thesis	4 SH	8 SH	
Minimum semester hours required	32 SH	32 SH	32 SH

## Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 230).

### GORDON INSTITUTE OF ENGINEERING LEADERSHIP

#### Master's Degree in Engineering and Public Policy with Concentration in Energy and Environment with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Engineering and Public Policy with Concentration in Energy and Environment in addition to earning a Graduate Certificate in Engineering Leadership. Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16 semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour degree and certificate will require 20 hours of advisor-approved energy and environment technical courses.

Engineering Leadership (p. 225)

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
<b>Energy and Environment</b>		
ENGR 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage	4
<b>Environmental Systems Modeling</b>		
Complete 4 semester hours from the following:		4
CIVE 5261	Dynamic Modeling for Environmental Investment and Policymaking	
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure	
IE 5500	Systems Engineering in Public Programs	
<b>Economics</b>		
Complete 4 semester hours from the following:		4
ECON 7210	Applied Microeconomic Policy Analysis	
PPUA 5260	Ecological Economics	
PPUA 6502	Economic Analysis for Policy and Planning	
<b>Public Policy and Analysis</b>		
Complete 4 semester hours from the following:		4

LPSC 7311	Strategizing Public Policy	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6509	Techniques of Program Evaluation	
<b>Statistics</b>		
Complete 4 semester hours from the following:		4
CIVE 7100	Time Series and Geospatial Data Sciences	
CIVE 7388	Special Topics in Civil Engineering (Informatics in Civil Engineering)	
IE 5640	Data Mining for Engineering Applications	
IE 6200	Engineering Probability and Statistics	
IE 7280	Statistical Methods in Engineering	
INSH 5301	Introduction to Computational Statistics	
INSH 6500	Statistical Analysis	
LPSC 7215	Advanced Quantitative Techniques	

## Options

Complete one of the following options:

### COURSE WORK OPTION

Code	Title	Hours
Complete 12 semester hours from the Energy and Environment Course List below.		12

### REPORT OPTION

Code	Title	Hours
CIVE 8674	Master's Report	4
Complete 8 semester hours from the Energy and Environment Course List below.		8

### THESIS OPTION

Code	Title	Hours
CIVE 7990	Thesis	8
Complete 4 semester hours from the Energy and Environment Course List below.		4

## Energy and Environment Course List

Any required core course not used to meet the required core course requirement can be taken as a restricted elective.

Code	Title	Hours
CIVE 5271	Solid and Hazardous Waste Management	
CIVE 5280	Remote Sensing of the Environment	
CIVE 5300	Environmental Engineering Laboratory	
CIVE 5699	Special Topics in Civil Engineering (Building Energy Performance Simulation)	
CIVE 7252	Water Engineering: Planning, Design, and Management	
CIVE 7261	Surface Water Quality Modeling	
EMGT 6225	Economic Decision Making	
ENVR 5210	Environmental Planning	
ENVR 5260	Geographical Information Systems	
LPSC 7312	Cities, Sustainability, and Climate Change	

ME 5645	Environmental Issues in Manufacturing and Product Use
PHTH 5214	Environmental Health
PHTH 5230	Global Health
PPUA 5262	Big Data for Cities
PPUA 5263	Geographic Information Systems for Urban and Regional Policy
PPUA 5264	Energy Transitions and Climate Resilience: Technology, Policy, and Social Change
PPUA 5270	Food Systems and Public Policy
PPUA 6205	Research Design and Methodology in Urban and Regional Policy
PPUA 6210	Research Toolkit for Urban and Regional Policy: Cost/Benefit Analysis
PPUA 6212	Research Toolkit for Urban and Regional Policy: Project Management
PPUA 6213	Research Toolkit for Urban and Regional Policy: Data Visualization
PPUA 7237	Advanced Spatial Analysis of Urban Systems

### Program Credit/GPA Requirements

32 total semester hours required  
Minimum 3.000 GPA required

### Engineering and Public Policy with Concentration in Infrastructure Resilience, MS

The purpose of this degree is to provide students with a background in engineering with the tools necessary to conduct robust policy analysis. It includes required core courses from the Department of Civil and Environmental Engineering and the School of Public Policy, complemented by electives in engineering and public policy, which can be met by two courses and a master's report (recommended), or by one course and a thesis, or by three courses. A minimum of 16 semester hours must be taken in the College of Engineering.

Degree Requirements	With Report	With Thesis	Course Work Only
Required core courses	20 SH	20 SH	20 SH
Other electives	8 SH	4 SH	12 SH
Master of Science report/thesis	4 SH	8 SH	
Minimum semester hours required	32 SH	32 SH	32 SH

### Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 230).

### GORDON INSTITUTE OF ENGINEERING LEADERSHIP

#### Master's Degree in Engineering and Public Policy with Concentration in Infrastructure Resilience with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Engineering and Public Policy with Concentration in Infrastructure Resilience in addition to earning a Graduate Certificate in Engineering Leadership. Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16 semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour degree and certificate will require 20 hours of advisor-approved infrastructure resilience technical courses.

Engineering Leadership (p. 225)

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
<b>Infrastructure Resilience</b>		
CIVE 7110	Critical Infrastructure Resilience	4
<b>Environmental Systems Modeling</b>		
Complete 4 semester hours from the following:		4
CIVE 5261	Dynamic Modeling for Environmental Investment and Policymaking	
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure	
CIVE 5280	Remote Sensing of the Environment	
CIVE 5699	Special Topics in Civil Engineering (Climate Science and Technology Adaptation Policy)	
IE 5500	Systems Engineering in Public Programs	
<b>Economics</b>		
Complete 4 semester hours from the following:		4
ECON 7210	Applied Microeconomic Policy Analysis	
PPUA 6502	Economic Analysis for Policy and Planning	
<b>Public Policy and Analysis</b>		
Complete 4 semester hours from the following:		4
LPSC 7311	Strategizing Public Policy	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6509	Techniques of Program Evaluation	
<b>Statistics</b>		
Complete 4 semester hours from the following:		4
CIVE 7100	Time Series and Geospatial Data Sciences	
CIVE 7388	Special Topics in Civil Engineering (Informatics in Civil Engineering)	
IE 5640	Data Mining for Engineering Applications	
IE 6200	Engineering Probability and Statistics	
IE 7280	Statistical Methods in Engineering	

INSH 5301	Introduction to Computational Statistics
INSH 6500	Statistical Analysis
LPSC 7215	Advanced Quantitative Techniques

PPUA 6213	Research Toolkit for Urban and Regional Policy: Data Visualization
PPUA 7230	Housing Policy
PPUA 7231	Transportation Policy
PPUA 7234	Land Use and Urban Growth Policy
PPUA 7237	Advanced Spatial Analysis of Urban Systems
PPUA 7239	Problems in Metropolitan Policymaking
PPUA 7240	Health Policy and Politics

**Options**

Complete one of the following options:

**COURSE WORK OPTION**

Code	Title	Hours
	Complete 12 semester hours from the infrastructure course list below.	12

**REPORT OPTION**

Code	Title	Hours
CIVE 8674	Master's Report	4
	Complete 8 semester hours from the Infrastructure course list below.	8

**THESIS OPTION**

Code	Title	Hours
CIVE 7990	Thesis	8
	Complete 4 semester hours from the Infrastructure course list below.	4

**Infrastructure Course List**

Any required core course not used to meet the required core course requirement can be taken as a restricted elective.

Code	Title	Hours
CIVE 5699	Special Topics in Civil Engineering (Building Energy Performance Simulation)	
CY 5250	Decision Making for Critical Infrastructure	
EMGT 6225	Economic Decision Making	
ENVR 5260	Geographical Information Systems	
IE 7290	Reliability Analysis and Risk Assessment	
LPSC 7312	Cities, Sustainability, and Climate Change	
ME 5645	Environmental Issues in Manufacturing and Product Use	
PHTH 5214	Environmental Health	
PHTH 5230	Global Health	
PPUA 5260	Ecological Economics	
PPUA 5262	Big Data for Cities	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
PPUA 5264	Energy Transitions and Climate Resilience: Technology, Policy, and Social Change	
PPUA 5270	Food Systems and Public Policy	
PPUA 6205	Research Design and Methodology in Urban and Regional Policy	
PPUA 6210	Research Toolkit for Urban and Regional Policy: Cost/Benefit Analysis	
PPUA 6212	Research Toolkit for Urban and Regional Policy: Project Management	

**Program Credit/GPA Requirements**

32 total semester hours required  
 Minimum 3.000 GPA required

**Civil Engineering with Concentration in Water, Environmental, and Coastal Systems, MSCIVE**

This program integrates the study of infrastructure; hydrology; hydraulics; engineering for coastal areas; numerical modeling; remote sensing; spatial and temporal data analysis; and physical, chemical, and biological processes that impact the water and air quality to provide students with the knowledge and tools for developing and managing sustainable, resilient water resources and infrastructure. It includes required core courses from the Department of Civil and Environmental Engineering, complemented by electives in electrical and computer engineering, mechanical and industrial engineering, and earth and environmental sciences.

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	
<b>Minimum semester hours required</b>	<b>32 SH</b>	<b>32 SH</b>	<b>32 SH</b>

**Graduate Certificate Options**

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 230).

**GORDON INSTITUTE OF ENGINEERING LEADERSHIP**

**Master's Degree in Civil Engineering with Concentration in Water, Environmental, and Coastal Systems with Graduate Certificate in Engineering Leadership**

Students may complete a Master of Science in Civil Engineering with Concentration in Water, Environmental, and Coastal Systems in addition to earning a Graduate Certificate in Engineering Leadership. Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-

hour degree and certificate will require 16 hours of advisor-approved environmental and water systems technical courses.

Engineering Leadership (p. 225)

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
Complete 8 semester hours of the following:		8
CIVE 5281	Coastal Dynamics and Design	
CIVE 7250	Environmental Chemistry	
CIVE 7251	Environmental Biological Processes	
CIVE 7260	Hydrologic Modeling	
CIVE 7261	Surface Water Quality Modeling	
CIVE 7272	Air Quality Management	
CIVE 7281	Coastal and Nearshore Hydrodynamics	
CIVE 7392	Special Topics in Environmental Engineering (Hydraulic Modeling)	

### Options

Complete one of the following options:

#### COURSE WORK OPTION

Code	Title	Hours
Complete 12 semester hours from the Restricted Elective List below.		12
Complete 12 semester hours from the Other Elective List below.		12

#### REPORT OPTION

Code	Title	Hours
CIVE 8674	Master's Report	4
Complete 12 semester hours from the Restricted Elective List below.		12
Complete 8 semester hours from the Other Elective List below.		8

#### THESIS OPTION

Code	Title	Hours
CIVE 7990	Thesis	8
Complete 12 semester hours from the Restricted Elective List below.		12
Complete 4 semester hours from the Other Elective List below.		4

### Course Lists

#### RESTRICTED ELECTIVE LIST

Any required core course not used to meet the required core course requirement can be taken as a restricted elective.

Code	Title	Hours
CIVE 5260	Environmental Fluid Mechanics	
CIVE 5261	Dynamic Modeling for Environmental Investment and Policymaking	
CIVE 5271	Solid and Hazardous Waste Management	

CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure
CIVE 5280	Remote Sensing of the Environment
CIVE 5300	Environmental Engineering Laboratory
CIVE 5536	Hydrologic and Hydraulic Design
CIVE 5699	Special Topics in Civil Engineering (Climate Science and Technology Adaptation Policy)
CIVE 6777	Climate Hazards and Resilient Cities Abroad
CIVE 6778	Climate Adaptation and Policy Abroad
CIVE 7100	Time Series and Geospatial Data Sciences
CIVE 7110	Critical Infrastructure Resilience
CIVE 7252	Water Engineering: Planning, Design, and Management
CIVE 7255	Environmental Physical/Chemical Processes
ME 6200	Mathematical Methods for Mechanical Engineers 1

#### OTHER ELECTIVE LIST

Any required core course not used to meet the required core course or restricted elective requirements can be taken as another elective. Any restricted elective not used to meet the restricted elective requirement can be taken as another elective.

Code	Title	Hours
CIVE 7388	Special Topics in Civil Engineering (Urban Informatics Processing)	
CIVE 7388	Special Topics in Civil Engineering (Random Data and Processing)	
CIVE 7388	Special Topics in Civil Engineering (Informatics in Civil Engineering)	
EECE 7204	Applied Probability and Stochastic Processes	
ENVR 5260	Geographical Information Systems	
EEMB 5516	Oceanography	
IE 6200	Engineering Probability and Statistics	
IE 7280	Statistical Methods in Engineering	
IE 7290	Reliability Analysis and Risk Assessment	
MATH 7341	Probability 2	
MATH 7343	Applied Statistics	
MATH 7344	Regression, ANOVA, and Design	

### Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

### Civil Engineering with Concentration in Construction Management, MSCivE

This program is intended for students interested in construction management and engineering or a closely related field. It includes required core courses primarily from the Department of Civil and Environmental Engineering, 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	
<b>Minimum semester hours required</b>	<b>32 SH</b>	<b>32 SH</b>	<b>32 SH</b>

## Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 230).

### GORDON INSTITUTE OF ENGINEERING LEADERSHIP

#### Master's Degree in Civil Engineering with a Concentration in Construction Management with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Civil Engineering with a Concentration in Construction Management in addition to earning a Graduate Certificate in Engineering Leadership. Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 33-semester-hour degree and certificate will require 17 hours of advisor-approved construction management technical courses.

Engineering Leadership (p. 225)

### ENGINEERING BUSINESS

#### Master's Degree in Civil Engineering with Concentration in Construction Management with Graduate Certificate in Engineering Business

Students may complete a Master of Science in Civil Engineering with Concentration in Construction Management in addition to earning a Graduate Certificate in Engineering Business. Students must apply and be admitted to the Galante Engineering Business Program in order to pursue this option. The program requires the applicant to have earned or be in a program to earn a Bachelor of Science in Engineering from Northeastern University. The integrated 32-semester-hour degree and certificate will require 16 semester hours of the core courses and 16 semester hours from the outlined business-skill curriculum. The course work, along with participation in cocurricular professional development elements, earn the Graduate Certificate in Engineering Business.

Engineering Business (<http://catalog.northeastern.edu/graduate/engineering/multidisciplinary/engineering-business-graduate-certificate/>)

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
CIVE 5221	Construction Project Control and Organization	2
CIVE 7220	Construction Management	4
CIVE 7230	Legal Aspects of Civil Engineering	4
EMGT 6305	Financial Management for Engineers	4
IE 6200	Engineering Probability and Statistics	4

## Options

Complete one of the following options:

### COURSE WORK OPTION

Code	Title	Hours
	Complete 14 semester hours from the course list below.	14

### REPORT OPTION

Code	Title	Hours
CIVE 8674	Master's Report	4
	Complete 10 semester hours from the course list below.	10

### THESIS OPTION

Code	Title	Hours
CIVE 7990	Thesis	8
	Complete 6 semester hours from the course list below.	6

## Course List

Code	Title	Hours
OR 6205	Deterministic Operations Research	
ACCT 6200	Financial Reporting and Managerial Decision Making 1	
ACCT 6201	Financial Reporting and Managerial Decision Making 2	
CIVE 5231	Alternative Project Delivery Systems in Construction	
CIVE 5699	Special Topics in Civil Engineering (Building Energy Performance Simulation)	
CIVE 7240	Construction Equipment and Modeling	
CIVE 7301	Advanced Soil Mechanics	
CIVE 7302	Advanced Foundation Engineering	
CIVE 7388	Special Topics in Civil Engineering (Urban Informatics Processing)	
EMGT 5300	Engineering/Organizational Psychology	
GE 5010	Customer-Driven Technical Innovation for Engineers	
GE 5100	Product Development for Engineers	
IE 5617	Lean Concepts and Applications	
IE 5640	Data Mining for Engineering Applications	
or IE 7275	Data Mining in Engineering	
IE 7215	Simulation Analysis	
IE 7290	Reliability Analysis and Risk Assessment	
INFO 6210	Data Management and Database Design	
INFO 6215	Business Analysis and Information Engineering	

INFO 6245	Planning and Managing Information Systems Development
SBSY 5200	Sustainable Engineering Systems for Buildings
SBSY 5300	Information Systems for Integrated Project Delivery

### Program Credit/GPA Requirements

32 total semester hours required  
Minimum 3.000 GPA required

### Civil Engineering with Concentration in Geotechnical/Geoenvironmental Engineering, MSCivE

This program includes study in the areas of soil mechanics/foundations and geoenvironmental engineering. It includes studies of soil and related earth materials for problems related to the protection of human health and the environment. Related areas include soil mechanics, fate/transport in subsurfaces, subsurface remediation, and others. The degree requirements include core courses from the Department of Civil and Environmental Engineering, 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	
<b>Minimum semester hours required</b>	<b>32 SH</b>	<b>32 SH</b>	<b>32 SH</b>

### Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 230).

#### GORDON INSTITUTE OF ENGINEERING LEADERSHIP

#### Master's Degree in Civil Engineering with a Concentration in Geotechnical/Geoenvironmental Engineering with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Civil Engineering with a Concentration in Geotechnical/Geoenvironmental Engineering in addition to earning a Graduate Certificate in Engineering Leadership. Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 hours of advisor-approved geotechnical/geoenvironmental engineering technical courses.

Engineering Leadership (p. 225)

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
CIVE 7301	Advanced Soil Mechanics	4
CIVE 7302	Advanced Foundation Engineering	4

### Options

Complete one of the following options:

#### COURSE WORK OPTION

Code	Title	Hours
Complete 24 semester hours from the Elective Course List below.		24

#### REPORT OPTION

Code	Title	Hours
CIVE 8674	Master's Report	4
Complete 20 semester hours from the Elective Course List below.		20

#### THESIS OPTION

Code	Title	Hours
CIVE 7990	Thesis	8
Complete 16 semester hours from the Elective Course List below.		16

### Elective Course List

Code	Title	Hours
CIVE 5271	Solid and Hazardous Waste Management	
CIVE 5300	Environmental Engineering Laboratory	
CIVE 5536	Hydrologic and Hydraulic Design	
CIVE 5699	Special Topics in Civil Engineering (Vibration-based Structural Health Monitoring)	
CIVE 7230	Legal Aspects of Civil Engineering	
CIVE 7240	Construction Equipment and Modeling	
CIVE 7250	Environmental Chemistry	
CIVE 7251	Environmental Biological Processes	
CIVE 7260	Hydrologic Modeling	
CIVE 7261	Surface Water Quality Modeling	
CIVE 7311	Soil and Foundation Dynamics	
CIVE 7312	Earthquake Engineering	
CIVE 7330	Advanced Structural Analysis	
CIVE 7331	Structural Dynamics	
CIVE 7388	Special Topics in Civil Engineering (Soil Improvement)	
IE 6200	Engineering Probability and Statistics	
IE 7290	Reliability Analysis and Risk Assessment	
ME 5657	Finite Element Method	
ME 7205	Advanced Mathematical Methods for Mechanical Engineers	

## Program Credit/GPA Requirements

32 total semester hours required  
Minimum 3.000 GPA required

### Civil Engineering with Concentration in Structures, MSCivE

This program is designed for students with career goals in structural engineering and structural design. The program includes courses in structural analysis and design, structural mechanics, dynamics of structures, earthquake engineering, wind engineering, and structural health monitoring. The degree requirements include core courses from the Department of Civil and Environmental Engineering, complemented by electives in civil and environmental engineering, as well as electives from other departments such as mechanical and industrial engineering and mathematics.

Degree Requirements	With Report	With Thesis	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	
<b>Minimum semester hours required</b>	<b>32 SH</b>	<b>32 SH</b>	<b>32 SH</b>

## Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 230).

### GORDON INSTITUTE OF ENGINEERING LEADERSHIP

#### Master's Degree in Civil Engineering with Concentration in Structural Engineering with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Civil Engineering with Concentration in Structural Engineering in addition to earning a Graduate Certificate in Engineering Leadership. Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 hours of advisor-approved structural engineering technical courses.

Engineering Leadership (p. 225)

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
CIVE 7330	Advanced Structural Analysis	4
CIVE 7331	Structural Dynamics	4

## Options

Complete one of the following options:

### COURSE WORK OPTION

Code	Title	Hours
	Complete 12 semester hours from the Restricted Elective List below.	12
	Complete 12 semester hours from the Other Elective List below.	12

### REPORT OPTION

Code	Title	Hours
CIVE 8674	Master's Report	4
	Complete 12 semester hours from the Restricted Elective List below.	12
	Complete 8 semester hours from the Other Elective List below.	8

### THESIS OPTION

Code	Title	Hours
CIVE 7990	Thesis	8
	Complete 12 semester hours from the Restricted Elective List below.	12
	Complete 4 semester hours from the Other Elective List below.	4

## Course Lists

### RESTRICTED ELECTIVE LIST

Code	Title	Hours
CIVE 5520	Structural Systems	
CIVE 5522	Structural Systems Modeling	
CIVE 5525	Prestressed Concrete Design	
CIVE 5699	Special Topics in Civil Engineering (Vibration-based Structural Health Monitoring)	
CIVE 7340	Seismic Analysis and Design	
CIVE 7341	Structural Reliability	
CIVE 7350	Behavior of Concrete Structures	
CIVE 7351	Behavior of Steel Structures	
CIVE 7354	Wind Engineering	
CIVE 7355	Advanced Bridge Design	
CIVE 7357	Advanced Structural Mechanics	
CIVE 7388	Special Topics in Civil Engineering (Random Data and Processing)	
CIVE 7388	Special Topics in Civil Engineering (Informatics in Civil Engineering)	
CIVE 7388	Special Topics in Civil Engineering (Dynamics and Control of Infrastructure Systems)	

### OTHER ELECTIVE LIST

Any restricted elective not used to meet the restricted elective requirement can be taken as another elective.

Code	Title	Hours
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure	
CIVE 7301	Advanced Soil Mechanics	
CIVE 7302	Advanced Foundation Engineering	

CIVE 7311	Soil and Foundation Dynamics
CIVE 7312	Earthquake Engineering
CIVE 7388	Special Topics in Civil Engineering (Urban Informatics Processing)
MATH 7241	Probability 1
MATH 7342	Mathematical Statistics
MATH 7343	Applied Statistics
MATL 7365	Properties and Processing of Electronic Materials
ME 5240	Computer Aided Design and Manufacturing
ME 5650	Advanced Mechanics of Materials
ME 5655	Dynamics and Mechanical Vibration
ME 5657	Finite Element Method
ME 5659	Control Systems Engineering
ME 6200	Mathematical Methods for Mechanical Engineers 1
ME 6201	Mathematical Methods for Mechanical Engineers 2
ME 7205	Advanced Mathematical Methods for Mechanical Engineers
ME 7210	Elasticity and Plasticity
ME 7232	Theory of Plates and Shells
ME 7238	Advanced Finite Element Method
ME 7245	Fracture Mechanics and Failure Analysis
ME 7255	Continuum Mechanics
SBSY 5100	Sustainable Design and Technologies in Construction
SBSY 5200	Sustainable Engineering Systems for Buildings

### Program Credit/GPA Requirements

32 total semester hours required  
Minimum 3.000 GPA required

### Civil Engineering with Concentration in Transportation, MSCivE

This program is designed for students with career goals in transportation engineering and transportation planning. The degree requirements include core courses from the Department of Civil and Environmental Engineering, 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 electives	8 SH	8 SH	12 SH
Other electives	8 SH	4 SH	8 SH
Master of Science report/thesis	4 SH	8 SH	

**Minimum semester hours required**      32 SH      32 SH      32 SH

### Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 230).

### GORDON INSTITUTE OF ENGINEERING LEADERSHIP

#### Master's Degree in Civil Engineering with Concentration in Transportation with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Civil Engineering with Concentration in Transportation in addition to earning a Graduate Certificate in Engineering Leadership. Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 hours of advisor-approved transportation engineering technical courses.

Engineering Leadership (p. 225)

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
CIVE 5373	Transportation Systems: Analysis and Planning	4
CIVE 5376	Traffic Engineering and Sustainable Urban Street Design	4
IE 6200	Engineering Probability and Statistics	4

### Options

Complete one of the following options:

#### COURSE WORK OPTION

Code	Title	Hours
	Complete 12 semester hours from the Restricted Elective List below.	12
	Complete 8 semester hours from the Other Elective List below.	8

#### REPORT OPTION

Code	Title	Hours
CIVE 8674	Master's Report	4
	Complete 8 semester hours from the Restricted Elective List below.	8
	Complete 8 semester hours from the Other Elective List below.	8

#### THESIS OPTION

Code	Title	Hours
CIVE 7990	Thesis	8
	Complete 8 semester hours from the Restricted Elective List below.	8

Complete 4 semester hours from the Other Elective List below.

**Course Lists**

**RESTRICTED ELECTIVE LIST**

Code	Title	Hours
CIVE 6566	Sustainable Urban Transportation: Netherlands	4
CIVE 7380	Performance Models and Simulation of Transportation Networks	
CIVE 7381	Transportation Demand Forecasting and Model Estimation	
CIVE 7382	Advanced Traffic Control and Simulation	
CIVE 7385	Public Transportation	
CIVE 7387	Design Aspects of Roadway Safety	
CIVE 7388	Special Topics in Civil Engineering (Informatics in Civil Engineering)	
CIVE 7388	Special Topics in Civil Engineering (Urban Informatics Processing)	
CIVE 7388	Special Topics in Civil Engineering (Random Data and Processing)	
IE 7215	Simulation Analysis	
IE 7280	Statistical Methods in Engineering	

**OTHER ELECTIVE LIST**

Any restricted elective not used to meet the restricted elective requirement can be used as another elective. Courses outside this list may be taken as electives with advisor approval.

Code	Title	Hours
IE 7275	Data Mining in Engineering	
IE 7290	Reliability Analysis and Risk Assessment	
INFO 6210	Data Management and Database Design	
MATH 7343	Applied Statistics	
OR 6205	Deterministic Operations Research	
OR 7230	Probabilistic Operation Research	
OR 7245	Network Analysis and Advanced Optimization	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
PPUA 7231	Transportation Policy	
PPUA 7234	Land Use and Urban Growth Policy	

**Program Credit/GPA Requirements**

32 total semester hours required  
 Minimum 3.000 GPA required

**Environmental Engineering, MSENVE**

This program integrates the study of physical, chemical, and biological processes and fundamental principles for water and wastewater treatment and disposal, hazardous waste management, surface water and groundwater quality, water resources management, and air quality management. Successful graduates will have the ability to develop and implement technologies for various environmental applications with the goal to improve and protect the environment and human health.

4 It includes required core courses from the Department of Civil and Environmental Engineering (CEE), complemented by electives in civil and environmental engineering, mechanical and industrial engineering, earth and environmental sciences, and mathematics.

Degree Requirements	With Report	With Thesis	Course Work Only
Required core electives	12 SH	12 SH	12 SH
Restricted electives	8 SH	8 SH	12 SH
Other electives	8 SH	4 SH	8 SH
Master of Science report/thesis	4 SH	8 SH	

**Graduate Certificate Options**

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 230).

**GORDON INSTITUTE OF ENGINEERING LEADERSHIP**

**Master's Degree in Environmental Engineering with Graduate Certificate in Engineering Leadership**

Students may complete a Master of Science in Environmental Engineering in addition to earning a Graduate Certificate in Engineering Leadership. Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16 semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour degree and certificate will require 20 hours of advisor-approved environmental engineering technical courses.

Engineering Leadership (p. 225)

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Core Requirements**

Code	Title	Hours
Complete three of the following:		12
CIVE 7250	Environmental Chemistry	
CIVE 7251	Environmental Biological Processes	
CIVE 7255	Environmental Physical/Chemical Processes	
CIVE 7260	Hydrologic Modeling	

**Options**

Complete one of the following options:

**COURSE WORK OPTION**

Code	Title	Hours
Complete 12 semester hours from the Restricted Electives List below.		12
Complete 8 semester hours from the Other Electives List below.		8

**REPORT OPTION**

Code	Title	Hours
CIVE 8674	Master's Report	4
Complete 8 semester hours from the Restricted Electives List below.		8
Complete 8 semester hours from the Other Electives List below.		8

**THESIS OPTION**

Code	Title	Hours
CIVE 7990	Thesis	8
Complete 8 semester hours from the Restricted Electives List below.		8
Complete 4 semester hours from the Other Electives List below.		4

**Course Lists****RESTRICTED ELECTIVES LIST**

Any required core course not used to meet the required core course requirement can be taken as a restricted elective.

Code	Title	Hours
CIVE 5260	Environmental Fluid Mechanics	
CIVE 5261	Dynamic Modeling for Environmental Investment and Policymaking	
CIVE 5271	Solid and Hazardous Waste Management	
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure	
CIVE 5280	Remote Sensing of the Environment	
CIVE 5300	Environmental Engineering Laboratory	
CIVE 5536	Hydrologic and Hydraulic Design	
CIVE 5699	Special Topics in Civil Engineering (Climate Science and Technology Adaptation and Policy)	
CIVE 6777	Climate Hazards and Resilient Cities Abroad	
CIVE 6778	Climate Adaptation and Policy Abroad	
CIVE 7252	Water Engineering: Planning, Design, and Management	
CIVE 7261	Surface Water Quality Modeling	
CIVE 7272	Air Quality Management	
CIVE 7392	Special Topics in Environmental Engineering (Hydraulic Modeling)	
CIVE 7392	Special Topics in Environmental Engineering (Aquatic Biogeochemistry)	

**OTHER ELECTIVES LIST**

Any required core course not used to meet the required core course requirement can be taken as another elective. Any restricted elective not used to meet the restricted elective requirement can be taken as another elective.

Code	Title	Hours
EECE 7204	Applied Probability and Stochastic Processes	
ENVR 5190	Soil Science	
ENVR 5260	Geographical Information Systems	
EEMB 5516	Oceanography	

IE 6200	Engineering Probability and Statistics
IE 7280	Statistical Methods in Engineering
IE 7290	Reliability Analysis and Risk Assessment
MATH 7241	Probability 1
MATH 7343	Applied Statistics
MATH 7344	Regression, ANOVA, and Design

**Program Credit/GPA Requirements**

32 total semester hours required  
Minimum 3.000 GPA required

**Sustainable Building Systems, MSSBS**

The sustainable building systems program focuses on the design and operation of buildings to provide a comfortable, healthy, and productive indoor environment with minimal energy and environmental impact. Students have an opportunity to develop leadership and decision-making skills to implement sustainable building practices in either the private or public sectors in the global market.

The graduates of the **Master of Science in Sustainable Building Systems** program should display a high level of engineering knowledge in a broad range of architectural engineering, civil engineering, and construction management while embracing the concepts of engineering sustainability as related to energy and materials usage and the effects on the environment. Graduates will have the base training necessary to lead efforts within companies to plan and implement sustainable practices for the design and operation of buildings, realize energy and materials efficiency improvements, and minimize environmental impact. Upon graduation, students will have a theoretical background to the concepts behind the LEED (Leadership in Energy and Environmental Design) Green Associate examination.

Below is a typical course sequence for graduation in two semesters. The program is flexible to accommodate full-time students—who wish to proceed over a period of two to four semesters—and part-time students—who can complete the program requirements by taking one to two courses per semester, finishing the program in approximately four years.

Degree Requirements	Full-Time Study	Part-Time Study
Core courses	12	12
Restricted electives	8	8
Open elective	12	12

**Graduate Certificate Options**

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 230).

**GORDON INSTITUTE OF ENGINEERING LEADERSHIP****Master's Degree in Sustainable Building Systems with Graduate Certificate in Engineering Leadership**

Students may complete a Master of Science in Sustainable Building Systems in addition to earning a Graduate Certificate in Engineering Leadership. Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The

integrated 32-semester-hour degree and certificate will require 16 hours of advisor-approved sustainable building systems technical courses.

Engineering Leadership (p. 225)

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
ARCH 5210	Environmental Systems <sup>1</sup>	4
SBSY 5100	Sustainable Design and Technologies in Construction	4
SBSY 5200	Sustainable Engineering Systems for Buildings	4

Students must register for this 0 SH course every semester:

SBSY 5400	Sustainable Building Systems Seminar
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### Electives

#### RESTRICTED ELECTIVE LIST

Code	Title	Hours
Complete 8 semester hours from the following:		8
ARCH 5220	Integrated Building Systems	
CIVE 5221	Construction Project Control and Organization	
CIVE 5231	Alternative Project Delivery Systems in Construction	
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure	
CIVE 5699	Special Topics in Civil Engineering (Building Energy Performance Simulation)	
CIVE 7220	Construction Management	
or EMGT 5220	Engineering Project Management	
CIVE 7230	Legal Aspects of Civil Engineering	
EMGT 6305	Financial Management for Engineers	
SBSY 5300	Information Systems for Integrated Project Delivery	

#### OTHER ELECTIVE LIST

Any restricted elective not used to meet the restricted elective requirement can be taken as another elective.

Code	Title	Hours
Complete 12 semester hours from the following:		12
ACCT 6200	Financial Reporting and Managerial Decision Making 1	
ACCT 6201	Financial Reporting and Managerial Decision Making 2	
CIVE 7350	Behavior of Concrete Structures	
CIVE 7351	Behavior of Steel Structures	
CIVE 7388	Special Topics in Civil Engineering (Dynamics and Control of Infrastructure Systems)	
CIVE 7388	Special Topics in Civil Engineering (Urban Informatics Processing)	
FINA 6200	Value Creation through Financial Decision Making	

FINA 6216	Valuation and Value Creation
FINA 6217	Real Estate Finance and Investment
LPSC 7312	Cities, Sustainability, and Climate Change
ME 5645	Environmental Issues in Manufacturing and Product Use

### Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

<sup>1</sup> Recitation (ARCH 5211) is a required corequisite.

## Electrical and Computer Engineering

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The Department of Electrical and Computer Engineering's (ECE) graduate program is a dynamic and thriving center of world-recognized research in a wide range of areas. The department has strong ties to local industry and the world-famous hospitals and medical centers of Boston and is involved in many joint research projects with them. With four NSF- and DHS-funded research centers and over 20 industrial partners, faculty and students are actively conducting cutting-edge research in areas such as computer vision; pattern recognition and machine learning; brain-computer interface; power systems and power electronics; underwater communication networks and signal processing; robotics; information theory; communications, control, and signal processing; RF, electromagnetics, optics, and magnetic materials; micro/nanomechanical structures and advanced nanomaterials; power-first system/computer architecture; internet-of-things; ultra-low power biomedical and neural circuits and systems.

ECE's graduate program educates MS and PhD students with deep fundamental and practical knowledge in the various disciplines of electrical and computer engineering by offering a strong curriculum and providing opportunities for research in these disciplines. The department educates the next generation of highly skilled engineers and researchers with necessary skills to address the future needs of industry, government, and humanity.

### Overview of Programs Offered

ECE's graduate program offers a Master of Science in Electrical and Computer Engineering, a Master of Science in Electrical and Computer Engineering Leadership, a Doctor of Philosophy in Electrical Engineering, and a Doctor of Philosophy in Computer Engineering.

### Mission of the Department

The primary educational missions of the electrical and computer engineering department are to educate undergraduate students so they have the opportunity to obtain successful careers in electrical and

computer engineering and related disciplines, and pursue advanced study such as graduate study in engineering or related disciplines, and to educate graduate students so they can make meaningful contributions to research and industry.

### Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 230).

#### GORDON INSTITUTE OF ENGINEERING LEADERSHIP OPTION

Students have the opportunity to pursue the Master of Science in Electrical and Computer Engineering Leadership (MSECEL) (p. 176) along with the Graduate Certificate in Engineering Leadership.

In addition, students have the opportunity to pursue the Gordon Engineering Leadership Program (p. 224) in combination with the Master of Science in Electrical and Computer Engineering. This option results in an increase in total hours beyond that required for the master's degree only.

### Programs

#### Doctor of Philosophy (PhD)

- Computer Engineering (p. 152)
- Computer Engineering—Advanced Entry (p. 153)
- Electrical Engineering (p. 154)
- Electrical Engineering—Advanced Entry (p. 155)

#### Master of Science (MS)

- Applied Physics and Engineering (p. 156)
- Data Science (p. 101)
- Robotics (p. 118)

#### Master of Science in Electrical and Computer Engineering (MSECE)

- Concentration in Communications, Control, and Signal Processing (p. 160)
- Concentration in Computer Systems and Software (p. 162)
- Concentration in Computer Networks and Security (p. 165)
- Concentration in Computer Vision, Machine Learning, and Algorithms (p. 167)
- Concentration in Electromagnetics, Plasma, and Optics (p. 169)
- Concentration in Microsystems, Materials, and Devices (p. 172)
- Concentration in Power Systems (p. 174)

#### Master of Science in Electrical and Computer Engineering Leadership (MSECEL)

- Electrical and Computer Engineering Leadership (p. 176)

### Computer Engineering, PhD

The Doctor of Philosophy in Computer Engineering offers students an opportunity for study in a broad range of areas in computer engineering. Details on PhD requirements can be found in the *Graduate Program Guide*. A summary of requirements is given below.

#### Qualifying Exam and Degree Candidacy

The PhD qualifying exam is the examination for admissions to the doctoral programs in electrical engineering and in computer engineering. It is a written exam in the student's major area, and some concentrations

include an oral exam. The exam has the dual purposes of serving as an indicator of the student's capability for successful completion of the PhD in electrical engineering or in computer engineering and of serving as a guide to the student's advisor in developing a suitable plan of study, tailored to the individual needs of the student. Students are tested on graduate course material as specified by the faculty in the chosen area.

A student who has matriculated 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.

#### Annual Review

PhD students are reviewed annually starting with their second year in the ECE department. Students complete a form and submit a one-page report of their progress during the past year. Each student is evaluated and receives a grade of satisfactory or unsatisfactory. Students who receive an unsatisfactory grade will meet with their advisor and the ECE department chair in order to receive feedback and set goals for the next year. Students who receive unsatisfactory grades in two consecutive years are terminated from the PhD program.

#### Residence Requirement

After reaching PhD candidacy, one year of full-time graduate work or two consecutive years of part-time graduate work satisfy the university residence requirement. In the latter case, the student's advisor must approve a detailed schedule in order to ensure that the student devotes at least half of the time to the requirements of the Graduate School of Engineering.

#### Dissertation

Within one year of passing the PhD qualifying exam, the PhD candidate must form a dissertation committee. A dissertation committee must have at least three members. At least two of the committee members must be tenured or tenure-track Department of Electrical and Computer Engineering (ECE) faculty, and the committee must include the student's advisor. The chair of the committee must be a tenured or tenure-track faculty member in the ECE department.

The dissertation committee must design an appropriate program of study that prepares the student to be a successful doctoral-level engineer as well as direct the candidate's dissertation research. The dissertation committee will approve the dissertation in final form.

#### DISSERTATION AND DISSERTATION CONTINUATION REGISTRATION

Upon successful completion of the PhD qualifying exam and the required course work, the PhD candidate must register in two consecutive semesters for Dissertation (EECE 9990). Upon completion of this sequence, the student must register for Dissertation Continuation (EECE 9996) in every semester until the dissertation is completed. A student may not register for Continuation until he or she fulfills the two-semester sequence of Dissertation.

#### REGISTRATION REQUIREMENTS FOR PREDOCTORAL AND PHD CANDIDATE GRADUATE ASSISTANTS

The ECE department requires that predoctoral students and PhD candidates who hold research or teaching assistantships be registered full-time. Predoctoral PhD students may register for Research (EECE 9986) (zero credit, full-time equivalent) *if needed* to fulfill the registration requirement.



**PHD PROPOSAL REVIEW**

Each PhD candidate must demonstrate, by means of the proposal review, subject matter knowledge satisfactory for the award of the degree.

The proposal review is an oral presentation followed by a question-and-answer session administered by the student’s dissertation advisor/committee. The proposal review will be given at the time the student submits his or her dissertation proposal to the dissertation advisor/committee for approval. As part of this exam, the dissertation advisor/committee will review the student’s doctoral program and his or her performance in graduate courses, as well as examine the student on subject matter related to his or her graduate course work and dissertation subject area.

**FINAL DISSERTATION DEFENSE**

The final dissertation defense will include the subject matter of the dissertation and significant developments in the field of the dissertation work. Other related fields may be included if recommended by the examining faculty. The dissertation defense must be scheduled at least six months after the PhD proposal review.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Milestones**

- Annual departmental review (each fall semester after the student has been in the program for at least one year)
- Qualifying examination
- Dissertation committee
- Proposal stage review
- Dissertation defense

**Core Requirements**

Complete 32 semester hours of approved course work—equivalent of MSECE degree. Then complete 16 semester hours, of which 8 must be graduate-level EECE courses. Consult faculty research advisor for acceptable courses.

**Dissertation**

Code	Title	Hours
Complete the following (repeatable) course twice:		
EECE 9990	Dissertation	

**Program Credit/GPA Requirements**

- 48 total semester hours required
- Minimum 3.000 GPA required

**Computer Engineering, PhD—Advanced Entry**

The PhD program in computer engineering offers students an opportunity for study in a broad range of areas in computer engineering. Details on PhD requirements can be found in the *Graduate Program Guide*. A summary of requirements is given below.

**Qualifying Exam and Degree Candidacy**

The PhD qualifying exam is the examination for admissions to the doctoral programs in electrical engineering and in computer engineering. It is a written exam in the student’s major area, and some concentrations include an oral exam. The exam has the dual purposes of serving as an indicator of the student’s capability for successful completion of the PhD in electrical engineering or in computer engineering and of serving as a guide to the student’s advisor in developing a suitable plan of study,

tailored to the individual needs of the student. Students are tested on graduate course material as specified by the faculty in the chosen area.

A student who has matriculated 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.

**Annual Review**

PhD students are reviewed annually starting with their second year in the ECE department. Students complete a form and submit a one-page report of their progress during the past year. Each student is evaluated and receives a grade of satisfactory or unsatisfactory. Students who receive an unsatisfactory grade will meet with their advisor and the ECE department chair in order to receive feedback and set goals for the next year. Students who receive unsatisfactory grades in two consecutive years are terminated from the PhD program.

**Residence Requirement**

After reaching PhD candidacy, one year of full-time graduate work or two consecutive years of part-time graduate work satisfy the university residence requirement. In the latter case, the student’s advisor must approve a detailed schedule in order to ensure that the student devotes at least half of the time to the requirements of the Graduate School of Engineering.

**Dissertation**

Within one year of passing the PhD qualifying exam, the PhD candidate must form a dissertation committee. A dissertation committee must have at least three members. At least two of the committee members must be tenured or tenure-track Department of Electrical and Computer Engineering (ECE) faculty and the committee must include the student’s advisor. The chair of the committee must be a tenured or tenure-track faculty member in the ECE department.

The dissertation committee must design an appropriate program of study that prepares the student to be a successful doctoral-level engineer as well as direct the candidate’s dissertation research. The dissertation committee will approve the dissertation in final form.

**DISSERTATION AND DISSERTATION CONTINUATION REGISTRATION**

Upon successful completion of the PhD qualifying exam and the required course work, the PhD candidate must register in two consecutive semesters for Dissertation (EECE 9990) . Upon completion of this sequence, the student must register for Dissertation Continuation (EECE 9996) in every semester until the dissertation is completed.. A student may not register for Continuation until he or she fulfills the two-semester sequence of Dissertation.

**REGISTRATION REQUIREMENTS FOR PREDOCTORAL AND PHD CANDIDATE GRADUATE ASSISTANTS**

The ECE department requires that predoctoral students and PhD candidates who hold research or teaching assistantships be registered full-time. Predoctoral PhD students may register for Research (EECE 9986) (zero credit, full-time equivalent) *if needed* to fulfill the registration requirement.

**PHD PROPOSAL REVIEW**

Each PhD candidate must demonstrate, by means of the proposal review, subject matter knowledge satisfactory for the award of the degree.

The proposal review is an oral presentation followed by a question-and-answer session administered by the student's dissertation advisor/committee. The proposal review will be given at the time the student submits his or her dissertation proposal to the dissertation advisor/committee for approval. As part of this exam, the dissertation advisor/committee will review the student's doctoral program and his or her performance in graduate courses, as well as examine the student on subject matter related to his or her graduate course work and dissertation subject area.

### FINAL DISSERTATION DEFENSE

The final dissertation defense will include the subject matter of the dissertation and significant developments in the field of the dissertation work. Other related fields may be included if recommended by the examining faculty. The dissertation defense must be scheduled at least six months after the PhD proposal review.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Milestones

Annual review (each fall semester after the student has been in the program for at least one year)  
 Qualifying examination  
 Dissertation committee  
 Proposal stage review  
 Dissertation defense

### Core Requirements

Complete 16 semester hours of approved course work. At least 8 semester hours must be graduate-level EECE courses. Consult your faculty advisor for acceptable courses.

### Dissertation

Code	Title	Hours
Complete the following (repeatable) course twice:		
EECE 9990	Dissertation	

### Program Credit/GPA Requirements

16 total semester hours required  
 Minimum 3.000 GPA required

## Electrical Engineering, PhD

The PhD program in electrical engineering offers students an opportunity for study in a broad range of areas in electrical engineering. Details on PhD requirements can be found in the *Graduate Program Guide*. A summary of requirements is given below.

### Qualifying Exam and Degree Candidacy

The PhD qualifying exam is the examination for admissions to the doctoral programs in electrical engineering and in computer engineering. It is a written exam in the student's major area, and some concentrations include an oral exam. The exam has the dual purposes of serving as an indicator of the student's capability for successful completion of the PhD in electrical engineering or in computer engineering and of serving as a guide to the student's 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.

### Annual Review

PhD students are reviewed annually starting with their second year in the ECE department. Students complete a form and submit a one-page report of their progress during the past year. Each student is evaluated and receives a grade of satisfactory or unsatisfactory. Students who receive an unsatisfactory grade will meet with their advisor and the ECE department chair in order to receive feedback and set goals for the next year. Students who receive unsatisfactory grades in two consecutive years are terminated from the PhD program.

### Residence Requirement

After reaching PhD candidacy, one year of full-time graduate work or two consecutive years of part-time graduate work satisfy the university residence requirement. In the latter case, the student's advisor must approve a detailed schedule in order to ensure that the student devotes at least half of the time to the requirements of the Graduate School of Engineering.

### Dissertation

Within one year of passing the PhD qualifying exam, the PhD candidate must form a dissertation committee. A dissertation committee must have at least three members. At least two of the committee members must be tenured or tenure-track Department of Electrical and Computer Engineering (ECE) faculty and the committee must include the student's advisor. The chair of the committee must be a tenured or tenure-track faculty member in the ECE department.

The dissertation committee must design an appropriate program of study that prepares the student to be a successful doctoral-level engineer as well as direct the candidate's dissertation research. The dissertation committee will approve the dissertation in final form.

### DISSERTATION AND DISSERTATION CONTINUATION REGISTRATION

Upon successful completion of the PhD qualifying exam and the required course work, the PhD candidate must register in two consecutive semesters for Dissertation (EECE 9990). Upon completion of this sequence, the student must register for Dissertation (EECE 9990) in every semester until the dissertation is completed. A student may not register for Continuation until he or she fulfills the two-semester sequence of Dissertation.

### REGISTRATION REQUIREMENTS FOR PREDOCTORAL AND PHD CANDIDATE GRADUATE ASSISTANTS

The ECE department requires that predoctoral students and PhD candidates who hold research or teaching assistantships be registered full-time. Predoctoral PhD students may register for Research (EECE 9986) (zero credit, full-time equivalent) if needed to fulfill the registration requirement.

### PHD PROPOSAL REVIEW

Each PhD candidate must demonstrate, by means of the proposal review, subject matter knowledge satisfactory for the award of the degree.

The proposal review is an oral presentation followed by a question-and-answer session administered by the student's dissertation advisor/committee. The proposal review will be given at the time the student submits his or her dissertation proposal to the dissertation advisor/committee for approval. As part of this exam, the dissertation advisor/committee will review the student's doctoral program and his or her

performance in graduate courses, as well as examine the student on subject matter related to his or her graduate course work and dissertation subject area.

**FINAL DISSERTATION DEFENSE**

The final dissertation defense will include the subject matter of the dissertation and significant developments in the field of the dissertation work. Other related fields may be included if recommended by the examining faculty. The dissertation defense must be scheduled at least six months after the PhD proposal review.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Milestones**

- Annual review (each fall semester after the student has been in the program for at least one year)
- Qualifying examination
- Dissertation committee
- Proposal stage review
- Dissertation defense

**Core Requirements**

Complete 32 semester hours of approved course work—equivalent of MSECE degree. Then complete 16 semester hours, of which 8 must be graduate-level EECE courses. Consult your faculty research advisor for acceptable courses.

**Dissertation**

Code	Title	Hours
Complete the following (repeatable) course twice:		
EECE 9990	Dissertation	

**Program Credit/GPA Requirements**

- 48 total semester hours required
- Minimum 3.000 GPA required

**Electrical Engineering, PhD—Advanced Entry**

The PhD program in electrical engineering offers students the opportunity for study in a broad range of areas in electrical engineering. Details on PhD requirements can be found in the *Graduate Program Guide*. A summary of requirements is given below.

**Qualifying Exam and Degree Candidacy**

The PhD qualifying exam is the examination for admissions to the doctoral programs in electrical engineering and in computer engineering. It is a written exam in the student’s major area, and some concentrations include an oral exam. The exam has the dual purposes of serving as an indicator of the student’s capability for successful completion of the PhD in electrical engineering or in computer engineering and of serving as a guide to the student’s 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.

**Annual Review**

PhD students are reviewed annually starting with their second year in the ECE department. Students complete a form and submit a one-page report of their progress during the past year. Each student is evaluated and receives a grade of satisfactory or unsatisfactory. Students who receive an unsatisfactory grade will meet with their advisor and the ECE department chair in order to receive feedback and set goals for the next year. Students who receive unsatisfactory grades in two consecutive years are terminated from the PhD program.

**Residence Requirement**

After reaching PhD candidacy, one year of full-time graduate work or two consecutive years of part-time graduate work satisfy the university residence requirement. In the latter case, the student’s advisor must approve a detailed schedule in order to ensure that the student devotes at least half of the time to the requirements of the Graduate School of Engineering.

**Dissertation**

Within one year of passing the PhD qualifying exam, the PhD candidate must form a dissertation committee. A dissertation committee must have at least three members. At least two of the committee members must be tenured or tenure-track Department of Electrical and Computer Engineering (ECE) faculty and the committee must include the student’s advisor. The chair of the committee must be a tenured or tenure-track faculty member in the ECE department.

The dissertation committee must design an appropriate program of study that prepares the student to be a successful doctoral-level engineer as well as direct the candidate’s dissertation research. The dissertation committee will approve the dissertation in final form.

**DISSERTATION AND DISSERTATION CONTINUATION REGISTRATION**

Upon successful completion of the PhD qualifying exam and the required course work, the PhD candidate must register in two consecutive semesters for Dissertation (EECE 9990). Upon completion of this sequence, the student must register for Dissertation Continuation (EECE 9996) in every semester until the dissertation is completed. A student may not register for Continuation until he or she fulfills the two-semester sequence of Dissertation.

**REGISTRATION REQUIREMENTS FOR PREDOCTORAL AND PHD CANDIDATE GRADUATE ASSISTANTS**

The ECE department requires that predoctoral students and PhD candidates who hold research or teaching assistantships be registered full-time. Predoctoral PhD students may register for Research (EECE 9986) (zero credit, full-time equivalent) if needed to fulfill the registration requirement.

**PHD PROPOSAL REVIEW**

Each PhD candidate must demonstrate, by means of the proposal review, subject matter knowledge satisfactory for the award of the degree.

The proposal review is an oral presentation followed by a question-and-answer session administered by the student’s dissertation advisor/committee. The proposal review will be given at the time the student submits his or her dissertation proposal to the dissertation advisor/committee for approval. As part of this exam, the dissertation advisor/committee will review the student’s doctoral program and his or her performance in graduate courses, as well as examine the student on

subject matter related to his or her graduate course work and dissertation subject area.

### FINAL DISSERTATION DEFENSE

The final dissertation defense will include the subject matter of the dissertation and significant developments in the field of the dissertation work. Other related fields may be included if recommended by the examining faculty. The dissertation defense must be scheduled at least six months after the PhD proposal review.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

Annual review (each fall semester after the student has been in the program for at least one year)  
Qualifying examination  
Dissertation committee  
Proposal stage review  
Dissertation defense

### Core Requirements

Complete 16 semester hours of approved course work. At least 8 semester hours must be graduate-level EECE courses. Consult your faculty advisor for acceptable courses.

### Dissertation

Code	Title	Hours
Complete the following (repeatable) course twice:		
EECE 9990	Dissertation	

### Program Credit/GPA Requirements

16 total semester hours required  
Minimum 3.000 GPA required

## Applied Physics and Engineering, MS

The combined MS program in applied physics and engineering allows graduate students to receive training in one of three concentrations of the electrical and computer engineering department while also receiving fundamental graduate-level physics training that is relevant to that area.

### Thesis Option

A student may complete an additional 8 semester hours of thesis. Students may register for an additional two semesters of thesis work, Thesis (EECE 7990) (4 semester hours) or Thesis (PHYS 7990) (4 semester hours), depending on the affiliation of the thesis advisor. A thesis committee is composed of an advisor and two faculty members from physics or electrical engineering.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Concentrations

Complete one of the following concentrations:

- Microsystems, Materials, and Devices (p. 156)
- Electromagnetics, Plasma, and Optics (p. 156)
- Analysis, Modeling, and Computation (p. 157)

## MICROSYSTEMS, MATERIALS, AND DEVICES

Code	Title	Hours
<b>Core Courses</b>		
EECE 7201	Solid State Devices	4
PHYS 7324	Condensed Matter Physics	4
<b>Engineering Course Work</b>		
Complete 12 semester hours from the following:		12
EECE 5606	Micro- and Nanofabrication	
EECE 5680	Electric Drives	
EECE 7204	Applied Probability and Stochastic Processes	
EECE 7240	Analog Integrated Circuit Design	
EECE 7242	Integrated Circuits for Mixed Signals and Data Communication	
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)	
EECE 7245	Microwave Circuit Design for Wireless Communication	
EECE 7353	VLSI Design	
EECE 7398	Special Topics	

### Physics Course Work

Complete 12 semester hours from the following:		12
PHYS 5318	Principles of Experimental Physics	
PHYS 7301	Classical Mechanics/Math Methods	
PHYS 7302	Electromagnetic Theory	
PHYS 7305	Statistical Physics	
PHYS 7315	Quantum Theory 1	
PHYS 7316	Quantum Theory 2	
PHYS 7321	Computational Physics	
PHYS 7331	Network Science Data	
PHYS 7734	Topics: Condensed Matter Physics	

## ELECTROMAGNETICS, PLASMA, AND OPTICS

Code	Title	Hours
<b>Core Courses</b>		
EECE 7203	Complex Variable Theory and Differential Equations	4
PHYS 7302	Electromagnetic Theory	4
<b>Engineering Course Work</b>		
Complete 12 semester hours from the following:		12
EECE 5698	Special Topics in Electrical and Computer Engineering (Subsurface Imaging)	
EECE 7105	Optics for Engineers	
EECE 7202	Electromagnetic Theory 1	
EECE 7245	Microwave Circuit Design for Wireless Communication	
EECE 7270	Electromagnetic Theory 2	
EECE 7271	Computational Methods in Electromagnetics	
EECE 7275	Antennas and Radiation	
EECE 7293	Modern Imaging	

### Physics Course Work

Complete 12 semester hours from the following:		12
PHYS 5318	Principles of Experimental Physics	
PHYS 7305	Statistical Physics	

PHYS 7315	Quantum Theory 1
PHYS 7316	Quantum Theory 2
PHYS 7321	Computational Physics
PHYS 7324	Condensed Matter Physics
PHYS 7731	Biological Physics 1

### ANALYSIS, MODELING, AND COMPUTATION

Code	Title	Hours
<b>Core Courses</b>		
EECE 7205	Fundamentals of Computer Engineering	4
PHYS 7321	Computational Physics	4
<b>Engineering Course Work</b>		
Complete 12 semester hours from the following:		12
EECE 5639	Computer Vision	
EECE 5640	High-Performance Computing	
EECE 5642	Data Visualization	
EECE 5643	Simulation and Performance Evaluation	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7205	Fundamentals of Computer Engineering	
EECE 7271	Computational Methods in Electromagnetics	
EECE 7352	Computer Architecture	
EECE 7353	VLSI Design	
EECE 7374	Fundamentals of Computer Networks	
EECE 7376	Operating Systems: Interface and Implementation	
<b>Physics Course Work</b>		
Complete 12 semester hours from the following:		12
PHYS 5116	Complex Networks and Applications	
PHYS 5318	Principles of Experimental Physics	
PHYS 7301	Classical Mechanics/Math Methods	
PHYS 7305	Statistical Physics	
PHYS 7331	Network Science Data	
PHYS 7335	Dynamical Processes in Complex Networks	

### Thesis Option

Students may register for an additional two semesters of thesis work, Thesis (EECE 7990) or Thesis (PHYS 7990), depending on the affiliation of the thesis advisor. Thesis credits cannot be substituted for any of the course work listed above. This option requires a total of 40 semester hours for the master's degree.

### Program Credit/GPA Requirements

32–40 total semester hours required

Minimum 3.000 GPA required

## Data Science, MS

Khoury College of Computer Sciences and the Department of Electrical and Computer Engineering (ECE) jointly offer a new interdisciplinary Master of Science program in data science. This program is designed to give students a comprehensive framework for reasoning about data. Students will engage in extensive course work intended to develop depth in data collection, storage, retrieval, manipulation, visualization, modeling and interpretation. Students will also be able to choose elective courses from a variety of offerings in Khoury, the College of Engineering

(COE), and throughout the campus to explore areas that generate data, or specialized data science applications. Successful program graduates will be well positioned to attain data scientist and data engineer positions in a fast-growing field or to progress into doctoral degrees in related disciplines.

### Prerequisite Courses

The Master of Science in Data Science curriculum is tailored toward technically or mathematically trained students. To ensure that all students have the foundation necessary to be successful in this program, each incoming student, regardless of his or her background, must take two introductory courses in programming and mathematics. The introductory courses are not counted as credit towards the degree, but are included in the student's cumulative GPA. The two introductory courses are Introduction to Programming for Data Science (DS 5010) and Introduction to Linear Algebra and Probability for Data Science (DS 5020)

If a student believes that he or she has sufficient academic or professional experience in these areas, they may opt to take two placement exams administered one week prior to the beginning of the semester. The two exams cover fundamentals of computer science and programming skills and basic statistics, probability, and linear algebra. If a student scores a B or higher, he or she is waived out of the corresponding course.

### Learning Outcomes

Students who successfully complete the MS degree will be able to:

- Collect data from numerous sources (databases, files, XML, JSON, CSV, and Web APIs) and integrate them into a form in which the data is fit for analysis
- Use R and Python to explore data, produce summary statistics, perform statistical analyses; use standard data mining and machine-learning models for effective analysis
- Select, plan, and implement storage, search, and retrieval components of large-scale structure and unstructured repositories
- Retrieve data for analysis, which requires knowledge of standard retrieval mechanisms such as SQL and XPath, but also retrieval of unstructured information such as text, image, and a variety of alternate formats
- Manage, process, analyze, and visualize data at scale. This outcome allows students to handle data where the conventional information technology fail
- Match the methodological principles and limitations of machine learning and data mining methods to specific applied problems and communicate the applicability and the advantages/disadvantages of the methods in the specific problem to nondata experts
- Carry out the full data analysis workflow, including unsupervised class discovery, supervised class comparison, and supervised class prediction; Summarize, interpret, and communicate the analysis of results
- Organize visualization of data for analysis, understanding, and communication; choose appropriate visualization method for a given data type using effective design and human perception principle
- Develop methods for modeling, analyzing, and reasoning about data arising in one or more application domains such as social science, health informatics, web and social media, climate informatics, urban informatics, geographical information systems, business analytics, bioinformatics, complex networks, public health, and game design

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Students should refer to the course numbering table for graduate course leveling (p. 29).

## Core Requirements

A cumulative GPA of 3.000 or higher is required in the following core courses:

Code	Title	Hours
<b>Algorithms</b>		
Complete 4 semester hours from the following:		4
CS 5800	Algorithms	
EECE 7205	Fundamentals of Computer Engineering	
<b>Data Management and Processing</b>		
DS 5110	Introduction to Data Management and Processing	4
<b>Machine Learning and Data Mining</b>		
DS 5220	Supervised Machine Learning and Learning Theory	4
DS 5230	Unsupervised Machine Learning and Data Mining	4
<b>Presentation and Visualization</b>		
DS 5500	Information Visualization: Applications in Data Science	4

## Electives <sup>1</sup>

Code	Title	Hours
Complete 12 semester hours from the following:		12
<b>College of Computer and Information Science</b>		
CS 5100	Foundations of Artificial Intelligence	
CS 5200	Database Management Systems	
CS 5340	Computer/Human Interaction	
CS 5610	Web Development	
CS 6120	Natural Language Processing	
CS 6200	Information Retrieval	
CS 6240	Large-Scale Parallel Data Processing	
CS 6350	Empirical Research Methods	
CS 6620	Fundamentals of Cloud Computing	
CS 7180	Special Topics in Artificial Intelligence	
CS 7280	Special Topics in Database Management	

### College of Engineering

CIVE 7100	Time Series and Geospatial Data Sciences	
CIVE 7388	Special Topics in Civil Engineering	
EECE 5639	Computer Vision	
EECE 5640	High-Performance Computing	
EECE 7337	Information Theory	
EECE 7370	Advanced Computer Vision	
EECE 7397	Advanced Machine Learning	
IE 7280	Statistical Methods in Engineering	

### College of Social Sciences and Humanities

ECON 5140	Applied Econometrics	
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PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5262	Big Data for Cities	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
PPUA 5266	Urban Theory and Science	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	
POLS 7200	Perspectives on Social Science Inquiry	
POLS 7201	Research Design	
POLS 7202	Quantitative Techniques	
<b>D'Amore-McKim School of Business</b>		
BUSN 6320	Business Analytics Fundamentals	
<b>College of Science</b>		
PHYS 5116	Complex Networks and Applications	
PHYS 7305	Statistical Physics	
PHYS 7321	Computational Physics	
PHYS 7331	Network Science Data	
<b>Bouvé College of Health Sciences</b>		
PHTH 5202	Introduction to Epidemiology	
PHTH 5210	Biostatistics in Public Health	
PHTH 6224	Social Epidemiology	
<b>College of Arts, Media and Design</b>		
GSND 5110	Game Design and Analysis	
GSND 6350	Data-Driven Player Modeling	

## Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

<sup>1</sup> Students taking electives worth less than 4 credits (i.e., Bouvé, CSSH courses) should enroll for an accompanying data science project course in the same semester to bring the cumulative credits to 4. In order to earn this additional credit, students are expected to work with faculty to design an additional project in line with the curricular aims of their chosen elective and the data science core learning outcomes.

## Robotics, MS

MS Robotics is a multidisciplinary Master of Science program offered by the College of Engineering (COE) and the Khoury College of Computer Sciences. The program is designed to provide students comprehensive training in algorithms, sensors, control systems, and mechanisms used in robotics.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
<b>Mechanical Engineering</b>		
Complete one of the following:		4
ME 5659	Control Systems Engineering	
ME 5250	Robot Mechanics and Control	
<b>Electrical and Computer Engineering</b>		
Complete one of the following:		4

EECE 5550	Mobile Robotics	
EECE 5554	Robotics Sensing and Navigation	
<b>Computer Science</b>		
Complete one of the following:		4
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5335	Robotic Science and Systems	

## Concentrations

Complete one of the following concentrations:

- Mechanical Engineering (p. 119)
- Electrical and Computer Engineering (p. 119)
- Computer Science (p. 119)

## MECHANICAL ENGINEERING

Code	Title	Hours
<b>Required Course</b>		
Complete additional ME course not used to fulfill the core requirements:		4
ME 5659	Control Systems Engineering	
ME 5250	Robot Mechanics and Control	
<b>Options</b>		
Complete one of the following options:		16
<i>Course Work Option</i>		
Complete four of the following from the mechanical engineering course list. (p. 119)		
<i>Thesis Option</i>		
ME 7990	Thesis	
Complete two of the following from the mechanical engineering course list. (p. 119)		
<i>Project Option</i>		
ME 7945	Master's Project	
Complete three of the following from the mechanical engineering course list. (p. 119)		

## ELECTRICAL AND COMPUTER ENGINEERING

Code	Title	Hours
<b>Required Course</b>		
Complete additional EECE course not used to fulfill the core requirements:		4
EECE 5698	Special Topics in Electrical and Computer Engineering	
EECE 5698	Special Topics in Electrical and Computer Engineering	
<b>Options</b>		
Complete one of the following options:		16
<i>Course Work Option</i>		
Complete four of the following from the electrical and computer engineering course list. (p. 119)		
<i>Thesis Option</i>		
EECE 7990	Thesis	
Complete two of the following from the electrical and computer engineering course list. (p. 119)		
<i>Project Option</i>		
EECE 7674	Master's Project	

Complete three of the following from the electrical and computer engineering course list. (p. 119)

## COMPUTER SCIENCE

Code	Title	Hours
<b>Required Course</b>		
Complete additional CS course not used to fulfill the core requirements:		4
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5335	Robotic Science and Systems	
<b>Options</b>		
Complete one of the following options:		16
<i>Course Work Option</i>		
Complete four of the following from the computer science course list. (p. 120)		
<i>Thesis Option</i>		
CS 7990	Thesis (complete twice for a total of 8 credits)	
Complete three of the following from the computer science course list. (p. 120)		
<i>Project Option</i>		
CS 8674	Master's Project	
Complete three of the following from the computer science course list. (p. 120)		

## Program Credit/GPA Requirements

32 total semester hours required  
Minimum 3.000 GPA required

## Course Lists

### MECHANICAL ENGINEERING COURSE LIST

Code	Title	Hours
ME 5240	Computer Aided Design and Manufacturing	
ME 5245	Mechatronic Systems	
ME 5250	Robot Mechanics and Control	
ME 5655	Dynamics and Mechanical Vibration	
ME 5659	Control Systems Engineering	
ME 5665	Musculoskeletal Biomechanics	
ME 6200	Mathematical Methods for Mechanical Engineers 1	
ME 6201	Mathematical Methods for Mechanical Engineers 2	
ME 7210	Elasticity and Plasticity	
ME 7247	Advanced Control Engineering	
ME 7253	Advanced Vibrations	
IE 5630	Biosensor and Human Behavior Measurement	
IE 7280	Statistical Methods in Engineering	
IE 7315	Human Factors Engineering	

### ELECTRICAL AND COMPUTER ENGINEERING COURSE LIST

Code	Title	Hours
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	

EECE 5580	Classical Control Systems
EECE 5639	Computer Vision
EECE 5642	Data Visualization
EECE 5644	Introduction to Machine Learning and Pattern Recognition
EECE 7150	Autonomous Field Robotics
EECE 7263	Humanoid Robotics
EECE 7323	Numerical Optimization Methods
EECE 7337	Information Theory
EECE 7370	Advanced Computer Vision
EECE 7397	Advanced Machine Learning

**COMPUTER SCIENCE COURSE LIST**

Code	Title	Hours
CS 5006	Algorithms	
CS 5100	Foundations of Artificial Intelligence	
CS 5320	Digital Image Processing	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 6110	Knowledge-Based Systems	
CS 6120	Natural Language Processing	
CS 6130	Affective Computing	
CS 6140	Machine Learning	
CS 6350	Empirical Research Methods	
CS 7140	Advanced Machine Learning	
CS 7170	Seminar in Artificial Intelligence	
DS 5220	Supervised Machine Learning and Learning Theory	

### Electrical and Computer Engineering with Concentration in Communications, Control, and Signal Processing, MSECE

The master's degree program in electrical and computer engineering offers in-depth course work within the concentration-choice-related areas. The curriculum is integrated and intensive and is built on state-of-the-art research, taught by faculty who are experts in their areas.

**Excluded Courses for All MSECE Concentrations**

You **cannot take excluded courses as part of your MSECE program**. Please do not petition to take these courses, as any petition to take these courses will be automatically rejected. Courses from the following subject areas may not count toward any concentration within the MSECE program: CSYE, ENSY, EMGT, INFO, SBSY, TELE. Select CS courses are also excluded from all MSECE concentrations. Please see the program requirements tab and your college administrator for more information.

**Graduate Certificate Options**

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 230).

**GORDON INSTITUTE OF ENGINEERING LEADERSHIP**

**Master's Degree in Electrical and Computer Engineering with a Concentration in Communications, Control, and Signal Processing with Graduate Certificate in Engineering Leadership**

Students may complete a Master of Science in Electrical and Computer Engineering with a Concentration in Communications, Control, and Signal Processing in addition to earning a Graduate Certificate in Engineering Leadership. Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 48-semester-hour degree and certificate will require 32 semester hours of advisor-approved communications, control, and signal processing technical courses.

Engineering Leadership (p. 225)

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Options**

Complete one of the following options:

**COURSE WORK OPTION**

Code	Title	Hours
<b>Depth Courses</b>		
Complete 20 semester hours from the depth course list below. (p. 160)		20
<b>Breadth Courses</b>		
Complete 8 semester hours from the breadth course list below. (p. 161)		8
Note: Depth courses cannot be taken for breadth.		
<b>Elective</b>		
Complete 4 additional semester hours from either the depth or breadth course lists below.		4

**THESIS OPTION**

Code	Title	Hours
EECE 7990	Thesis	8
<b>Depth Courses</b>		
Complete 12 semester hours from the depth course list below. (p. 160)		12
<b>Breadth Courses</b>		
Complete 4 semester hours from the breadth course list below. (p. 161)		4
Note: Depth courses cannot be taken for breadth.		
<b>Elective</b>		
Complete 8 additional semester hours from either the depth or breadth course lists below.		8

**Course Lists****DEPTH COURSES**

Code	Title	Hours
EECE 5115	Dynamical Systems in Biological Engineering	
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5576	Wireless Communication Systems	
EECE 5580	Classical Control Systems	
EECE 5610	Digital Control Systems	



EECE 5626	Image Processing and Pattern Recognition
EECE 5666	Digital Signal Processing
EECE 5698	Special Topics in Electrical and Computer Engineering (GNSS Signal Processing)
EECE 5698	Special Topics in Electrical and Computer Engineering (Feedback Control Systems: Applications to Unmanned Aerial Vehicles)
EECE 7200	Linear Systems Analysis
EECE 7204	Applied Probability and Stochastic Processes
EECE 7211	Nonlinear Control
EECE 7213	System Identification and Adaptive Control
EECE 7214	Optimal and Robust Control
EECE 7263	Humanoid Robotics
EECE 7310	Modern Signal Processing
EECE 7323	Numerical Optimization Methods
EECE 7336	Digital Communications
EECE 7337	Information Theory
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization
EECE 7346	Probabilistic System Modeling and Analysis
EECE 7398	Special Topics (Legged Robots)
EECE 7400	Special Problems in Electrical and Computer Engineering

**BREADTH COURSES**

Code	Title	Hours
EECE 5155	Wireless Sensor Networks and the Internet of Things	
EECE 5161	Thin Film Technologies	
EECE 5170	Introduction to Multiferroics Materials and Systems	
EECE 5554	Robotics Sensing and Navigation (Robotics Sensing and Navigation)	
EECE 5606	Micro- and Nanofabrication	
EECE 5627	Arithmetic and Circuit Design for Inexact Computing with Nanoscaled CMOS	
EECE 5638	Compilers for Modern Computer Architectures	
EECE 5639	Computer Vision	
EECE 5640	High-Performance Computing	
EECE 5641	Introduction to Software Security	
EECE 5642	Data Visualization	
EECE 5643	Simulation and Performance Evaluation	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 5645	Parallel Processing for Data Analytics	
EECE 5647	Nanophotonics	
EECE 5649	Design of Analog Integrated Circuits with Complementary Metal-Oxide-Semiconductor Technology	

EECE 5652	Microwave Circuits and Networks
EECE 5680 and EECE 5681	Electric Drives and Lab for EECE 5680
EECE 5682	Power Systems Analysis 1
EECE 5684 and EECE 5685	Power Electronics and Lab for EECE 5684
EECE 5686	Electrical Machines
EECE 5688	Analysis of Unbalanced Power Grids
EECE 5697	Acoustics and Sensing
EECE 5698	Special Topics in Electrical and Computer Engineering (Networks: Technology, Economics, Social Interactions)
EECE 5698	Special Topics in Electrical and Computer Engineering (Hardware and System Security)
EECE 5698	Special Topics in Electrical and Computer Engineering (Advanced Network Management)
EECE 5698	Special Topics in Electrical and Computer Engineering (Electromagnetic Devices)
EECE 7105	Optics for Engineers
EECE 7150	Autonomous Field Robotics
EECE 7201	Solid State Devices
EECE 7202	Electromagnetic Theory 1
EECE 7203	Complex Variable Theory and Differential Equations
EECE 7205	Fundamentals of Computer Engineering
EECE 7224	Power Systems State Estimation
EECE 7226	Modeling and Simulation of Power System Transients
EECE 7228	Advanced Power Electronics (Advanced Power Electronics)
EECE 7237	Special Topics in Power Electronics
EECE 7240 and EECE 7248	Analog Integrated Circuit Design and Lab for EECE 7240
EECE 7242	Integrated Circuits for Mixed Signals and Data Communication
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)
EECE 7245	Microwave Circuit Design for Wireless Communication
EECE 7247	Radio Frequency Integrated Circuit Design
EECE 7250	Power Management Integrated Circuits
EECE 7258	Human Sensing and Recognition (Human Centered Computing -- former Special Topics)
EECE 7270	Electromagnetic Theory 2
EECE 7271	Computational Methods in Electromagnetics
EECE 7275	Antennas and Radiation
EECE 7284	Optical Properties of Matter
EECE 7293	Modern Imaging
EECE 7296	Electronic Materials

EECE 7297	Advanced Magnetic Materials—Magnetic Devices
EECE 7352	Computer Architecture
EECE 7353	VLSI Design
EECE 7364	Mobile and Wireless Networking
EECE 7368	High-Level Design of Hardware-Software Systems
EECE 7370	Advanced Computer Vision
EECE 7374	Fundamentals of Computer Networks
EECE 7376	Operating Systems: Interface and Implementation
EECE 7377	Scalable and Sustainable System Design (Scalable and Sustainable System Design)
EECE 7390	Computer Hardware Security
EECE 7393	Analysis and Design of Data Networks
EECE 7397	Advanced Machine Learning
EECE 7398	Special Topics (Advanced Computer Architecture)
EECE 7398	Special Topics (Power System Constrained Optimization)
EECE 7398	Special Topics (Advances in Deep Learning)
EECE 7398	Special Topics (Advanced Radio Frequency Passive Technologies)
EECE 7399	Preparing High-Stakes Written and Oral Materials
ENGR 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage
MATH 7233	Graph Theory
CS 5100	Foundations of Artificial Intelligence
CS 5200	Database Management Systems
CS 5600	Computer Systems
CS 6110	Knowledge-Based Systems
CS 6200	Information Retrieval
CS 6220	Data Mining Techniques
CS 6410	Compilers
CS 6510	Advanced Software Development
CS 6760	Privacy, Security, and Usability
CS 7800	Advanced Algorithms
CY 5770	Software Vulnerabilities and Security
CY 6740	Network Security
CY 6750	Cryptography and Communications Security

**EXCLUDED COURSES FOR ALL MSECE CONCENTRATIONS**

Please see your college administrator for more information.

Code	Title	Hours
Courses from the following subject areas may not count toward any concentration within the MSECE program:		
CSYE, ENSY, EMGT, INFO, SBSY, TELE		
The following CS courses may not count toward any concentration within the MSECE program:		
CS 5010	Programming Design Paradigm	
CS 5320	Digital Image Processing	

CS 5330	Pattern Recognition and Computer Vision
CS 5340	Computer/Human Interaction
CS 5520	Mobile Application Development
CS 5610	Web Development
CS 5700	Fundamentals of Computer Networking
CS 5800	Algorithms
CS 6350	Empirical Research Methods
CS 6710	Wireless Network

**Program Credit/GPA Requirements**

32 total semester hours required

Minimum 3.000 GPA required

### Electrical and Computer Engineering with Concentration in Computer Systems and Software, MSECE

The master's degree programs in electrical and computer engineering offer in-depth course work within the concentration-choice-related areas. The curriculum is integrated and intensive and is built on groundbreaking research, taught by faculty who are experts in their areas.

**Excluded Courses for All MSECE Concentrations**

You **cannot take excluded courses as part of your MSECE program.**

Please **do not** petition to take these courses, as any petition to take these courses will be automatically rejected. Courses from the following subject areas may not count toward any concentration within the MSECE program: CSYE, ENSY, EMGT, INFO, SBSY, TELE. Select CS courses are also excluded from all MSECE concentrations. Please see the program requirements tab and your college administrator for more information.

**Graduate Certificate Options**

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 230).

**GORDON INSTITUTE OF ENGINEERING LEADERSHIP**

#### Master's Degree in Electrical and Computer Engineering with Concentration in Computer Systems and Software with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science degree in Electrical and Computer Engineering with Concentration in Computer Systems and Software in addition to earning a Graduate Certificate in Engineering Leadership. Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 48-semester-hour degree and certificate will require 32 semester hours of advisor-approved computer systems and software technical courses.

Engineering Leadership (p. 225)

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

## Options

Complete one of the following options:

### COURSE WORK OPTION

Code	Title	Hours
<b>Depth Courses</b>		
Complete 20 semester hours from the depth course list below. (p. 163)		20
<b>Breadth Courses</b>		
Complete 8 semester hours from the breadth course list below or other EECE courses chosen in consultation with a faculty advisor. (p. 163)		8
Note: Depth courses cannot be taken for breadth.		
<b>Elective</b>		
Complete 4 semester hours of either depth or breadth courses.		4

### THESIS OPTION

Code	Title	Hours
<b>Thesis</b>		
EECE 7990	Thesis	8
<b>Depth Courses</b>		
Complete 12 semester hours from the depth course list below. (p. 163)		12
<b>Breadth Courses</b>		
Complete 4 semester hours from the breadth course list below or other EECE courses chosen in consultation with a faculty advisor. (p. 163)		4
Note: Depth courses cannot be taken for breadth.		
<b>Elective</b>		
Complete 8 additional semester hours from either depth or breadth courses.		8

## Course Lists

### DEPTH COURSES

Code	Title	Hours
EECE 5552	Assistive Robotics (Principles of Assistive Robotics)	
EECE 5627	Arithmetic and Circuit Design for Inexact Computing with Nanoscaled CMOS	
EECE 5638	Compilers for Modern Computer Architectures	
EECE 5640	High-Performance Computing	
EECE 5643	Simulation and Performance Evaluation	
EECE 5698	Special Topics in Electrical and Computer Engineering (Hardware and System Security)	
EECE 7205	Fundamentals of Computer Engineering	
EECE 7352	Computer Architecture	
EECE 7353	VLSI Design	
EECE 7368	High-Level Design of Hardware-Software Systems	
EECE 7376	Operating Systems: Interface and Implementation	
EECE 7377	Scalable and Sustainable System Design (Scalable and Sustainable System Design)	

EECE 7390	Computer Hardware Security
EECE 7398	Special Topics (Advanced Computer Architecture)
EECE 7400	Special Problems in Electrical and Computer Engineering
CS 5200	Database Management Systems
CS 5600	Computer Systems
CS 6410	Compilers
CS 6510	Advanced Software Development

### BREADTH COURSES

Code	Title	Hours
EECE 5115	Dynamical Systems in Biological Engineering	
EECE 5155	Wireless Sensor Networks and the Internet of Things	
EECE 5161	Thin Film Technologies	
EECE 5170	Introduction to Multiferroics Materials and Systems	
EECE 5550	Mobile Robotics	
EECE 5554	Robotics Sensing and Navigation	
EECE 5576	Wireless Communication Systems	
EECE 5580	Classical Control Systems	
EECE 5606	Micro- and Nanofabrication	
EECE 5610	Digital Control Systems	
EECE 5626	Image Processing and Pattern Recognition	
EECE 5639	Computer Vision	
EECE 5641	Introduction to Software Security	
EECE 5642	Data Visualization	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 5645	Parallel Processing for Data Analytics	
EECE 5647	Nanophotonics	
EECE 5649	Design of Analog Integrated Circuits with Complementary Metal-Oxide-Semiconductor Technology	
EECE 5652	Microwave Circuits and Networks	
EECE 5666	Digital Signal Processing	
EECE 5680 and EECE 5681	Electric Drives and Lab for EECE 5680	
EECE 5682	Power Systems Analysis 1	
EECE 5684 and EECE 5685	Power Electronics and Lab for EECE 5684	
EECE 5686	Electrical Machines	
EECE 5688	Analysis of Unbalanced Power Grids	
EECE 5697	Acoustics and Sensing	
EECE 5698	Special Topics in Electrical and Computer Engineering (Networks: Technology, Economics, Social Interactions)	
EECE 5698	Special Topics in Electrical and Computer Engineering (GNSS Signal Processing)	

EECE 5698	Special Topics in Electrical and Computer Engineering (Feedback Control Systems: Applications to Unmanned Aerial Vehicles)	EECE 7346	Probabilistic System Modeling and Analysis
EECE 5698	Special Topics in Electrical and Computer Engineering (Electromagnetic Devices)	EECE 7364	Mobile and Wireless Networking
EECE 5698	Special Topics in Electrical and Computer Engineering (Advanced Network Management)	EECE 7370	Advanced Computer Vision
EECE 7105	Optics for Engineers	EECE 7374	Fundamentals of Computer Networks
EECE 7150	Autonomous Field Robotics	EECE 7393	Analysis and Design of Data Networks
EECE 7200	Linear Systems Analysis	EECE 7397	Advanced Machine Learning
EECE 7201	Solid State Devices	EECE 7398	Special Topics (Power System Constrained Optimization)
EECE 7202	Electromagnetic Theory 1	EECE 7398	Special Topics (Legged Robots)
EECE 7203	Complex Variable Theory and Differential Equations	EECE 7398	Special Topics (Advances in Deep Learning)
EECE 7204	Applied Probability and Stochastic Processes	EECE 7398	Special Topics (Advanced Radio Frequency Passive Technologies)
EECE 7211	Nonlinear Control	EECE 7399	Preparing High-Stakes Written and Oral Materials
EECE 7213	System Identification and Adaptive Control	ENGR 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage
EECE 7214	Optimal and Robust Control	MATH 7233	Graph Theory
EECE 7224	Power Systems State Estimation	CS 5100	Foundations of Artificial Intelligence
EECE 7226	Modeling and Simulation of Power System Transients	CS 6110	Knowledge-Based Systems
EECE 7228	Advanced Power Electronics	CS 6200	Information Retrieval
EECE 7237	Special Topics in Power Electronics	CS 6220	Data Mining Techniques
EECE 7240 and EECE 7248	Analog Integrated Circuit Design and Lab for EECE 7240	CS 6760	Privacy, Security, and Usability
EECE 7242	Integrated Circuits for Mixed Signals and Data Communication	CS 7800	Advanced Algorithms
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)	CY 5770	Software Vulnerabilities and Security
EECE 7245	Microwave Circuit Design for Wireless Communication	CY 6740	Network Security
EECE 7247	Radio Frequency Integrated Circuit Design	CY 6750	Cryptography and Communications Security
EECE 7250	Power Management Integrated Circuits		
EECE 7258	Human Sensing and Recognition		
EECE 7263	Humanoid Robotics		
EECE 7270	Electromagnetic Theory 2		
EECE 7271	Computational Methods in Electromagnetics		
EECE 7275	Antennas and Radiation		
EECE 7284	Optical Properties of Matter		
EECE 7293	Modern Imaging		
EECE 7296	Electronic Materials		
EECE 7297	Advanced Magnetic Materials—Magnetic Devices		
EECE 7310	Modern Signal Processing		
EECE 7323	Numerical Optimization Methods		
EECE 7336	Digital Communications		
EECE 7337	Information Theory		
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization		

**EXCLUDED COURSES FOR ALL MSECE CONCENTRATIONS**

Please see your college administrator for more information.

Code	Title	Hours
Courses from the following subject areas may not count toward any concentration within the MSECE program:		
CSYE, ENSY, EMGT, INFO, SBSY, TELE		
The following CS courses may not count toward any concentration within the MSECE program:		
CS 5010	Programming Design Paradigm	
CS 5320	Digital Image Processing	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5520	Mobile Application Development	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 5800	Algorithms	
CS 6350	Empirical Research Methods	
CS 6710	Wireless Network	

**Program Credit/GPA Requirements**

32 total semester hours required

Minimum 3.000 GPA required

## Electrical and Computer Engineering with Concentration in Computer Networks and Security, MSECE

The master's degree program in electrical and computer engineering offers in-depth course work within the concentration-choice-related areas. The curriculum is integrated and intensive and is built on state-of-the-art research, taught by faculty who are experts in their areas.

### Excluded Courses for All MSECE Concentrations

You **cannot take excluded courses as part of your MSECE program**. Please **do not** petition to take these courses, as any petition to take these courses will be automatically rejected. Courses from the following subject areas may not count toward any concentration within the MSECE program: CSYE, ENSY, EMGT, INFO, SBSY, TELE. Select CS courses are also excluded from all MSECE concentrations. Please see the program requirements tab and your college administrator for more information.

### Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 230).

#### GORDON INSTITUTE OF ENGINEERING LEADERSHIP

##### Master's Degree in Electrical and Computer Engineering with Concentration in Computer Networks and Security with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Electrical and Computer Engineering with Concentration in Computer Networks and Security in addition to earning a Graduate Certificate in Engineering Leadership. Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 48-semester-hour degree and certificate will require 32 semester hours of advisor-approved computer networks and security technical courses.

Engineering Leadership (p. 225)

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Options

Complete one of the following options:

#### COURSE WORK OPTION

Code	Title	Hours
<b>Depth Courses</b>		
Complete 20 semester hours from the depth course list below. (p. 165)		20
<b>Breadth Courses</b>		
Complete 8 semester hours from the breadth course list below or other EECE courses chosen in consultation with a faculty advisor. (p. 165)		8
Note: Depth courses cannot be taken for breadth.		
<b>Elective</b>		
Complete 4 semester hours of either depth or breadth courses.		4

#### THESIS OPTION

Code	Title	Hours
<b>Thesis</b>		
EECE 7990	Thesis	8
<b>Depth Courses</b>		
Complete 12 semester hours from the depth course list below. (p. 165)		12
<b>Breadth Courses</b>		
Complete 4 semester hours from the breadth course list below or other EECE courses chosen in consultation with a faculty advisor. (p. 165)		4
Note: Depth courses cannot be taken for breadth.		
<b>Elective</b>		
Complete 8 additional semester hours of either depth or breadth courses.		8

### Course Lists

#### DEPTH COURSES

Code	Title	Hours
EECE 5155	Wireless Sensor Networks and the Internet of Things	
EECE 5576	Wireless Communication Systems	
EECE 5640	High-Performance Computing	
EECE 5641	Introduction to Software Security	
EECE 5698	Special Topics in Electrical and Computer Engineering (Networks: Technology, Economics, Social Interactions)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Advanced Network Management)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Hardware and System Security)	
EECE 7204	Applied Probability and Stochastic Processes	
EECE 7205	Fundamentals of Computer Engineering	
EECE 7346	Probabilistic System Modeling and Analysis	
EECE 7364	Mobile and Wireless Networking	
EECE 7374	Fundamentals of Computer Networks	
EECE 7390	Computer Hardware Security	
EECE 7393	Analysis and Design of Data Networks	
EECE 7400	Special Problems in Electrical and Computer Engineering	
CS 6760	Privacy, Security, and Usability	
CY 5770	Software Vulnerabilities and Security	
CY 6740	Network Security	
CY 6750	Cryptography and Communications Security	

#### BREADTH COURSES

Code	Title	Hours
EECE 5170	Introduction to Multiferroics Materials and Systems	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	

EECE 5580	Classical Control Systems	and EECE 7248	and Lab for EECE 7240
EECE 5606	Micro- and Nanofabrication	EECE 7242	Integrated Circuits for Mixed Signals and Data Communication
EECE 5610	Digital Control Systems	EECE 7244	Introduction to Microelectromechanical Systems (MEMS)
EECE 5626	Image Processing and Pattern Recognition	EECE 7245	Microwave Circuit Design for Wireless Communication
EECE 5627	Arithmetic and Circuit Design for Inexact Computing with Nanoscaled CMOS	EECE 7247	Radio Frequency Integrated Circuit Design
EECE 5638	Compilers for Modern Computer Architectures	EECE 7258	Human Sensing and Recognition
EECE 5639	Computer Vision	EECE 7263	Humanoid Robotics
EECE 5642	Data Visualization	EECE 7270	Electromagnetic Theory 2
EECE 5643	Simulation and Performance Evaluation	EECE 7271	Computational Methods in Electromagnetics
EECE 5644	Introduction to Machine Learning and Pattern Recognition	EECE 7275	Antennas and Radiation
EECE 5645	Parallel Processing for Data Analytics	EECE 7284	Optical Properties of Matter
EECE 5647	Nanophotonics	EECE 7293	Modern Imaging
EECE 5649	Design of Analog Integrated Circuits with Complementary Metal-Oxide-Semiconductor Technology	EECE 7296	Electronic Materials
EECE 5652	Microwave Circuits and Networks	EECE 7297	Advanced Magnetic Materials—Magnetic Devices
EECE 5666	Digital Signal Processing	EECE 7310	Modern Signal Processing
EECE 5680 and EECE 5681	Electric Drives and Lab for EECE 5680	EECE 7323	Numerical Optimization Methods
EECE 5682	Power Systems Analysis 1	EECE 7336	Digital Communications
EECE 5684 and EECE 5685	Power Electronics and Lab for EECE 5684	EECE 7337	Information Theory
EECE 5686	Electrical Machines	EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization
EECE 5688	Analysis of Unbalanced Power Grids	EECE 7352	Computer Architecture
EECE 5697	Acoustics and Sensing	EECE 7353	VLSI Design
EECE 5698	Special Topics in Electrical and Computer Engineering (Feedback Control Systems: Applications to Unmanned Aerial Vehicles)	EECE 7368	High-Level Design of Hardware-Software Systems
EECE 5698	Special Topics in Electrical and Computer Engineering (GNSS Signal Processing)	EECE 7370	Advanced Computer Vision
EECE 5698	Special Topics in Electrical and Computer Engineering (Electromagnetic Devices)	EECE 7376	Operating Systems: Interface and Implementation
EECE 7105	Optics for Engineers	EECE 7377	Scalable and Sustainable System Design
EECE 7150	Autonomous Field Robotics	EECE 7397	Advanced Machine Learning
EECE 7200	Linear Systems Analysis	EECE 7398	Special Topics (Legged Robots)
EECE 7201	Solid State Devices	EECE 7398	Special Topics (Advanced Computer Architecture)
EECE 7202	Electromagnetic Theory 1	EECE 7398	Special Topics (Power System Constrained Optimization)
EECE 7203	Complex Variable Theory and Differential Equations	EECE 7398	Special Topics (Advances in Deep Learning)
EECE 7211	Nonlinear Control	EECE 7398	Special Topics (Advanced Radio Frequency Passive Technologies)
EECE 7213	System Identification and Adaptive Control	EECE 7399	Preparing High-Stakes Written and Oral Materials
EECE 7214	Optimal and Robust Control	ENGR 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage
EECE 7224	Power Systems State Estimation	MATH 7233	Graph Theory
EECE 7226	Modeling and Simulation of Power System Transients	CS 5100	Foundations of Artificial Intelligence
EECE 7228	Advanced Power Electronics	CS 5200	Database Management Systems
EECE 7237	Special Topics in Power Electronics	CS 5600	Computer Systems
EECE 7240	Analog Integrated Circuit Design	CS 6110	Knowledge-Based Systems
		CS 6200	Information Retrieval
		CS 6220	Data Mining Techniques

CS 6410	Compilers
CS 6510	Advanced Software Development
CS 7800	Advanced Algorithms

**EXCLUDED COURSES FOR ALL MSECE CONCENTRATIONS**

Please see your college administrator for more information.

Code	Title	Hours
Courses from the following subject areas may not count toward any concentration within the MSECE program:		
CSYE, ENSY, EMGT, INFO, SBSY, TELE		
The following CS courses may not count toward any concentration within the MSECE program:		
CS 5010	Programming Design Paradigm	
CS 5320	Digital Image Processing	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5520	Mobile Application Development	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 5800	Algorithms	
CS 6350	Empirical Research Methods	
CS 6710	Wireless Network	

**Program Credit/GPA Requirements**

32 total semester hours required  
 Minimum 3.000 GPA required

**Electrical and Computer Engineering with Concentration in Computer Vision, Machine Learning, and Algorithms, MSECE**

The master’s degree program in electrical and computer engineering offers in-depth course work within the concentration-choice-related areas. The curriculum is integrated and intensive and is built on state-of-the-art research, taught by faculty who are experts in their areas.

**Excluded Courses for All MSECE Concentrations**

You **cannot take excluded courses as part of your MSECE program**. Please **do not** petition to take these courses, as any petition to take these courses will be automatically rejected. Courses from the following subject areas may not count toward any concentration within the MSECE program: CSYE, ENSY, EMGT, INFO, SBSY, TELE. Select CS courses are also excluded from all MSECE concentrations. Please see the program requirements tab and your college administrator for more information.

**Graduate Certificate Options**

Students enrolled in a master’s degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 230).

**GORDON INSTITUTE OF ENGINEERING LEADERSHIP**  
**Master’s Degree in Electrical and Computer Engineering with Concentration in Computer Vision, Machine Learning, and Algorithms with Graduate Certificate in Engineering Leadership**

Students may complete a Master of Science in Electrical and Computer Engineering with Concentration in Computer Vision, Machine Learning, and Algorithms in addition to earning a Graduate Certificate in Engineering Leadership. Students must apply and be admitted to the

Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 48-semester-hour degree and certificate will require 32 semester hours of advisor-approved computer vision, machine learning, and algorithms technical courses.

Engineering Leadership (p. 225)

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Options**

Complete one of the following options:

**COURSE WORK OPTION**

Code	Title	Hours
<b>Depth Courses</b>		
Complete 20 semester hours from the depth course list below. (p. 167)		20
<b>Breadth Courses</b>		
Complete 8 semester hours from the breadth course list below or other EECE courses chosen in consultation with a faculty advisor. (p. 168)		8
Note: Depth courses cannot be taken for breadth.		
<b>Elective</b>		
Complete 4 semester hours of either depth or breadth courses.		4

**THESIS OPTION**

Code	Title	Hours
<b>Thesis</b>		
EECE 7990	Thesis	8
<b>Depth Courses</b>		
Complete 12 semester hours from the depth course list below. (p. 167)		12
<b>Breadth Courses</b>		
Complete 4 semester hours from the breadth course list below or other EECE courses chosen in consultation with a faculty advisor. (p. 168)		4
Note: Depth courses cannot be taken for breadth.		
<b>Elective</b>		
Complete 8 additional semester hours from either depth or breadth courses.		8

**Course Lists**

**DEPTH COURSES**

Code	Title	Hours
EECE 5550	Mobile Robotics	
EECE 5554	Robotics Sensing and Navigation	
EECE 5626	Image Processing and Pattern Recognition	
EECE 5639	Computer Vision	
EECE 5640	High-Performance Computing	
EECE 5642	Data Visualization	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	

EECE 5645	Parallel Processing for Data Analytics
EECE 7150	Autonomous Field Robotics
EECE 7204	Applied Probability and Stochastic Processes
EECE 7205	Fundamentals of Computer Engineering
EECE 7258	Human Sensing and Recognition
EECE 7323	Numerical Optimization Methods
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization
EECE 7352	Computer Architecture
EECE 7370	Advanced Computer Vision
EECE 7397	Advanced Machine Learning
EECE 7398	Special Topics (Big Data and Sparsity in Control, Machine Learning and Signal Processing)
EECE 7398	Special Topics (Advances in Deep Learning)
EECE 7400	Special Problems in Electrical and Computer Engineering
CS 5100	Foundations of Artificial Intelligence
CS 6110	Knowledge-Based Systems
CS 6200	Information Retrieval
CS 6220	Data Mining Techniques
CS 7800	Advanced Algorithms
MATH 7233	Graph Theory
EECE 5680 and EECE 5681	Electric Drives and Lab for EECE 5680
EECE 5682	Power Systems Analysis 1
EECE 5684 and EECE 5685	Power Electronics and Lab for EECE 5684
EECE 5686	Electrical Machines
EECE 5688	Analysis of Unbalanced Power Grids
EECE 5697	Acoustics and Sensing
EECE 5698	Special Topics in Electrical and Computer Engineering (Feedback Control Systems: Applications to Unmanned Aerial Vehicles)
EECE 5698	Special Topics in Electrical and Computer Engineering (GNSS Signal Processing)
EECE 5698	Special Topics in Electrical and Computer Engineering (Networks: Technology, Economics, Social Interactions)
EECE 5698	Special Topics in Electrical and Computer Engineering (Hardware and System Security)
EECE 5698	Special Topics in Electrical and Computer Engineering (Advanced Network Management)
EECE 5698	Special Topics in Electrical and Computer Engineering (Electromagnetic Devices)

**BREADTH COURSES**

Code	Title	Hours
EECE 5155	Wireless Sensor Networks and the Internet of Things (Wireless Sensor Networks and the Internet of Things – former special topics course)	
EECE 5115	Dynamical Systems in Biological Engineering	
EECE 5161	Thin Film Technologies (Thin Film Technologies – former special topics course)	
EECE 5170	Introduction to Multiferroics Materials and Systems	
EECE 5552	Assistive Robotics	
EECE 5576	Wireless Communication Systems	
EECE 5580	Classical Control Systems	
EECE 5606	Micro- and Nanofabrication	
EECE 5610	Digital Control Systems	
EECE 5627	Arithmetic and Circuit Design for Inexact Computing with Nanoscaled CMOS	
EECE 5638	Compilers for Modern Computer Architectures	
EECE 5641	Introduction to Software Security	
EECE 5643	Simulation and Performance Evaluation	
EECE 5647	Nanophotonics	
EECE 5649	Design of Analog Integrated Circuits with Complementary Metal-Oxide-Semiconductor Technology	
EECE 5652	Microwave Circuits and Networks	
EECE 5666	Digital Signal Processing	
EECE 7105	Optics for Engineers	
EECE 7200	Linear Systems Analysis	
EECE 7201	Solid State Devices	
EECE 7202	Electromagnetic Theory 1	
EECE 7203	Complex Variable Theory and Differential Equations	
EECE 7211	Nonlinear Control	
EECE 7213	System Identification and Adaptive Control	
EECE 7214	Optimal and Robust Control	
EECE 7224	Power Systems State Estimation	
EECE 7226	Modeling and Simulation of Power System Transients	
EECE 7228	Advanced Power Electronics (Advanced Power Electronics – former special topics course)	
EECE 7237	Special Topics in Power Electronics	
EECE 7240 and EECE 7248	Analog Integrated Circuit Design and Lab for EECE 7240	
EECE 7242	Integrated Circuits for Mixed Signals and Data Communication	
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)	
EECE 7245	Microwave Circuit Design for Wireless Communication	
EECE 7247	Radio Frequency Integrated Circuit Design	
EECE 7250	Power Management Integrated Circuits (Power Management Integrated Circuits – former special topics course)	



EECE 7263	Humanoid Robotics (Humanoid Robotics – former special topics course)
EECE 7270	Electromagnetic Theory 2
EECE 7271	Computational Methods in Electromagnetics
EECE 7275	Antennas and Radiation
EECE 7284	Optical Properties of Matter
EECE 7293	Modern Imaging
EECE 7296	Electronic Materials
EECE 7297	Advanced Magnetic Materials—Magnetic Devices
EECE 7310	Modern Signal Processing
EECE 7336	Digital Communications
EECE 7337	Information Theory
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization
EECE 7346	Probabilistic System Modeling and Analysis
EECE 7353	VLSI Design
EECE 7364	Mobile and Wireless Networking
EECE 7368	High-Level Design of Hardware-Software Systems
EECE 7374	Fundamentals of Computer Networks
EECE 7376	Operating Systems: Interface and Implementation
EECE 7377	Scalable and Sustainable System Design (Scalable and Sustainable System Design)
EECE 7390	Computer Hardware Security
EECE 7393	Analysis and Design of Data Networks
EECE 7398	Special Topics (Legged Robots)
EECE 7398	Special Topics (Advanced Computer Architecture)
EECE 7398	Special Topics (Power System Constrained Optimization)
EECE 7398	Special Topics (Advanced Radio Frequency Passive Technologies)
EECE 7399	Preparing High-Stakes Written and Oral Materials
ENGR 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage
CS 5200	Database Management Systems
CS 5600	Computer Systems
CS 6410	Compilers
CS 6510	Advanced Software Development
CS 6760	Privacy, Security, and Usability
CY 5770	Software Vulnerabilities and Security
CY 6740	Network Security
CY 6750	Cryptography and Communications Security

### EXCLUDED COURSES FOR ALL MSECE CONCENTRATIONS

Please see your college administrator for more information.

Code	Title	Hours
Courses from the following subject areas may not count toward any concentration within the MSECE program:		
CSYE, ENSY, EMGT, INFO, SBSY, TELE		
The following CS courses may not count toward any concentration within the MSECE program:		
CS 5010	Programming Design Paradigm	
CS 5320	Digital Image Processing	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5520	Mobile Application Development	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 5800	Algorithms	
CS 6350	Empirical Research Methods	
CS 6710	Wireless Network	

### Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

### Electrical and Computer Engineering with Concentration in Electromagnetics, Plasma, and Optics, MSECE

The master's degree program in electrical and computer engineering offers in-depth course work within the concentration-choice-related areas. The curriculum is integrated and intensive and is built on state-of-the-art research, taught by faculty who are experts in their areas.

### Excluded Courses for All MSECE Concentrations

You **cannot take excluded courses as part of your MSECE program.**

Please **do not** petition to take these courses, as any petition to take these courses will be automatically rejected. Courses from the following subject areas may not count toward any concentration within the MSECE program: CSYE, ENSY, EMGT, INFO, SBSY, TELE. Select CS courses are also excluded from all MSECE concentrations. Please see the program requirements tab and your college administrator for more information.

### Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 230).

### GORDON INSTITUTE OF ENGINEERING LEADERSHIP

#### Master's Degree in Electrical and Computer Engineering with Concentration in Electromagnetics, Plasma, and Optics with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Electrical and Computer Engineering with Concentration in Electromagnetics, Plasma, and Optics in addition to earning a Graduate Certificate in Engineering Leadership. Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16 semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 48-semester-hour degree and certificate will require 32 semester hours

of advisor-approved electromagnetics, plasma, and optics technical courses.

Engineering Leadership (p. 225)

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Options

Complete one of the following options:

#### COURSE WORK OPTION

Code	Title	Hours
<b>Depth Courses</b>		
Complete 20 semester hours from the depth course list below. (p. 170)		20
<b>Breadth Courses</b>		
Complete 8 semester hours from the breadth course list below. (p. 170)		8
Note: Depth courses cannot be taken for breadth.		
<b>Elective</b>		
Complete 4 additional semester hours from either depth or breadth courses.		4

#### THESIS OPTION

Code	Title	Hours
<b>Thesis</b>		
EECE 7990	Thesis	8
<b>Depth Courses</b>		
Complete 12 semester hours from the depth course list below. (p. 170)		12
<b>Breadth Courses</b>		
Complete 4 semester hours from the breadth course list below. (p. 170)		4
Note: Depth courses cannot be taken for breadth.		
<b>Elective</b>		
Complete 8 additional semester hours from either depth or breadth courses.		8

### Course Lists

#### DEPTH COURSES

Code	Title	Hours
EECE 5170	Introduction to Multiferroics Materials and Systems	
EECE 5697	Acoustics and Sensing	
EECE 5698	Special Topics in Electrical and Computer Engineering (Electromagnetic Devices)	
EECE 7105	Optics for Engineers	
EECE 7202	Electromagnetic Theory 1	
EECE 7203	Complex Variable Theory and Differential Equations	
EECE 7270	Electromagnetic Theory 2	
EECE 7271	Computational Methods in Electromagnetics	
EECE 7275	Antennas and Radiation	
EECE 7284	Optical Properties of Matter	
EECE 7293	Modern Imaging	

EECE 7296	Electronic Materials
EECE 7297	Advanced Magnetic Materials—Magnetic Devices
EECE 7398	Special Topics (Advanced Radio Frequency Passive Technologies)
EECE 7400	Special Problems in Electrical and Computer Engineering

#### BREADTH COURSES

Code	Title	Hours
EECE 5115	Dynamical Systems in Biological Engineering	
EECE 5155	Wireless Sensor Networks and the Internet of Things	
EECE 5161	Thin Film Technologies	
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics (Principles of Assistive Robotics)	
EECE 5554	Robotics Sensing and Navigation (Robotics Sensing and Navigation)	
EECE 5576	Wireless Communication Systems	
EECE 5580	Classical Control Systems	
EECE 5606	Micro- and Nanofabrication	
EECE 5610	Digital Control Systems	
EECE 5626	Image Processing and Pattern Recognition	
EECE 5627	Arithmetic and Circuit Design for Inexact Computing with Nanoscaled CMOS	
EECE 5638	Compilers for Modern Computer Architectures	
EECE 5639	Computer Vision	
EECE 5640	High-Performance Computing	
EECE 5641	Introduction to Software Security	
EECE 5642	Data Visualization	
EECE 5643	Simulation and Performance Evaluation	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 5645	Parallel Processing for Data Analytics	
EECE 5647	Nanophotonics	
EECE 5649	Design of Analog Integrated Circuits with Complementary Metal-Oxide-Semiconductor Technology	
EECE 5652	Microwave Circuits and Networks	
EECE 5666	Digital Signal Processing	
EECE 5680 and EECE 5681	Electric Drives and Lab for EECE 5680	
EECE 5682	Power Systems Analysis 1	
EECE 5684 and EECE 5685	Power Electronics and Lab for EECE 5684	
EECE 5686	Electrical Machines	
EECE 5688	Analysis of Unbalanced Power Grids	
EECE 5698	Special Topics in Electrical and Computer Engineering (GNSS Signal Processing)	

EECE 5698	Special Topics in Electrical and Computer Engineering (Feedback Control Systems: Applications to Unmanned Aerial Vehicles)
EECE 5698	Special Topics in Electrical and Computer Engineering (Networks: Technology, Economics, Social Interactions)
EECE 5698	Special Topics in Electrical and Computer Engineering (Hardware and System Security)
EECE 5698	Special Topics in Electrical and Computer Engineering (Advanced Network Management)
EECE 7150	Autonomous Field Robotics
EECE 7200	Linear Systems Analysis
EECE 7201	Solid State Devices
EECE 7204	Applied Probability and Stochastic Processes
EECE 7205	Fundamentals of Computer Engineering
EECE 7211	Nonlinear Control
EECE 7213	System Identification and Adaptive Control
EECE 7214	Optimal and Robust Control
EECE 7224	Power Systems State Estimation
EECE 7226	Modeling and Simulation of Power System Transients
EECE 7228	Advanced Power Electronics
EECE 7237	Special Topics in Power Electronics
EECE 7240 and EECE 7248	Analog Integrated Circuit Design and Lab for EECE 7240
EECE 7242	Integrated Circuits for Mixed Signals and Data Communication
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)
EECE 7245	Microwave Circuit Design for Wireless Communication
EECE 7247	Radio Frequency Integrated Circuit Design
EECE 7250	Power Management Integrated Circuits
EECE 7258	Human Sensing and Recognition
EECE 7263	Humanoid Robotics
EECE 7310	Modern Signal Processing
EECE 7323	Numerical Optimization Methods
EECE 7336	Digital Communications
EECE 7337	Information Theory
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization
EECE 7346	Probabilistic System Modeling and Analysis
EECE 7352	Computer Architecture
EECE 7353	VLSI Design
EECE 7364	Mobile and Wireless Networking
EECE 7368	High-Level Design of Hardware-Software Systems
EECE 7370	Advanced Computer Vision
EECE 7374	Fundamentals of Computer Networks

EECE 7376	Operating Systems: Interface and Implementation
EECE 7377	Scalable and Sustainable System Design (Scalable and Sustainable System Design)
EECE 7390	Computer Hardware Security
EECE 7393	Analysis and Design of Data Networks
EECE 7397	Advanced Machine Learning
EECE 7398	Special Topics (Legged Robots)
EECE 7398	Special Topics (Advanced Computer Architecture)
EECE 7398	Special Topics (Power System Constrained Optimization)
EECE 7398	Special Topics (Advances in Deep Learning)
EECE 7399	Preparing High-Stakes Written and Oral Materials
ENGR 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage
MATH 7233	Graph Theory
CS 5100	Foundations of Artificial Intelligence
CS 5200	Database Management Systems
CS 5600	Computer Systems
CS 6110	Knowledge-Based Systems
CS 6200	Information Retrieval
CS 6220	Data Mining Techniques
CS 6410	Compilers
CS 6510	Advanced Software Development
CS 6760	Privacy, Security, and Usability
CS 7800	Advanced Algorithms
CY 5770	Software Vulnerabilities and Security
CY 6740	Network Security
CY 6750	Cryptography and Communications Security

### EXCLUDED COURSES FOR ALL MSECE CONCENTRATIONS

Please see your college administrator for more information.

Code	Title	Hours
Courses from the following subject areas may not count toward any concentration within the MSECE program:		
CSYE, ENSY, EMGT, INFO, SBSY, TELE		
The following CS courses may not count toward any concentration within the MSECE program:		
CS 5010	Programming Design Paradigm	
CS 5320	Digital Image Processing	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5520	Mobile Application Development	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 5800	Algorithms	
CS 6350	Empirical Research Methods	
CS 6710	Wireless Network	

## Program Credit/GPA Requirements

32 total semester hours required  
Minimum 3.000 GPA required

### Electrical and Computer Engineering with Concentration in Microsystems, Materials, and Devices, MSECE

The master's degree program in electrical and computer engineering offers in-depth course work within the concentration-choice-related areas. The curriculum is integrated and intensive and is built on state-of-the-art research, taught by faculty who are experts in their areas.

## Excluded Courses for All MSECE Concentrations

You **cannot take excluded courses as part of your MSECE program**. Please **do not** petition to take these courses, as any petition to take these courses will be automatically rejected. Courses from the following subject areas may not count toward any concentration within the MSECE program: CSYE, ENSY, EMGT, INFO, SBSY, TELE. Select CS courses are also excluded from all MSECE concentrations. Please see the program requirements tab and your college administrator for more information.

## Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 230).

### GORDON INSTITUTE OF ENGINEERING LEADERSHIP

#### Master's Degree in Electrical and Computer Engineering with Concentration in Microsystems, Materials, and Devices with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Electrical and Computer Engineering with Concentration in Microsystems, Materials, and Devices in addition to earning a Graduate Certificate in Engineering Leadership. Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 48-semester-hour degree and certificate will require 32 semester hours of advisor-approved microsystems, materials, and devices technical courses.

Engineering Leadership (p. 225)

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

## Options

Complete one of the following options:

### COURSE WORK OPTION

Code	Title	Hours
<b>Depth Courses</b>		
Complete 20 semester hours from the depth course list below. (p. 172)		20
<b>Breadth Courses</b>		
Complete 8 semester hours from the breadth course list below. (p. 172)		8
Note: Depth courses cannot be taken for breadth.		

<b>Elective</b>		
Complete 4 additional semester hours from either depth or breadth courses.		4

### THESIS OPTION

Code	Title	Hours
<b>Thesis</b>		
EECE 7990	Thesis	8

<b>Depth Courses</b>		
Complete 12 semester hours from the depth course list below. (p. 172)		12

<b>Breadth Courses</b>		
Complete 4 semester hours from the breadth course list below. (p. 172)		4
Note: Depth courses cannot be taken for breadth.		

<b>Elective</b>		
Complete 8 additional semester hours from either depth or breadth courses.		8

## Course Lists

### DEPTH COURSES

Code	Title	Hours
EECE 5161	Thin Film Technologies	
EECE 5606	Micro- and Nanofabrication	
EECE 5647	Nanophotonics	
EECE 5649	Design of Analog Integrated Circuits with Complementary Metal-Oxide-Semiconductor Technology	
EECE 5652	Microwave Circuits and Networks	
EECE 7201	Solid State Devices	
EECE 7240 and EECE 7248	Analog Integrated Circuit Design and Lab for EECE 7240	
EECE 7242	Integrated Circuits for Mixed Signals and Data Communication	
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)	
EECE 7245	Microwave Circuit Design for Wireless Communication	
EECE 7247	Radio Frequency Integrated Circuit Design	
EECE 7250	Power Management Integrated Circuits	
EECE 7284	Optical Properties of Matter	
EECE 7296	Electronic Materials	
EECE 7297	Advanced Magnetic Materials—Magnetic Devices	
EECE 7353	VLSI Design	
EECE 7398	Special Topics (Advanced Radio Frequency Passive Technologies)	
EECE 7400	Special Problems in Electrical and Computer Engineering	

### BREADTH COURSES

Code	Title	Hours
EECE 5115	Dynamical Systems in Biological Engineering	
EECE 5155	Wireless Sensor Networks and the Internet of Things	

EECE 5170	Introduction to Multiferroics Materials and Systems	EECE 7205	Fundamentals of Computer Engineering
EECE 5550	Mobile Robotics	EECE 7211	Nonlinear Control
EECE 5552	Assistive Robotics	EECE 7213	System Identification and Adaptive Control
EECE 5554	Robotics Sensing and Navigation	EECE 7214	Optimal and Robust Control
EECE 5576	Wireless Communication Systems	EECE 7224	Power Systems State Estimation
EECE 5580	Classical Control Systems	EECE 7226	Modeling and Simulation of Power System Transients
EECE 5610	Digital Control Systems	EECE 7228	Advanced Power Electronics
EECE 5626	Image Processing and Pattern Recognition	EECE 7237	Special Topics in Power Electronics
EECE 5627	Arithmetic and Circuit Design for Inexact Computing with Nanoscaled CMOS	EECE 7258	Human Sensing and Recognition
EECE 5638	Compilers for Modern Computer Architectures	EECE 7263	Humanoid Robotics
EECE 5639	Computer Vision	EECE 7270	Electromagnetic Theory 2
EECE 5640	High-Performance Computing	EECE 7271	Computational Methods in Electromagnetics
EECE 5641	Introduction to Software Security	EECE 7275	Antennas and Radiation
EECE 5642	Data Visualization	EECE 7310	Modern Signal Processing
EECE 5643	Simulation and Performance Evaluation	EECE 7323	Numerical Optimization Methods
EECE 5644	Introduction to Machine Learning and Pattern Recognition	EECE 7336	Digital Communications
EECE 5645	Parallel Processing for Data Analytics	EECE 7337	Information Theory
EECE 5666	Digital Signal Processing	EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization
EECE 5680 and EECE 5681	Electric Drives and Lab for EECE 5680	EECE 7346	Probabilistic System Modeling and Analysis
EECE 5682	Power Systems Analysis 1	EECE 7352	Computer Architecture
EECE 5684 and EECE 5685	Power Electronics and Lab for EECE 5684	EECE 7364	Mobile and Wireless Networking
EECE 5686	Electrical Machines	EECE 7368	High-Level Design of Hardware-Software Systems
EECE 5688	Analysis of Unbalanced Power Grids	EECE 7370	Advanced Computer Vision
EECE 5697	Acoustics and Sensing	EECE 7374	Fundamentals of Computer Networks
EECE 5698	Special Topics in Electrical and Computer Engineering (Networks: Technology, Economics, Social Interactions)	EECE 7376	Operating Systems: Interface and Implementation
EECE 5698	Special Topics in Electrical and Computer Engineering (Feedback Control Systems: Applications to Unmanned Aerial Vehicles)	EECE 7377	Scalable and Sustainable System Design (Scalable and Sustainable System Design)
EECE 5698	Special Topics in Electrical and Computer Engineering (Advanced Network Management)	EECE 7390	Computer Hardware Security
EECE 5698	Special Topics in Electrical and Computer Engineering (Hardware and System Security)	EECE 7393	Analysis and Design of Data Networks
EECE 5698	Special Topics in Electrical and Computer Engineering (Electromagnetic Devices)	EECE 7397	Advanced Machine Learning
EECE 7105	Optics for Engineers	EECE 7398	Special Topics (Legged Robots)
EECE 7150	Autonomous Field Robotics	EECE 7398	Special Topics (Advanced Computer Architecture)
EECE 7200	Linear Systems Analysis	EECE 7398	Special Topics (Power System Constrained Optimization)
EECE 7202	Electromagnetic Theory 1	EECE 7398	Special Topics (Advances in Deep Learning)
EECE 7203	Complex Variable Theory and Differential Equations	EECE 7399	Preparing High-Stakes Written and Oral Materials
EECE 7204	Applied Probability and Stochastic Processes	ENGR 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage
		MATH 7233	Graph Theory
		CS 5100	Foundations of Artificial Intelligence
		CS 5200	Database Management Systems
		CS 5600	Computer Systems
		CS 6110	Knowledge-Based Systems
		CS 6200	Information Retrieval
		CS 6220	Data Mining Techniques

CS 6410	Compilers
CS 6510	Advanced Software Development
CS 6760	Privacy, Security, and Usability
CS 7800	Advanced Algorithms
CY 5770	Software Vulnerabilities and Security
CY 6740	Network Security
CY 6750	Cryptography and Communications Security

**EXCLUDED COURSES FOR ALL MSECE CONCENTRATIONS**

Please see your college administrator for more information.

**Code Title Hours**

Courses from the following subject areas may not count toward any concentration within the MSECE program:

CSYE, ENSY, EMGT, INFO, SBSY, TELE

The following CS courses may not count toward any concentration within the MSECE program:

CS 5010	Programming Design Paradigm
CS 5320	Digital Image Processing
CS 5330	Pattern Recognition and Computer Vision
CS 5340	Computer/Human Interaction
CS 5520	Mobile Application Development
CS 5610	Web Development
CS 5700	Fundamentals of Computer Networking
CS 5800	Algorithms
CS 6350	Empirical Research Methods
CS 6710	Wireless Network

**Program Credit/GPA Requirements**

32 total semester hours required

Minimum 3.000 GPA required

### Electrical and Computer Engineering with Concentration in Power Systems, MSECE

The master's degree program in electrical and computer engineering offers in-depth course work within the concentration-choice-related areas. The curriculum is integrated and intensive and is built on state-of-the-art research, taught by faculty who are experts in their areas.

**Excluded Courses for All MSECE Concentrations**

You **cannot take excluded courses as part of your MSECE program.**

Please **do not** petition to take these courses, as any petition to take these courses will be automatically rejected. Courses from the following subject areas may not count toward any concentration within the MSECE program: CSYE, ENSY, EMGT, INFO, SBSY, TELE. Select CS courses are also excluded from all MSECE concentrations. Please see the program requirements tab and your college administrator for more information.

**Graduate Certificate Options**

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 230).

**GORDON INSTITUTE OF ENGINEERING LEADERSHIP**

### Master's Degree in Electrical and Computer Engineering with Concentration in Power Systems with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Electrical and Computer Engineering with Concentration in Power Systems in addition to earning a Graduate Certificate in Engineering Leadership. Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 48-semester-hour degree and certificate will require 32 semester hours of advisor-approved power systems technical courses.

Engineering Leadership (p. 225)

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Options**

Complete one of the following options:

**COURSE WORK OPTION**

Code	Title	Hours
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**Depth Courses**

Complete 20 semester hours from the depth course list below. (p. 174)	20
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**Breadth Courses**

Complete 8 semester hours from the breadth course list below. (p. 175)	8
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Note: Depth courses cannot be taken for breadth.

**Elective**

Complete 4 additional semester hours from either depth or breadth courses.	4
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**THESIS OPTION**

Code	Title	Hours
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**Thesis**

EECE 7990	Thesis	8
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**Depth Courses**

Complete 12 semester hours from the depth course list below. (p. 174)	12
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**Breadth Courses**

Complete 4 semester hours from the breadth course list below. (p. 175)	4
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Note: Depth courses cannot be taken for breadth.

**Elective**

Complete 8 additional semester hours from either the depth or breadth courses.	8
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**Course Lists****DEPTH COURSES**

Code	Title	Hours
EECE 5580	Classical Control Systems	
EECE 5610	Digital Control Systems	
EECE 5680 and EECE 5681	Electric Drives and Lab for EECE 5680	
EECE 5682	Power Systems Analysis 1	

EECE 5684 and EECE 5685	Power Electronics and Lab for EECE 5684
EECE 5686	Electrical Machines
EECE 5688	Analysis of Unbalanced Power Grids
EECE 7200	Linear Systems Analysis
EECE 7211	Nonlinear Control
EECE 7213	System Identification and Adaptive Control
EECE 7214	Optimal and Robust Control
EECE 7224	Power Systems State Estimation
EECE 7226	Modeling and Simulation of Power System Transients
EECE 7228	Advanced Power Electronics
EECE 7237	Special Topics in Power Electronics
EECE 7250	Power Management Integrated Circuits
EECE 7323	Numerical Optimization Methods
EECE 7398	Special Topics (Power System Constrained Optimization)
EECE 7400	Special Problems in Electrical and Computer Engineering
ENGR 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage

**BREADTH COURSES**

Code	Title	Hours
EECE 5115	Dynamical Systems in Biological Engineering	
EECE 5155	Wireless Sensor Networks and the Internet of Things	
EECE 5161	Thin Film Technologies	
EECE 5170	Introduction to Multiferroics Materials and Systems	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
EECE 5576	Wireless Communication Systems	
EECE 5606	Micro- and Nanofabrication	
EECE 5626	Image Processing and Pattern Recognition	
EECE 5627	Arithmetic and Circuit Design for Inexact Computing with Nanoscaled CMOS	
EECE 5638	Compilers for Modern Computer Architectures	
EECE 5639	Computer Vision	
EECE 5640	High-Performance Computing	
EECE 5641	Introduction to Software Security	
EECE 5642	Data Visualization	
EECE 5643	Simulation and Performance Evaluation	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 5645	Parallel Processing for Data Analytics	
EECE 5647	Nanophotonics	
EECE 5649	Design of Analog Integrated Circuits with Complementary Metal-Oxide- Semiconductor Technology	
EECE 5652	Microwave Circuits and Networks	
EECE 5666	Digital Signal Processing	

EECE 5697	Acoustics and Sensing
EECE 5698	Special Topics in Electrical and Computer Engineering (GNSS Signal Processing)
EECE 5698	Special Topics in Electrical and Computer Engineering (Feedback Control Systems: Applications to Unmanned Aerial Vehicles)
EECE 5698	Special Topics in Electrical and Computer Engineering (Networks: Technology, Economics, Social Interactions)
EECE 5698	Special Topics in Electrical and Computer Engineering (Hardware and System Security)
EECE 5698	Special Topics in Electrical and Computer Engineering (Advanced Network Management)
EECE 5698	Special Topics in Electrical and Computer Engineering (Electromagnetic Devices)
EECE 7105	Optics for Engineers
EECE 7150	Autonomous Field Robotics
EECE 7201	Solid State Devices
EECE 7202	Electromagnetic Theory 1
EECE 7203	Complex Variable Theory and Differential Equations
EECE 7204	Applied Probability and Stochastic Processes
EECE 7205	Fundamentals of Computer Engineering
EECE 7240 and EECE 7248	Analog Integrated Circuit Design and Lab for EECE 7240
EECE 7242	Integrated Circuits for Mixed Signals and Data Communication
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)
EECE 7245	Microwave Circuit Design for Wireless Communication
EECE 7247	Radio Frequency Integrated Circuit Design
EECE 7258	Human Sensing and Recognition
EECE 7263	Humanoid Robotics
EECE 7270	Electromagnetic Theory 2
EECE 7271	Computational Methods in Electromagnetics
EECE 7275	Antennas and Radiation
EECE 7284	Optical Properties of Matter
EECE 7293	Modern Imaging
EECE 7296	Electronic Materials
EECE 7297	Advanced Magnetic Materials— Magnetic Devices
EECE 7310	Modern Signal Processing
EECE 7323	Numerical Optimization Methods
EECE 7336	Digital Communications
EECE 7337	Information Theory
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization

EECE 7346	Probabilistic System Modeling and Analysis
EECE 7352	Computer Architecture
EECE 7353	VLSI Design
EECE 7364	Mobile and Wireless Networking
EECE 7368	High-Level Design of Hardware-Software Systems
EECE 7370	Advanced Computer Vision
EECE 7374	Fundamentals of Computer Networks
EECE 7376	Operating Systems: Interface and Implementation
EECE 7377	Scalable and Sustainable System Design
EECE 7390	Computer Hardware Security
EECE 7393	Analysis and Design of Data Networks
EECE 7397	Advanced Machine Learning
EECE 7398	Special Topics (Legged Robots)
EECE 7398	Special Topics (Advanced Computer Architecture)
EECE 7398	Special Topics (Advances in Deep Learning)
EECE 7398	Special Topics (Advanced Radio Frequency Passive Technologies)
EECE 7399	Preparing High-Stakes Written and Oral Materials
MATH 7233	Graph Theory
CS 5100	Foundations of Artificial Intelligence
CS 5200	Database Management Systems
CS 5600	Computer Systems
CS 6110	Knowledge-Based Systems
CS 6200	Information Retrieval
CS 6220	Data Mining Techniques
CS 6410	Compilers
CS 6510	Advanced Software Development
CS 6760	Privacy, Security, and Usability
CS 7800	Advanced Algorithms
CY 5770	Software Vulnerabilities and Security
CY 6740	Network Security
CY 6750	Cryptography and Communications Security

**EXCLUDED COURSES FOR ALL MSECE CONCENTRATIONS**

Please see your college administrator for more information.

Code	Title	Hours
Courses from the following subject areas may not count toward any concentration within the MSECE program:		
CSYE, ENSY, EMGT, INFO, SBSY, TELE		
The following CS courses may not count toward any concentration within the MSECE program:		
CS 5010	Programming Design Paradigm	
CS 5320	Digital Image Processing	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5520	Mobile Application Development	
CS 5610	Web Development	

CS 5700	Fundamentals of Computer Networking
CS 5800	Algorithms
CS 6350	Empirical Research Methods
CS 6710	Wireless Network

**Program Credit/GPA Requirements**

32 total semester hours required  
Minimum 3.000 GPA required

**Electrical and Computer Engineering Leadership, MSECEL**

The Gordon Engineering Leadership Program is a transformational, technical, and challenging graduate-level learning experience targeted for engineering professionals.

The Gordon Institute, in collaboration with the College of Engineering, offers the **Master of Science in Electrical and Computer Engineering Leadership (MSECEL)** along with the **Graduate Certificate in Engineering Leadership** as formal recognition of the combined focus in electrical and computer engineering technical skills and midlevel engineers' leadership acumen and broadened cross-functional capabilities.

Pursuing the MSECEL and the graduate certificate allows participants to:

- Enhance technical knowledge in electrical and computer engineering
- Take part in a hands-on curriculum (<http://www.northeastern.edu/gordonleadership/about-the-institute/curriculum/>) taught by industry-experienced professors
- Work with peers from across engineering fields on leadership skills development
- Receive one-on-one mentoring from industry experts and faculty

The Gordon Engineering Leadership Program anchors around an intense, market-worthy challenge project based on your organization's strategic needs. This is a unique opportunity to apply your classroom experience to a professional setting, potentially further accelerating your career.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Core Requirements**

Code	Title	Hours
<b>Leadership</b>		
ENLR 5121	Engineering Leadership 1	2
ENLR 5122	Engineering Leadership 2	2
<b>Foundations</b>		
ENLR 5131	Scientific Foundations of Engineering 1	2
ENLR 5132	Scientific Foundations of Engineering 2	2
<b>Project</b>		
ENLR 7440	Engineering Leadership Challenge Project 1	4
ENLR 7442	Engineering Leadership Challenge Project 2	4

**Concentration Courses**

Complete 16 semester hours from any of the approved depth/breadth course lists within any of the seven EECE concentrations. Students are encouraged to take at least three courses within the same concentration. 16



## Program Credit/GPA Requirements

32 total semester hours required  
Minimum 3.000 GPA required

### Mechanical and Industrial Engineering

Website (<http://www.mie.neu.edu/mie/degrees-programs/graduate-studies/>)

#### Emanuel S. Melachrinoudis, PhD

Professor, Interim Chair, and Director of Industrial Engineering

#### Marilyn L. Minus, PhD

Associate Professor and Associate Chair for Graduate Studies and Research

334 Snell Engineering Center  
617.373.2740  
617.373.2921 (fax)

Mechanical engineers design, develop, and support the manufacture of machinery and devices to transmit power or to convert energy from thermal to mechanical form in order to power the modern world and its machines. Traditionally, mechanical engineers have designed and tested devices, such as heating and air-conditioning systems, machine tools, internal combustion engines, and steam power plants. Today, they also play primary roles in the development of new technologies in a variety of fields—energy conversion, solar energy utilization, environmental control, prosthetics, transportation, manufacturing, robotics, and new-materials development.

Industrial engineers design and analyze systems that include people, equipment, and materials and their interactions and performance in the workplace. An industrial engineer collects this information and evaluates alternatives to make decisions that best advance the goals of the enterprise. Industrial engineers work in manufacturing firms, hospitals, banks, public utilities, transportation, government agencies, insurance companies, and construction firms. Among the projects they undertake are design and implementation of a computer-integrated supply chain or manufacturing system, facilities planning for a variety of industries, design of a robotics system in a manufacturing environment, long-range corporate planning, development and implementation of a quality-control system, simulation analyses to improve processes and make operational decisions, design of healthcare operations to enhance patient safety and improve efficiency, productivity, and development of computer systems for information control.

## Mission of the Department

The mission of the Department of Mechanical and Industrial Engineering is to educate persons for professional and technical excellence; to perform research to advance the science and practice of engineering; to engage in service activities that advance the department, the university, and the profession; and to instill in ourselves and our students habits and attitudes that promote ethical behavior, professional responsibility, and careers that advance the well-being of society.

## Academic Programs

The Department of Mechanical and Industrial Engineering (MIE) offers comprehensive research and educational programs for both Master of Science (MS) and Doctor of Philosophy (PhD) students. Our cutting-edge and vibrant doctoral programs include PhDs in industrial engineering, mechanical engineering, and an interdisciplinary PhD (housed in the College of Engineering). Our MS degree programs are offered in both traditional mechanical and industrial engineering, operations

research, data analytics engineering, as well as applied programs and concentrations. These extensive programs and concentrations allow for the selection of a degree that meets a wide variety of personal and professional goals. Graduate students work with our world-renowned faculty to achieve research experience and their career goals and have opportunities to participate in the graduate cooperative education program.

## Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 230).

### GORDON INSTITUTE OF ENGINEERING LEADERSHIP OPTION

Students have the opportunity to pursue the Gordon Engineering Leadership Program (p. 224) in combination with the MS degree.

### ENGINEERING BUSINESS

Students have the opportunity to pursue the Galante Engineering Business Certificate (<http://catalog.northeastern.edu/graduate/engineering/multidisciplinary/engineering-business-graduate-certificate/>) in combination with several MS degrees.

## Programs

### Doctor of Philosophy (PhD)

- Industrial Engineering (p. 178)
- Industrial Engineering—Advanced Entry (p. 180)
- Mechanical Engineering (p. 183)
- Mechanical Engineering—Advanced Entry (p. 185)

### Master of Science (MS)

- Data Analytics Engineering (p. 188)
- Human Factors (p. 191)
- Robotics (p. 118)

### Master of Science in Industrial Engineering (MSIE)

- Industrial Engineering (p. 194)

### Master of Science in Engineering Management (MSEM)

- Engineering Management (p. 196)

### Master of Science in Energy Systems (MSENEs)

- Energy Systems (p. 199)
- Energy Systems - Academic Link Program (p. 201)

### Master of Science in Mechanical Engineering (MSME)

- Mechanical Engineering with Concentration in General Mechanical Engineering (p. 202)
- Mechanical Engineering with Concentration in Mechanics and Design (p. 205)
- Mechanical Engineering with Concentration in Materials Science (p. 203)
- Mechanical Engineering with Concentration in Mechatronics (p. 207)
- Mechanical Engineering with Concentration in Thermofluids (p. 208)

### Master of Science in Operations Research (MSOR)

- Operations Research (p. 210)

## Graduate Certificate

- Data Analytics Engineering (p. 212)
- Energy Systems (p. 213)
- Energy Systems Management (p. 213)
- Engineering Business (p. 213)
- Engineering Economic Decision Making (p. 214)
- Engineering Management (p. 214)
- Lean Six Sigma (p. 215)
- Renewable Energy (p. 215)
- Sustainable Energy Systems (p. 215)
- Supply Chain Engineering Management (p. 216)
- Technology Systems Management (p. 216)

## Industrial Engineering, PhD

### Requirements

The Doctor of Philosophy (PhD) is awarded to students who demonstrate high academic achievement and research competence in the field of industrial engineering. To earn a PhD, a student must complete approved and advanced course work and submit and defend an original dissertation of independent research. The Department of Mechanical and Industrial Engineering (MIE) expects all successful doctoral candidates to show depth of knowledge and research innovation in their chosen field of specialization.

The MIE department admits applicants to the PhD program either directly after earning a suitable bachelor's degree (i.e., bachelor's entry) or after earning a master's degree (i.e., advanced entry). Upon acceptance into the program, an applicant is designated as a doctoral student. This designation is changed to doctoral candidate upon successful completion of the doctoral qualifying examinations (both written and oral exams) as well as all the required 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 or jointly appointed 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 the co-advisor. Students are advised by the academic advisor of their discipline before they select their research advisor(s).

### Change of Research Advisor

Students who want to change their research advisors need to use the MIE petition form. The petition form needs to be signed both by the student and the student's current and future research advisors. The signed form then needs to be submitted to the MIE department for further processing.

### Course Requirements and Plan of Study

A typical program of study includes at least 40 semester hours of course work beyond a bachelor's degree. Students who choose to get a master's degree along the way to PhD must complete a total of 52 semester hours (32 semester hours to earn a master's degree and an additional 20 semester hours in order to earn a PhD). The 32 semester hours of course work that apply toward the master's degree may include up to 8 semester hours of thesis or 4 semester hours of project or approved independent study course work. Students may petition the MIE Graduate Affairs Committee to substitute up to 4 semester hours of Independent Study (IE 7978) as part of their required course work. An independent

study must be approved by the research advisor. When thesis or project is selected, an independent study course cannot be taken.

Each doctoral student, together with his or her research advisor, should develop an initial program during the first semester of study. The final program is also subject to the approval of the dissertation committee, who will add the program of study to the student's record upon admission to doctoral candidacy.

### PhD Students Annual Review

All PhD students in the MIE department must complete the PhD Students Annual Review form and submit the required documents by no later than January 31<sup>st</sup> of their third year of study (second year for PhD advanced entry) and all subsequent years thereafter.

### PhD Candidacy

To qualify as a doctoral candidate, a doctoral student must successfully complete the doctoral qualifying examinations (both a written comprehensive exam and an oral exam—see below) as well as all the required course work.

### Doctoral Qualifying Examinations

**Background and motivation:** To demonstrate breadth and depth in each of the subject exams, crossover and merging exams are necessary in an effort to provide students with an opportunity to master the core disciplines in mechanical or industrial engineering (at both undergraduate and graduate levels) along with a focus area of importance to their specialization. These exams also provide an assessment as to whether students have adequate knowledge to pursue advanced study and possess attributes of a doctoral candidate by demonstrating understanding of and the ability to apply fundamental principles. Also, an oral exam tied to the written exams is necessary in an effort to evaluate a student's potential to perform independent research in the chosen field of specialization for the doctoral program.

**Doctoral qualifying examinations framework:** The doctoral qualifying examinations consist of the following two parts:

1. Two **written comprehensive** exams, which are respectively referred to as exam A and exam B
2. An **oral** exam to be administered no later than the end of the semester in which the written exams are taken and passed

### WRITTEN COMPREHENSIVE EXAMINATIONS

All doctoral students admitted directly with a bachelor's degree must take the written comprehensive exams no later than the first time that it is offered after their first two years of study. The written comprehensive exams include two exams, **exam A** and **exam B**, which are given on the Thursday and/or Friday of the first week of classes during regular semesters. A complete list of these exams along with topical coverage and details are provided in the PhD Qualifying Examinations Guidelines on the MIE department graduate website (<http://www.mie.neu.edu/mie/degrees-programs/graduate-studies/>). Students should also consult extensively with their research advisor regarding all aspects of the qualifying exams.

### Written Comprehensive Exams Rules

Exam A, about four to six hours in length, should be selected from the list of major exams based on the student's concentration (i.e., industrial engineering—IND, sample list provided). No deviation from this rule will be permitted. Exam B, about two to three hours in length, should be selected from the list of exams B for PhD degree program in industrial engineering (a sample list is provided below), and only one exam from this list should be selected. All students are required to have their research advisor's

approval on selection of exam B prior to registering to take the written comprehensive exams. Note that exam B cannot be similar or close to one of the topics covered in exam A.

#### List of exams A and B based on student's research concentration:

#### Samples of exam A for industrial engineering PhD students:

- **Industrial Engineering (IND):** Probability (IND1), Statistics and Probabilistic OR (IND2), and Deterministic OR (IND3)

#### Samples of exam B for industrial engineering PhD students:

- Data Mining (DMN)
- Human-Machine Systems (HMS)
- Manufacturing Systems (MFS)
- Networks and Advanced Optimization (NAO)
- Reliability and Quality Assurance (RQA)
- Supply Chain Engineering (SCE)

### ORAL EXAMINATION

The objective of the oral exam is to assess a student's potential to perform independent research in the chosen field of specialization. This exam shall be administered no later than the end of the semester in which the written exams are taken and passed. The exam shall be publicly advertised **at least one week in advance** and all faculty members and students may attend and participate.

**Oral examination procedure:** The student's research advisor convenes and chairs an oral examination committee comprised of a minimum of three faculty members deemed appropriate by the research advisor. This committee provides a set of technical papers pertinent to the student's research area at least one month before the examination. The oral examination committee will then conduct the exam that comprises the following two parts (both completed in a one-hour session):

1. A 30-minute oral presentation on a selected number of papers out of the assigned technical papers
2. A 30-minute oral exam by committee members' questions and evaluation of the student covering topics specifically related to the student's research area

### GRADING PROCEDURE

#### Grading procedure and results of the written comprehensive

**examination:** The MIE Graduate Affairs Committee will review all students' performance in the written comprehensive exams. Depending on the results of both major and minor exams and in consultation with the student's research advisor, the Graduate Affairs Committee will recommend one of the following three possible options:

1. No invitation to oral exam: The student will be dismissed from the program. He or she may be granted a master's degree if the requirements are already met; otherwise, the student may continue to fulfill the requirements for a master's degree in industrial engineering (IE), mechanical engineering (ME), or other MIE departmental MS degree (e.g., operations research (OR)).
2. No invitation to oral exam yet: The student will be asked to retake the written exam(s) again in the next offering and/or take additional courses.
3. Student is invited to oral exam.

The Graduate Affairs Committee makes its final recommendation considering all aspects of the exam including, but not limited to, examiners' reports and results and the student's research performance and course work. The Graduate Affairs Committee reserves the right to

recommend option 1 above for students who register for the exams but do not show up.

**Grading procedure and results of the oral examination:** If the student's performance in the oral exam is not satisfactory, the student will be dismissed from the program. He or she may be granted a master's degree if the requirements are met; otherwise, the student may continue to fulfill the requirements for a master's degree in industrial engineering (IE), mechanical engineering (ME), or other MIE departmental MS degree (e.g., operations research (OR)).

Upon successfully passing the oral exam, the student continues in the PhD program. Upon passing all the required course work, he or she will become a PhD candidate. The results of written and oral exams and any recommended course work will become part of the student's record.

### APPEAL PROCEDURE

The preliminary qualifying examination process provides means for reevaluation for students who fail one or more exams to appeal the Graduate Affairs Committee decision. All communications related to these examinations should be coordinated through the student's research advisor. Only the student's research advisor may request the MIE Graduate Affairs Committee to reevaluate the student's failed exams using the appeal form found at the link (<http://www.coe.neu.edu/sites/default/files/pdfs/coe/gse/miepetitionform.pdf>).

### PhD Students Changing Their Program

PhD students who, for any reason, decide to change their program (i.e., from PhD in ME to PhD in IE or vice versa) must take (or retake) the doctoral qualifying examinations (both written comprehensive exams and oral exam) based on the student's new major research area (i.e., industrial engineering, materials, mechanics, mechatronics, or thermofluids).

### Interdisciplinary PhD Students with MIE as the Home Department

Students pursuing the College of Engineering (COE) interdisciplinary PhD program with the MIE department as their home department must take one of the major written comprehensive exams (exam A) of the MIE doctoral qualifying examinations. The minor exam (exam B) can be substituted with appropriate exam(s) from other department(s) involved with the student's interdisciplinary PhD program. Students dismissed from the ME or IE PhD programs in the MIE department cannot enroll in the PhD Interdisciplinary Engineering program with MIE as the primary affiliation.

### Dissertation Proposal Preparation and Presentation Timing

Students must present their dissertation proposal no more than 12 months after successfully completing the oral exam. In addition, the presentation of the dissertation proposal and the actual dissertation defense (see below) shall be no less than 6 months apart. The student's dissertation committee will invite any additional faculty deemed appropriate to that field; this dissertation committee will then conduct the dissertation proposal session. Each student's dissertation committee must be comprised of at least three members, including the research advisor. At least two of those three members must be full-time MIE faculty members.

### Dissertation Course Requirements

Upon successful completion of the doctoral qualifying examinations (both written preliminary and oral 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 (may include full summer term) for Dissertation (IE 9990). Upon completion of this sequence, the student must then register for Dissertation

Continuation (IE 9996) in every semester (in each fall and spring semester and also in the summer term if summer is the student's last semester) until the dissertation is completed. Students may not register for Dissertation Continuation (IE 9996) until they complete the two-semester registration sequence for Dissertation (IE 9990).

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, Candidacy Preparation—Doctoral (IE 8960), can be taken if needed to meet the full-time course registration requirement. Candidacy Preparation—Doctoral (IE 8960) is an individual instruction course, billed as one semester hour, and graded as S or U. This course does not have any course content, and students must register in a section for which their research or academic advisor is listed as the "instructor" in the online registration system.

### Final Oral (Dissertation Defense) Examination

All doctoral candidates must pass a final oral exam. This exam will be scheduled once the dissertation committee agrees that the candidate's research has reached a stage where it is appropriate for a formal presentation and after completion of all other requirements for the PhD, including all 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 an additional final oral dissertation defense.

### Residency Requirement

After achieving PhD candidacy, the university residency requirement is satisfied by two semesters of full-time graduate registration or four semesters of part-time graduate registration. Students must be continually enrolled during the pursuit of their dissertation.

### Program Requirements

#### Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

#### Milestones

Doctoral qualifying exams (both written comprehensive and oral area exams)  
Annual review  
Dissertation committee formation  
Dissertation proposal  
Dissertation defense

### Core Requirements

Code	Title	Hours
<b>Recommended Courses (semester hours can be counted towards course work component with advisor approval)</b>		
MEIE 6830	Graduate Traineeship I (Technical Writing and Communications) (2 SHs)	
MEIE 6860	Graduate Traineeship II (Research Ethics and Professional Development) (2 SHs)	

### Approved Course Work

Requires 40 semester hours of course work, including up to 4 semester hours of Independent Study (IE 7978). Students who choose to get a master's degree along the way to PhD must complete a total of 52 semester hours (32 semester hours toward the sought master's degree and 20 semester hours beyond the earned master's degree). The 32 semester hours applied toward the master's degree may include up to 8 semester hours of MS Thesis or 4 semester hours of MS Project or approved independent study course work. Please consult your faculty advisor for acceptable courses.

### Dissertation

Code	Title	Hours
Complete the following (repeatable) course twice. Must register in two consecutive semesters (may include full summer term).		
ME 9990	Dissertation	

### Program Credit/GPA Requirements

40 total semester hours required  
Minimum 3.000 GPA required

## Industrial Engineering, PhD—Advanced Entry

### Requirements

The Doctor of Philosophy (PhD) is awarded to students who demonstrate high academic achievement and research competence in the field of industrial engineering. To earn a PhD, a student must complete approved and advanced course work and submit and defend an original dissertation of independent research. The Department of Mechanical and Industrial Engineering (MIE) expects all successful doctoral candidates to show depth of knowledge and research innovation in their chosen field of specialization.

The MIE department admits applicants to the PhD program either directly after earning a suitable bachelor's degree (i.e., direct entry) or after earning a master's degree (i.e., advanced entry). Upon acceptance into the program, an applicant is designated as a doctoral student. This designation is changed to doctoral candidate upon successful completion of the doctoral qualifying examinations (both written and oral exams) and 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 or jointly appointed 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 the co-advisor. Students are advised by the academic advisor of their discipline before they select their research advisor(s).

### Change of Research Advisor

Students who want to change their research advisors need to use the MIE petition form. The petition form needs to be signed both by the student and the student's current and future research advisors. The signed form needs to be submitted to the MIE department for further processing.

### Course Requirements and Plan of Study

A typical program of study includes at least 20 semester hours of course work beyond a master's degree. Students may petition the MIE Graduate

Affairs Committee to substitute up to 4 semester hours of Independent Study (IE 7978) as part of their required course work. An independent study must be approved by the research advisor.

Each doctoral student, together with his or her research advisor, should develop an initial program during the first semester of study. The final program is also subject to the approval of the dissertation committee, who will add the program of study to the student's record upon admission to doctoral candidacy.

## PhD Students Annual Review

All PhD students in the MIE department must complete the PhD Students Annual Review form and submit the required documents by no later than January 31<sup>st</sup> of their second year of study (third year for PhD direct entry) and all subsequent years thereafter.

## PhD Candidacy

To qualify as a doctoral candidate, a doctoral student must successfully complete the doctoral qualifying examinations (both a written comprehensive exam and an oral exam—see below) as well as all the required course work.

## Doctoral Qualifying Examinations

**Background and motivation:** To demonstrate breadth and depth in each of the subject exams, crossover and merging exams are necessary in an effort to provide students with an opportunity to master the core disciplines in mechanical or industrial engineering (at both undergraduate and graduate levels) along with a focus area of importance to their specialization. These exams also provide an assessment as to whether students have adequate knowledge to pursue advanced study and possess attributes of a doctoral candidate by demonstrating understanding of and the ability to apply fundamental principles. Also, an oral exam tied to the written exams is necessary in an effort to evaluate the student's potential to perform independent research in the chosen field of specialization for the doctoral program.

**Doctoral qualifying examinations framework:** The doctoral qualifying examinations consist of the following two parts:

1. Two **written comprehensive** exams, which are respectively referred to as exam A and exam B
2. An **oral** exam to be administered no later than the end of the semester in which the written exams are taken and passed

### WRITTEN COMPREHENSIVE EXAMINATIONS

All doctoral students admitted directly with a bachelor's degree must take the written comprehensive exams no later than the first time that it is offered after their first two years of study. The written comprehensive exams include two exams, **exam A** and **exam B**, which are given on the Thursday and/or Friday of the first week of classes during regular semesters. A complete list of these exams along with topical coverage and details are provided in the PhD Qualifying Examinations Guidelines on the MIE department graduate website (<http://www.mie.neu.edu/mie/degrees-programs/graduate-studies/>). Students should also consult extensively with their research advisor regarding all aspects of the qualifying exams.

### Written Comprehensive Exams Rules

Exam A, about four to six hours in length, should be selected from the list of major exams based on the student's concentration (i.e., industrial engineering—IND, sample list provided). No deviation from this rule will be permitted. Exam B, about two to three hours in length, should be selected from the list of exams B for PhD degree program in industrial engineering (a sample list is provided below). Only one exam from this list should be selected. All students are required to have their research advisor's

approval on selection of exam B prior to registering to take the written comprehensive exams. Note that exam B cannot be similar or close to one of the topics covered in exam A.

**List of exams A and B based on student's research concentration:**

**Samples of exam A for industrial engineering PhD students:**

- **Industrial Engineering (IND):** Probability (IND1), Statistics and Probabilistic OR (IND2), and Deterministic OR (IND3)

**Samples of exam B for industrial engineering PhD students:**

- Data Mining (DMN)
- Human-Machine Systems (HMS)
- Manufacturing Systems (MFS)
- Networks and Advanced Optimization (NAO)
- Reliability and Quality Assurance (RQA)
- Supply Chain Engineering (SCE)

### ORAL EXAMINATION

The objective of the oral exam is to assess a student's potential to perform independent research in the chosen field of specialization. This exam shall be administered no later than the end of the semester in which the written exams are taken and passed. The exam shall be publicly advertised **at least one week in advance** and all faculty members and students may attend and participate.

**Oral examination procedure:** The student's research advisor convenes and chairs an oral examination committee comprised of a minimum of three faculty members deemed appropriate by the research advisor. This committee provides a set of technical papers pertinent to the student's research area at least one month before the examination. The oral examination committee will then conduct the exam that comprises the following two parts (both completed in a one-hour session):

1. A 30-minute oral presentation on a selected number of papers out of the assigned technical papers
2. A 30-minute oral exam by committee members' questions and evaluation of the student covering topics specifically related to the student's research area

### GRADING PROCEDURE

**Grading procedure and results of the written comprehensive examination:**

The MIE Graduate Affairs Committee will review all students' performance in the written comprehensive exams. Depending on the results of both major and minor exams and in consultation with the student's research advisor, the Graduate Affairs Committee will recommend one of the following three possible options:

1. No invitation to oral exam: The student will be dismissed from the program. He or she may be granted a master's degree if the requirements are already met; otherwise, the student may continue to fulfill the requirements for a master's degree in industrial engineering (IE), mechanical engineering (ME), or other MIE departmental MS degree (e.g., operations research (OR)).
2. No invitation to oral exam yet: The student will be asked to retake the written exam(s) again in the next offering and/or take additional courses.
3. Student is invited to oral exam.

The Graduate Affairs Committee makes its final recommendation considering all aspects of the exam including, but not limited to, examiners' reports and results and student's research performance and course work. The Graduate Affairs Committee reserves the rights to

recommend option 1 above for students who register for the exams but do not show up.

**Grading procedure and results of the oral examination:** If the student's performance in the oral exam is not satisfactory, the student will be dismissed from the program. He or she may be granted a master's degree if the requirements are met; otherwise, the student may continue to fulfill the requirements for a master's degree in industrial engineering (IE), mechanical engineering (ME), or other MIE departmental MS degree (e.g., operations research (OR)).

Upon successfully passing the oral exam, the student continues in the PhD program. Upon passing all the required course work, he or she will become a PhD candidate. The results of written and oral exams and any recommended course work will become part of the student's record.

### APPEAL PROCEDURE

The preliminary qualifying examination process provides means for reevaluation for students who fail one or more exams to appeal the Graduate Affairs Committee decision. All communications related to these examinations should be coordinated through the student's research advisor. Only the student's research advisor may request the MIE Graduate Affairs Committee to reevaluate the student's failed exams using the appeal form found at the link (<http://www.coe.neu.edu/sites/default/files/pdfs/coe/gse/miepetitionform.pdf>).

### PhD Students Changing Their Program

PhD students who, for any reason, decide to change their program (i.e., from PhD in ME to PhD in IE or vice versa) must take (or retake) the doctoral qualifying examinations (both written comprehensive exams and oral exam) based on the student's new major research area (i.e., industrial engineering, materials, mechanics, mechatronics, or thermofluids).

### Interdisciplinary PhD Students with MIE as the Home Department

Students pursuing the College of Engineering (COE) interdisciplinary PhD program with the MIE department as their home department must take one of the major written comprehensive exams (exam A) of the MIE doctoral qualifying examinations. The minor exam (exam B) can be substituted with appropriate exam(s) from other department(s) involved with the student's interdisciplinary PhD program. Students dismissed from the ME or IE PhD programs in the MIE department cannot enroll in the PhD Interdisciplinary Engineering program with MIE as the primary affiliation.

### Dissertation Proposal Preparation and Presentation Timing

Students must present their dissertation proposal no more than 12 months after successfully completing the oral exam. In addition, the presentation of the dissertation proposal and the actual dissertation defense (see below) shall be no less than 6 months apart. The student's dissertation committee will invite any additional faculty deemed appropriate to that field; this dissertation committee will then conduct the dissertation proposal session. Each student's dissertation committee must be comprised of at least three members, including the research advisor. At least two of those three members must be full-time MIE faculty members.

### Dissertation Course Requirements

Upon successful completion of the doctoral qualifying examinations (both written preliminary and oral 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 (may include full summer term) for Dissertation (IE 9990). Upon completion of this sequence, the student must then register for Dissertation

Continuation (IE 9996) in every semester (in each fall and spring term and also in the summer term if summer is the student's last semester) until the dissertation is completed. Students may not register for Dissertation Continuation (IE 9996) until they fulfill the two-semester registration sequence for Dissertation (IE 9990)

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, Candidacy Preparation—Doctoral (IE 8960), can be taken if needed to fulfill the full-time course registration requirement. Candidacy Preparation—Doctoral (IE 8960) is an individual instruction course, billed as one semester hour, and graded as S or U. Candidacy Preparation—Doctoral (IE 8960) does not have any course content, and students must register in a section for which their research or academic advisor is listed as the "instructor" in the online course registration system.

### Final Oral (Dissertation Defense) Examination

All doctoral candidates must pass a final oral exam. This exam will be scheduled once the dissertation committee agrees that the candidate's research has reached a stage where it is appropriate for a formal presentation and after completion of all other requirements for the PhD, including all 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 an additional final oral dissertation defense.

### Residency Requirement

After achieving PhD candidacy, the university residency requirement is satisfied by two semesters of full-time graduate registration or four semesters of part-time graduate registration. Students must be continually enrolled during the pursuit of their dissertation.

### Program Requirements

#### Master's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

#### Milestones

Doctoral qualifying exams (both written comprehensive and oral area exams)  
Annual review  
Dissertation committee formation  
Dissertation proposal  
Dissertation defense

### General Requirements

Code	Title	Hours
<b>Recommended Courses (semester hours can be counted toward course work component with advisor approval)</b>		
MEIE 6830	Graduate Traineeship I (Technical Writing and Communications) (2 SHs)	

MEIE 6860 Graduate Traineeship II (Research Ethics and Professional Development) (2 SHs)

#### Approved Course Work

Requires 20 semester hours of course work, including up to 4 semester hours of Independent Study (IE 7978). Please consult your faculty advisor for acceptable courses. 20

### Dissertation Courses

Code	Title	Hours
Complete the following (repeatable) course twice. Must register in two consecutive semesters (may include full summer term):		
ME 9990	Dissertation	

### Program Credit/GPA Requirements

20 total semester hours required  
Minimum 3.000 GPA required

## Mechanical Engineering, PhD

### Requirements

The PhD is awarded to students who demonstrate high academic achievement and research competence in the fields of mechanical engineering. To earn a PhD, a student must complete an approved, rigorous program of advanced course work and submit and defend an original dissertation of independent research. The Department of Mechanical and Industrial Engineering (MIE) expects all successful doctoral candidates to show depth of knowledge and research innovation in their chosen field of specialization.

The MIE department admits applicants to the PhD program either directly after earning a suitable bachelor's degree (i.e., direct entry) or after earning a suitable master's degree (i.e., advanced entry). Upon acceptance into the program, an applicant is designated as a doctoral student. This designation is changed to doctoral candidate upon successful completion of the doctoral qualifying examinations (both written and oral exams) as well as all the required 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 or jointly appointed 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 the co-advisor. Students are advised by the academic advisor of their discipline before they select their research advisor(s).

### Change of Research Advisor

Students who wish to change their research advisor need to use the MIE petition form to make that request. The petition form must be signed by the student and by the student's current and future research advisor. The signed petition form should then be submitted to the MIE department for further processing.

### Course Requirements and Plan of Study

A typical program of study includes at least 40 semester hours of course work beyond a bachelor's degree. Students who choose to get a master's degree along the way to a PhD must complete a total of 52 semester hours (32 semester hours to earn a master's degree and an additional 20 semester hours in order to earn a PhD). The 32 semester hours of course work that apply toward the master's degree may include up to

8 semester hours of thesis or 4 semester hours of project or approved independent study course work. Students may petition the MIE Graduate Affairs Committee to substitute up to 4 semester hours of Independent Study (ME 7978) as part of their required course work. An independent study must be approved by the research advisor. When thesis or project is selected, an independent study course cannot be taken.

Each doctoral student, together with his or her research advisor, should develop an initial program during the first semester of study. The final program is also subject to the approval of the dissertation committee, who will add the program of study to the student's record upon admission to doctoral candidacy.

### PhD Students Annual Review

All PhD students in the MIE department must complete the PhD Students Annual Review form and submit the required documents by no later than January 31<sup>st</sup> of their third year of study (second year for PhD advanced entry) and all subsequent years thereafter.

### PhD Candidacy

To qualify as a doctoral candidate, a doctoral student must successfully complete the doctoral qualifying examinations (both a written comprehensive exam and an oral exam—see below) as well as all the required course work.

### Doctoral Qualifying Examinations

**Background and motivation:** To demonstrate breadth and depth in each of the subject exams, crossover and merging exams are necessary in an effort to provide students with an opportunity to master the core disciplines in mechanical or industrial engineering (at both undergraduate and graduate levels) along with a focus area of importance to their specialization. These exams also provide an assessment as to whether students have adequate knowledge to pursue advanced study and possess attributes of a doctoral candidate by demonstrating understanding of and the ability to apply fundamental principles. Also, an oral exam tied to the written exams is necessary in an effort to evaluate a student's potential to perform independent research in the chosen field of specialization for the doctoral program.

**Doctoral qualifying examinations framework:** The doctoral qualifying examinations consist of the following two parts:

1. Two **written comprehensive** exams, which are respectively referred to as exam A and exam B
2. An **oral** exam to be administered no later than the end of the semester in which the written exams are taken and passed

### WRITTEN COMPREHENSIVE EXAMINATIONS

All doctoral students admitted directly with a bachelor's degree must take the written comprehensive exams no later than the first time that it is offered after their first two years of study. The written comprehensive exams include two exams, **exam A** and **exam B**, which are given on the Thursday and/or Friday of the first week of classes during regular semesters. A complete list of these exams along with topical coverage and details are provided in the PhD Qualifying Examinations Guidelines on the MIE department graduate website (<http://www.mie.neu.edu/mie/degrees-programs/graduate-studies/>). Students should also consult extensively with their research advisor regarding all aspects of the qualifying exams.

### Written Comprehensive Exams Rules

Exam A, about four to six hours in length, should be selected from the list of major exams based on the student's concentration (i.e., materials, mechanics, mechatronics, or thermofluids, sample list provided). No deviation from this rule will be permitted. Exam B, about two to three

hours in length, should be selected from the list of B exams for PhD degree program in mechanical engineering (a sample list is provided below), and only one exam from this list should be selected. All students are required to have their research advisor's approval for their selection of exams A and B prior to registering to take the written comprehensive exams. Note that exam B cannot be similar or close to one of the topics covered in exam A.

**List of exams A and B are based on student's research concentration:**

**Samples of exam A for mechanical engineering PhD students:**

- **Materials Science Engineering (MSE):** Kinetics of Materials (MSE1), and Thermodynamics of Materials (MSE2)
- **Mechanics (MEC):** Mechanics of Deformable Media (MEC1), Dynamics and Vibration (MEC2), and Finite Element Method (MEC3)
- **Dynamic Systems and Control (DSC):** Dynamic Systems (DSC1); Mechanical Vibrations (DSC2); and Control Systems (DSC3)
- **Thermofluids Science (TFS):** Thermodynamics (TFS1); Fluid Mechanics (TFS2); and Heat Transfer (TFS3)

**Samples of exam B for mechanical engineering PhD students:**

- Control Systems (DSC3)
- Dynamic Systems (DSC1)
- Dynamics and Vibration (MEC2)
- Engineering Mathematics (MTH)
- Finite Element Method (MEC3)
- Fluid Mechanics (TFS2)
- Heat Transfer (TFS3)
- Kinetics of Materials (MSE1)
- Mechanics of Deformable Media (MEC1)
- Thermodynamics (TFS1)
- Thermodynamics of Materials (MSE2)

### ORAL EXAMINATION

The objective of the oral exam is to assess a student's potential to perform independent research in the chosen field of specialization. This exam shall be administered no later than the end of the semester in which the written exams are taken and passed. The exam shall be publicly advertised **at least one week in advance**, and all faculty members and students may attend and participate.

**Oral examination procedure:** The student's research advisor convenes and chairs an oral examination committee comprised of a minimum of three faculty members deemed appropriate by the research advisor. This committee provides a set of technical papers pertinent to the student's research area at least one month before the examination. The oral examination committee will then conduct the exam that comprises the following two parts (both completed in a one-hour session):

1. A 30-minute oral presentation on a selected number of papers out of the assigned technical papers
2. A 30-minute oral exam by committee members' questions and evaluation of the student covering topics specifically related to the student's research area

### GRADING PROCEDURE

**Grading procedure and results of the written comprehensive examination:** The MIE Graduate Affairs Committee will review all students' performance in the written comprehensive exams. Depending on the results of both major and minor exams and in consultation with

the student's research advisor, the Graduate Affairs Committee will recommend one of the following three possible options:

1. No invitation to oral exam: The student will be dismissed from the program. He or she may be granted a master's degree if the requirements are already met; otherwise, the student may continue to fulfill the requirements for a master's degree in industrial engineering (IE), mechanical engineering (ME), or other MIE departmental MS degree (e.g., operations research (OR)).
2. No invitation to oral exam yet: The student will be asked to retake the written exam(s) again in the next offering and/or take additional courses.
3. Student is invited to oral exam.

The Graduate Affairs Committee makes its final recommendation considering all aspects of the exam including, but not limited to, examiners' reports and results, student's research performance, and course work. The Graduate Affairs Committee reserves the right to recommend option 1 above for students who register for the exams but do not show up.

**Grading procedure and results of the oral examination:** If the student's performance in the oral exam is not satisfactory, the student will be dismissed from the program. He or she may be granted a master's degree if the requirements are met; otherwise, the student may continue to fulfill the requirements for a master's degree in industrial engineering (IE), mechanical engineering (ME), or other MIE departmental MS degree (e.g., operations research (OR)).

Upon successfully passing the oral exam, the student continues in the PhD program. Upon passing all the required course work, he or she will become a PhD candidate. The results of written and oral exams and any recommended course work will become part of the student's record.

### APPEAL PROCEDURE

The preliminary qualifying examination process provides means for reevaluation for students who fail one or more exams to appeal the Graduate Affairs Committee decision. All communications related to these examinations should be coordinated through the student's research advisor. Only the student's research advisor may request the MIE Graduate Affairs Committee to reevaluate the student's failed exams using the appeal form found at the link (<http://www.coe.neu.edu/sites/default/files/pdfs/coe/gse/miepetitionform.pdf>).

### PhD Students Changing Their Program

PhD students who, for any reason, decide to change their degree program (i.e., from PhD in ME to PhD in IE or vice versa) must take (or retake) the doctoral qualifying examinations (both written comprehensive exams and oral exam) based on the student's new major research area (i.e., industrial engineering, materials, mechanics, mechatronics, or thermofluids).

### Interdisciplinary PhD Students with MIE as the Home Department

Students pursuing the College of Engineering (COE) interdisciplinary PhD program with the MIE department as their home department must take one of the major written comprehensive exams (exam A) of the MIE doctoral qualifying examinations. The minor exam (exam B) can be substituted with appropriate exam(s) from other department(s) involved with the student's interdisciplinary PhD program. Students dismissed from the ME or IE PhD programs in the MIE department cannot enroll in the PhD Interdisciplinary Engineering program with MIE as the primary affiliation.



## Dissertation Proposal Preparation and Presentation Timing

Students must present their dissertation proposal no more than 12 months after successfully completing the oral exam. In addition, the presentation of the dissertation proposal and the actual dissertation defense (see below) shall be no less than 6 months apart. The student's dissertation committee will invite any additional faculty deemed appropriate to that field; this dissertation committee will then conduct the dissertation proposal session. Each student's dissertation committee must be comprised of at least three members, including the research advisor. At least two of those three members must be full-time MIE faculty members.

## Dissertation Course Requirements

Upon successful completion of the doctoral qualifying examinations (both written preliminary and oral 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 (may include full summer term) for Dissertation (ME 9990). Upon completion of this sequence, the student must then register for Dissertation Continuation (ME 9996) in every semester (in each fall and spring term and also in the summer term if summer is the student's last semester) until the dissertation is completed. Students may not register for Dissertation Continuation (ME 9996) until they fulfill the two-semester sequence of Dissertation (ME 9990).

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, Candidacy Preparation—Doctoral (ME 8960), can be taken if needed to fulfill the full-time course registration requirement. Candidacy Preparation—Doctoral (ME 8960) is an individual instruction course, billed as one semester hour, and graded S or U. Candidacy Preparation—Doctoral (ME 8960) does not have any course content, and students must register in a section for which their research or academic advisor is listed as the "instructor."

## Final Oral (Dissertation Defense) Examination

All doctoral candidates must pass a final oral exam. This exam will be scheduled once the dissertation committee agrees that the candidate's research is at a stage where it is appropriate for formal presentation and after completion of all other PhD requirements, including all the 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 an additional final oral dissertation defense.

## Residency Requirement

After achieving PhD candidacy, the university residency requirement is satisfied by two semesters of full-time graduate registration or four semesters of part-time graduate registration. Students must be continually enrolled during the pursuit of dissertation.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

Doctoral qualifying exams (both written comprehensive and oral area exams)  
Annual review  
Dissertation committee formation  
Dissertation proposal  
Dissertation defense

## Core Requirements

Code	Title	Hours
<b>Recommended Courses (semester hours can be counted toward course work component with advisor approval)</b>		
MEIE 6830	Graduate Traineeship I (Technical Writing and Communications) (2 SHs)	
MEIE 6860	Graduate Traineeship II (Research Ethics and Professional Development) (2 SHs)	
<b>Approved Course Work</b>		
	Requires 40 semester hours of course work, including up to 4 semester hours of Independent Study (ME 7978). Students who choose to get an MS degree along the way to a PhD must complete a total of 52 semester hours (32 semester hours toward the sought MS degree and 20 semester hours beyond the earned MS degree). The 32 semester hours applied toward the master's degree may include up to 8 semester hours of MS Thesis or 4 semester hours of MS Project or approved independent study course work. Please consult your faculty advisor for acceptable courses.	40

## Dissertation

Code	Title	Hours
Complete the following (repeatable) course twice. Must register in two consecutive semesters (may include full summer term):		
ME 9990	Dissertation	

## Program Credit/GPA Requirements

40 total semester hours required  
Minimum 3.000 GPA required

## Mechanical Engineering, PhD—Advanced Entry

### Requirements

The PhD is awarded to students who demonstrate high academic achievement and research competence in the fields of mechanical engineering. To earn a PhD, a student must complete an approved, rigorous program of advanced course work and submit and defend an original dissertation of independent research. The Department of Mechanical and Industrial Engineering (MIE) expects all successful doctoral candidates to show depth of knowledge and research innovation in their chosen field of specialization.

The MIE department admits applicants to the PhD program either directly after earning a suitable bachelor's degree (i.e., direct entry) or after earning a master's degree (i.e., advanced entry). Upon acceptance into the program, an applicant is designated as a doctoral student. This designation is changed to doctoral candidate upon successful

completion of the doctoral qualifying examinations (both written and oral exams) as well as all the required 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 or jointly appointed 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 the co-advisor. Students are advised by the academic advisor of their discipline before they select their research advisor(s).

### Change of Research Advisor

Students who wish to change their research advisor need to use the MIE petition form to make that request. The petition form must be signed by the student and by the student's current and future research advisor. The signed petition form should then be submitted to the MIE department for further processing.

### Course Requirements and Plan of Study

A typical program of study includes at least 20 semester hours of course work beyond a master's degree. Students may petition the MIE Graduate Affairs Committee to substitute up to 4 semester hours of Independent Study (ME 7978) as part of their required course work. An independent study must be approved by the research advisor.

Each doctoral student, together with his or her research advisor, should develop an initial program during the first semester of study. The final program is also subject to the approval of the dissertation committee, who will add the program of study to the student's record upon admission to doctoral candidacy.

### PhD Students Annual Review

All PhD students in the MIE department must complete the PhD Students Annual Review form and submit the required documents by no later than January 31<sup>st</sup> of their second year of study (third year for PhD direct entry) and all subsequent years thereafter.

### PhD Candidacy

To qualify as a doctoral candidate, a doctoral student must successfully complete the doctoral qualifying examinations (both a written comprehensive exam and an oral exam—see below) as well as all the required course work.

### Doctoral Qualifying Examinations

**Background and motivation:** To demonstrate breadth and depth in each of the subject exams, crossover and merging exams are necessary in an effort to provide students with an opportunity to master the core disciplines in mechanical or industrial engineering (at both undergraduate and graduate levels) along with a focus area of importance to their specialization. These exams also provide an assessment as to whether students have adequate knowledge to pursue advanced study and possess attributes of a doctoral candidate by demonstrating understanding of and the ability to apply fundamental principles. Also, an oral exam tied to the written exams is necessary in an effort to evaluate a student's potential to perform independent research in the chosen field of specialization for the doctoral program.

**Doctoral qualifying examinations framework:** The doctoral qualifying examinations consist of the following two parts:

1. Two **written comprehensive** exams, which are respectively referred to as exam A and exam B

2. An **oral** exam to be administered no later than the end of the semester in which the written exams are taken and passed

### WRITTEN COMPREHENSIVE EXAMINATIONS

All doctoral students admitted directly with a bachelor's degree must take the written comprehensive exams no later than the first time that it is offered after their first two years of study. The written comprehensive exams include two exams, **exam A** and **exam B**, which are given on Thursday and/or Friday of the first week of classes during regular semesters. A complete list of these exams along with topical coverage and details are provided in the PhD Qualifying Examinations Guidelines on the MIE department graduate website (<http://www.mie.neu.edu/mie/degrees-programs/graduate-studies/>). Students should also consult extensively with their research advisor regarding all aspects of the qualifying exams.

#### Written Comprehensive Exams Rules

Exam A, about four to six hours in length, should be selected from the list of major exams based on the student's concentration (i.e., materials, mechanics, mechatronics, or thermofluids, sample list provided). No deviation from this rule will be permitted. Exam B, about two to three hours in length, should be selected from the list of exams B for PhD degree program in mechanical engineering (a sample list is provided below), and only one exam from this list should be selected. All students are required to have their research advisor's approval on selection of exams A and B prior to registering to take the written comprehensive exams. Note that exam B cannot be similar or close to one of the topics covered in exam A.

#### List of exams A and B based on student's research concentration:

##### Samples of exam A for mechanical engineering PhD students:

- **Materials Science Engineering (MSE):** Kinetics of Materials (MSE1) and Thermodynamics of Materials (MSE2)
- **Mechanics (MEC):** Mechanics of Deformable Media (MEC1), Dynamics and Vibration (MEC2), and Finite Element Method (MEC3)
- **Dynamic Systems and Control (DSC):** Dynamic Systems (DSC1), Mechanical Vibrations (DSC2), and Control Systems (DSC3)
- **Thermofluids Science (TFS):** Thermodynamics (TFS1), Fluid Mechanics (TFS2), and Heat Transfer (TFS3)

##### Samples of exam B for mechanical engineering PhD students:

- Control Systems (DSC3)
- Dynamic Systems (DSC1)
- Dynamics and Vibration (MEC2)
- Engineering Mathematics (MTH)
- Finite Element Method (MEC3)
- Fluid Mechanics (TFS2)
- Heat Transfer (TFS3)
- Kinetics of Materials (MSE1)
- Mechanics of Deformable Media (MEC1)
- Thermodynamics (TFS1)
- Thermodynamics of Materials (MSE2)

### ORAL EXAMINATION

The objective of the oral exam is to assess a student's potential to perform independent research in the chosen field of specialization. This exam shall be administered no later than the end of the semester in which the written exams are taken and passed. The exam shall be publicly advertised **at least one week in advance**, and all faculty members and students may attend and participate.

**Oral examination procedure:** The student's research advisor convenes and chairs an oral examination committee comprised of a minimum of three faculty members deemed appropriate by the research advisor. This committee provides a set of technical papers pertinent to the student's research area at least one month before the examination. The oral examination committee will then conduct the exam that comprises the following two parts (both completed in a one-hour session):

1. A 30-minute oral presentation on a selected number of papers out of the assigned technical papers
2. A 30-minute oral exam by committee members' questions and evaluation of the student covering topics specifically related to the student's research area

### GRADING PROCEDURE

#### Grading procedure and results of the written comprehensive examination:

The MIE Graduate Affairs Committee will review all students' performance in the written comprehensive exams. Depending on the results of both major and minor exams and in consultation with the student's research advisor, the Graduate Affairs Committee will recommend one of the following three possible options:

1. No invitation to oral exam: The student will be dismissed from the program. He or she may be granted a master's degree if the requirements are already met; otherwise, the student may continue to fulfill the requirements for a master's degree in industrial engineering (IE), mechanical engineering (ME), or other MIE departmental MS degree (e.g., operations research (OR)).
2. No invitation to oral exam yet: The student will be asked to retake the written exam(s) again in the next offering and/or take additional courses.
3. Student is invited to oral exam.

The Graduate Affairs Committee makes its final recommendation considering all aspects of the exam including, but not limited to, examiners' reports and results, student's research performance, and course work. The Graduate Affairs committee reserves the right to recommend option 1 above for students who register for the exams but do not show up.

**Grading procedure and results of the oral examination:** If the student's performance in the oral exam is not satisfactory, the student will be dismissed from the program. He or she may be granted a master's degree if the requirements are met; otherwise, the student may continue to fulfill the requirements for a master's degree in industrial engineering (IE), mechanical engineering (ME), or other MIE departmental MS degree (e.g., operations research (OR)).

Upon successfully passing the oral exam, the student continues in the PhD program and upon passing all the required course work, he or she will become a PhD candidate. The results of written and oral exams and any recommended course work will become part of the student's record.

### APPEAL PROCEDURE

The preliminary qualifying examination process provides means for reevaluation for students who fail one or more exams to appeal the Graduate Affairs Committee decision. All communications related to these examinations should be coordinated through the student's research advisor. Only the student's research advisor may request the MIE Graduate Affairs Committee to reevaluate the student's failed exams using the appeal form found at the link (<http://www.coe.neu.edu/sites/default/files/pdfs/coe/gse/miepetitionform.pdf>).

## PhD Students Changing Their Program

PhD students who, for any reason, decide to change their program (i.e., from PhD in ME to PhD in IE or vice versa) must take (or retake) the doctoral qualifying examinations (both written comprehensive exams and oral exam) based on the student's new major research area (i.e., industrial engineering, materials, mechanics, mechatronics, or thermofluids).

## Interdisciplinary PhD Students with MIE as the Home Department

Students pursuing the College of Engineering (COE) interdisciplinary PhD program with the MIE department as their home department must take one of the major written comprehensive exams (exam A) of the MIE doctoral qualifying examinations. The minor exam (exam B) can be substituted with appropriate exam(s) from other department(s) involved with the student's interdisciplinary PhD program. Students dismissed from the ME or IE PhD programs in the MIE department cannot enroll in the PhD Interdisciplinary Engineering program with MIE as the primary affiliation.

## Dissertation Proposal Preparation and Presentation Timing

Students must present their dissertation proposal no more than 12 months after successfully completing the oral exam. In addition, the presentation of the dissertation proposal and the actual dissertation defense (see below) shall be no less than 6 months apart. The student's dissertation committee will invite any additional faculty deemed appropriate to that field; this dissertation committee will then conduct the dissertation proposal session. Each student's dissertation committee must be comprised of at least three members, including the research advisor. At least two of those three members must be full-time MIE faculty members.

## Dissertation Course Requirements

Upon successful completion of the doctoral qualifying examinations (both written preliminary and oral 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 (may include full summer term) for Dissertation (ME 9990). Upon completion of this sequence, the student must then register for Dissertation Continuation (ME 9996) in every semester (in each fall and spring term and also in the summer term if summer is the student's last semester) until the dissertation is completed. Students may not register for Dissertation Continuation (ME 9996) until they fulfill the two-semester Dissertation (ME 9990) registration 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, Candidacy Preparation—Doctoral (ME 8960), can be taken if needed to meet full-time course registration requirements. This course is an individual instruction course, billed at 1 semester hour, and graded as S or U. Candidacy Preparation—Doctoral (ME 8960) does not have any course content, and students must register in a section for which their research or academic advisor is listed as the "instructor" in the online course registration system.

## Final Oral (Dissertation Defense) Examination

All doctoral candidates must pass a final oral exam. This exam will be scheduled once the dissertation committee agrees that the candidate's research is at a stage where it is 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 an additional final oral dissertation defense.

### Residency Requirement

After achieving PhD candidacy, the university residency requirement is satisfied by two semesters of full-time graduate registration or four semesters of part-time graduate registration. Students must be continually enrolled during the pursuit of their dissertation.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

Doctoral qualifying exams (both written comprehensive and oral area exams)

Annual review

Dissertation committee formation

Dissertation proposal

Dissertation defense

### Core Requirements

Code	Title	Hours
<b>Recommended Courses (semester hours can be counted toward course work component with advisor approval)</b>		

MEIE 6830	Graduate Traineeship I (Technical Writing and Communications) (2 SHs)	
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MEIE 6860	Graduate Traineeship II (Research Ethics and Professional Development) (2 SHs)	
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### Approved Course Work

Requires 20 semester hours of course work, including up to 4 semester hours of Independent Study (ME 7978). Please consult your faculty advisor for acceptable courses.	20
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### Dissertation

Code	Title	Hours
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Complete the following (repeatable) course twice. Must register in two consecutive semesters (may include full summer term):

ME 9990	Dissertation	
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### Program Credit/GPA Requirements

20 total semester hours required

Minimum 3.000 GPA required

## Data Analytics Engineering, MS

### Sagar Kamarthi

Professor and Program Director

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### Overview

The Department of Mechanical and Industrial Engineering (MIE) offers the Master of Science in Data Analytics Engineering in order to meet the current and projected demand for a workforce trained in analytics. This degree program offers students an opportunity to train for industry jobs or to acquire rigorous analytical skills and research experience to prepare for a doctoral program in health, security, and sustainability at Northeastern University. While the core courses for this program are offered by the College of Engineering, elective courses can be chosen from diverse disciplines spread across various colleges at Northeastern. The MS degree in data analytics engineering is designed to enable the graduating students to address the growing need for professionals who are trained in advanced data analytics and can transform large streams of data into understandable and actionable information for the purpose of making decisions. The key sectors that require analytics professionals include healthcare, smart manufacturing, supply chain and logistics, national security, defense, banking, finance, marketing, and human resources.

The Master of Science in Data Analytics Engineering is designed to help students acquire knowledge and skills to:

- Discover opportunities to improve systems, processes, and enterprises through data analytics
- Apply optimization, statistical, and machine-learning methods to solve complex problems involving large data from multiple sources
- Collect and store data from a variety of sources, including Internet of Things (IoT), an integrated network of devices and sensors, customer touch points, processes, social media, and people
- Work with technology teams to design and build large and complex SQL databases
- Use tools and methods for data mining, big-data algorithms, and data visualization to generate reports for analysis and decision making
- Create integrated views of data collected from multiple sources of an enterprise
- Understand and explain results of data analytics to decision makers
- Design and develop analytics projects

This degree program seeks to prepare students for a comprehensive list of tasks including collecting, storing, processing, and analyzing data; reporting statistics and patterns; drawing conclusions and insights; and making actionable recommendations.

### General Degree Requirements

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved course work (exclusive of any preparatory courses) with a minimum grade-point average (GPA) of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: course work option, project option, and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

### Specific Degree Requirements

Core courses for the MS in data analytics engineering provide students with a foundation in operations research, statistics, data and knowledge engineering, and visualization. Students can select electives from a wide range of fields including business, engineering, healthcare, manufacturing, and urban communities/cities. These courses are designed to provide students with a strong understanding of probability

and statistics, optimization methods, data mining, database design, and visualization. Elective courses provide students with the knowledge and understanding of descriptive, prescriptive, diagnostic, and predictive analytics as applied to a specific field of interest such as business, healthcare, manufacturing, and urban communities/cities. Alternatively, students can select their electives so that they can prepare for a doctoral program by taking advanced courses in mathematics, statistics, machine learning, and pattern recognition.

### Academic and Research Advisors

All nonthesis students are advised by the academic advisor designated for their respective concentration or program. Students willing to pursue the thesis option must first find a research advisor within their first year of study. The research advisor will guide the students' thesis work, and thesis reader(s) may be assigned at the discretion of their research advisor. The research advisor must be a full-time or jointly appointed faculty 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 the general policies, procedures, and expectations.

In order to receive proper guidance with their course work needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study (PS) to the department before enrolling in second-semester courses. This form not only helps the students manage their course work, but it also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Each student's academic advisor must approve all courses prior to registration. Students may only use courses taken with the approval of their academic advisor toward the 32-semester-hour minimum requirement. However, students may petition the MIE graduate affairs committee to substitute graduate-level courses from outside the approved list of electives.

Students pursuing study or research under the guidance of a faculty member can choose project option by taking Master's Project (IE 7945). An MS project must be petitioned to the MIE graduate affairs committee and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

Students pursuing course work option may petition the MIE graduate affairs committee to substitute up to a 4-semester-hour Independent Study (IE 7978). An independent study must be approved by the academic advisor. The petition must clearly state the instructor; the reason for taking the course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme. Students in other options (i.e., thesis or project) are not eligible to take independent study. When taking thesis or project options, the independent study course cannot be taken.

### Options for MS Students (course work only, project, or thesis)

Students accepted into any of the MS programs in the MIE department can choose one of the three options: course work only, project, or thesis. Please see the Program Requirements tab on the top menu of this page for more information. MS students who want to pursue project or thesis options must find, within the first year of their study, a faculty member or a research advisor who will be willing to direct and supervise a mutually agreed research project or MS thesis. Moreover, students who receive financial support from the university in the form of a research, teaching, or tuition assistantship must complete 8 semester hours of thesis. Students are strongly encouraged to complete their 8 semester hours of Thesis (ME 7990 or IE 7990) over two consecutive semesters.

Students who complete the thesis option must make a presentation of their thesis before approval by the department. The MS thesis presentation shall be publicly advertised at least one week in advance and all faculty members and students may attend and participate. If deemed appropriate by the research advisor, other faculty members may be invited to serve as thesis readers to provide technical opinions and judge the quality of the thesis and presentation.

### Change of Program/Concentration

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE graduate affairs committee, the student must be in good academic standing and have completed at least 8 semester hours of required course work in their sought program at Northeastern.

### Graduate Certificate Options

Students enrolled in a graduate degree program in the College of Engineering have the opportunity to pursue an engineering graduate certificate in addition to or in combination with the MS degree. For more information please refer to Graduate Certificate Programs (p. 230). Please note that students pursuing the Master of Science in Data Analytics Engineering are not eligible for the Graduate Certificate in Data Mining.

#### **GORDON INSTITUTE OF ENGINEERING LEADERSHIP**

##### **Master's Degree in Data Analytics Engineering with Graduate Certificate in Engineering Leadership**

Students may complete a Master of Science in Data Analytics Engineering in addition to earning a Graduate Certificate in Engineering Leadership. Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 semester hours of advisor-approved data analytics technical courses.

Engineering Leadership (<https://na01.safelinks.protection.outlook.com/?url=http%3A%2F%2Fcatalog.northeastern.edu%2Fgraduate%2Fengineering%2Fleadership%2Fengineering-leadership-graduate-certificate%2F%23text&data=02%7C01%7Cj.kearney%40northeastern.edu%7Ce7015ff4e56b4be1440308d6901e704b%7Ca8eec281aaa34daeac9b9a398b9215e7%7C0%7C0%7C636854857755867775&%2BLtXFWf2ujcesHsM%3D&reserved=0/>)

#### **ENGINEERING BUSINESS**

##### **Master's Degree in Data Analytics Engineering with Graduate Certificate in Engineering Business**

Students may complete a Master of Science in Data Analytics Engineering in addition to earning a Graduate Certificate in Engineering Business. Students must apply and be admitted to the Galante Engineering Business Program in order to pursue this option. The program requires the applicant to have earned or be in a program to earn a Bachelor of Science in Engineering from Northeastern University. The integrated 32-semester-hour degree and certificate will require 16 semester hours of the data analytics engineering core courses and 16 semester hours from the outlined business-skill curriculum. The course work, along with participation in cocurricular professional development elements, earn the Graduate Certificate in Engineering Business.

Engineering Business (p. 213)

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
IE 6200	Engineering Probability and Statistics	4
IE 6600	Computation and Visualization for Analytics	4
IE 7275	Data Mining in Engineering	4
IE 7280	Statistical Methods in Engineering	4
INFO 6210	Data Management and Database Design	4
OR 6205	Deterministic Operations Research	4

### Options

Complete one of the following options:

#### COURSE WORK OPTION

Code	Title	Hours
	Complete 8 semester hours from the course list below.	8

#### PROJECT OPTION

Code	Title	Hours
IE 7945	Master's Project	4
	Complete 4 semester hours from the course list below.	4

#### THESIS OPTION

Code	Title	Hours
	Complete 8 semester hours of thesis:	
IE 7990	Thesis	1-8

### Course List

Code	Title	Hours
<b>Business Administration</b>		
BUSN 6320	Business Analytics Fundamentals	1
BUSN 6324	Predictive Analytics for Managers	1
BUSN 6340	Modeling for Business Analytics for Managers	1
<b>Civil Engineering and Environmental Engineering</b>		
CIVE 7100	Time Series and Geospatial Data Sciences	4
<b>Computer Science</b>		
CS 5002	Discrete and Data Structures	4
CS 5004	Object-Oriented Design	4
CS 5006	Algorithms	2

CS 5100	Foundations of Artificial Intelligence	4
CS 5150	Game Artificial Intelligence	4
CS 5200	Database Management Systems	4
CS 5310	Computer Graphics	4
CS 5335	Robotic Science and Systems	4
CS 5330	Pattern Recognition and Computer Vision	4
CS 5800	Algorithms	4
CS 6120	Natural Language Processing	4
CS 6140	Machine Learning	4
CS 6200	Information Retrieval	4
CS 6220	Data Mining Techniques	4

#### Computer Systems Engineering

CSYE 7250	Big Data Architecture and Governance	4
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#### Criminal Justice

CRIM 7718	Advanced Data Analysis	4
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#### Data Science

DS 5010	Introduction to Programming for Data Science	4
DS 5020	Introduction to Linear Algebra and Probability for Data Science	4
DS 5110	Introduction to Data Management and Processing	4
DS 5220	Supervised Machine Learning and Learning Theory	4
DS 5230	Unsupervised Machine Learning and Data Mining	4

#### Electrical and Computer Engineering

EECE 5155	Wireless Sensor Networks and the Internet of Things	4
EECE 5639	Computer Vision	4
EECE 5644	Introduction to Machine Learning and Pattern Recognition	4
EECE 7204	Applied Probability and Stochastic Processes	4
EECE 7397	Advanced Machine Learning	4

#### Engineering Management

EMGT 5220	Engineering Project Management	4
EMGT 6225	Economic Decision Making	4
EMGT 6305	Financial Management for Engineers	4

#### Health Informatics

HINF 5101	Introduction to Health Informatics and Health Information Systems	3
HINF 5102	Data Management in Healthcare	3
HINF 5200	Theoretical Foundations in Personal Health Informatics	4
HINF 5301	Personal Health Technologies: Field Deployment and System Evaluation	4
HINF 6202	Business of Healthcare Informatics	3
HINF 6240	Improving the Patient Experience through Informatics	3
HINF 6335	Management Issues in Healthcare Information Technology	3
HINF 6400	Introduction to Health Data Analytics	3

#### Industrial Engineering

IE 5400	Healthcare Systems Modeling and Analysis	4
IE 5630	Biosensor and Human Behavior Measurement	4
IE 6300	Manufacturing Methods and Processes	4
IE 7200	Supply Chain Engineering	4
IE 7215	Simulation Analysis	4
IE 7285	Statistical Quality Control	4
IE 7290	Reliability Analysis and Risk Assessment	4

### Information Systems

INFO 6101	Data Science Engineering with Python	4
INFO 6205	Program Structure and Algorithms	4
INFO 6215	Business Analysis and Information Engineering	4
INFO 7275	Advanced Database Management Systems	4
INFO 7290	Data Warehousing and Business Intelligence	4
INFO 7330	Information Systems for Healthcare-Services Delivery	4
INFO 7390	Advances in Data Sciences and Architecture	4
INFO 7610	Special Topics in Natural Language Engineering Methods and Tools	4

### Mathematics

MATH 5131	Introduction to Mathematical Methods and Modeling	4
MATH 7234	Optimization and Complexity	4
MATH 7241	Probability 1	4
MATH 7340	Statistics for Bioinformatics	4
MATH 7341	Probability 2	4
MATH 7342	Mathematical Statistics	4
MATH 7343	Applied Statistics	4
MATH 7344	Regression, ANOVA, and Design	4
MATH 7345	Nonparametric Methods in Statistics	4
MATH 7346	Time Series	4

### Mechanical Engineering

ME 6201	Mathematical Methods for Mechanical Engineers 2	4
ME 7205	Advanced Mathematical Methods for Mechanical Engineers	4

### Operations Research

OR 6205	Deterministic Operations Research	4
OR 6500	Metaheuristics and Applications	4
OR 7230	Probabilistic Operation Research	4
OR 7235	Inventory Theory	4
OR 7240	Integer and Nonlinear Optimization	4
OR 7245	Network Analysis and Advanced Optimization	4
OR 7310	Logistics, Warehousing, and Scheduling	4
OR 7440	Operations Research Engineering Leadership Challenge Project 1	4

### Physics

PHYS 5116	Complex Networks and Applications	4
PHYS 7331	Network Science Data	4

PHYS 7332	Network Science Data 2	4
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### Public Policy and Urban Affairs

INSH 5301	Introduction to Computational Statistics	4
INSH 5302	Information Design and Visual Analytics	4
PPUA 5261	Dynamic Modeling for Environmental Decision Making	4
PPUA 5262	Big Data for Cities	4
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	4
PPUA 7237	Advanced Spatial Analysis of Urban Systems	4

### Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

<sup>1</sup> A thesis is required for all students who receive financial support from the university in the form of a research, teaching, or tuition assistantship. The thesis topic should cover one or more of the areas from statistics, mathematics, optimization, data mining, machine learning, database design, big data, visualization tools, or forecasting methods. The thesis should train students for research in data and operations analytics and/or prepare them for a doctoral program.

### Human Factors, MS

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This program addresses the growing need for engineering professionals trained in advanced human factors who can utilize Human Factors theories, procedures and empirically derived knowledge into understandable and actionable information for use in the design and evaluation of a wide variety of products and systems. The key sectors demanding human factors professionals include transportation, healthcare, robotics, manufacturing, computer, consumer products, social, and organizational and military issues. The core courses of the proposed MS in Human Factors program are built on the foundations of human factors and ergonomics, probabilities and statistics, etc. Topics from these foundation areas are integrated to create human factors for engineering applications. Students can select their elective or breadth courses from a wide range of fields. The program seeks to prepare students for a comprehensive set of human factors-related professional positions.

### General Degree Requirements

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved course work (exclusive of any preparatory courses) with a minimum grade-point average (GPA) of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: course work option, project option, and thesis option. Specific degree requirements for each of these tracks can be found under the Program

Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

### Academic and Research Advisors

All nonthesis students are advised by the academic advisor designated for their respective concentration or program. Students willing to pursue the thesis option must first find a research advisor within their first year of study. The research advisor will guide the students' thesis work, and thesis reader(s) may be assigned at the discretion of their research advisor. The research advisor must be a full-time or jointly appointed faculty 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 the general policies, procedures, and expectations.

In order to receive proper guidance with their course work needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study (PS) to the department before enrolling in second-semester courses. This form not only helps the students manage their course work but it also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

### Change of Program/Concentration

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE graduate affairs committee, the student must be in good academic standing and have completed at least 8 semester hours of required course work in their sought program at Northeastern.

### Program Requirements

#### Core Requirements

Complete all courses and requirements listed below unless otherwise indicated. Students may not register for more than 9 semester hours in the fall, spring, and summer terms.

Code	Title	Hours
IE 6500	Human Performance in Sociotechnical Systems	4
IE 7280	Statistical Methods in Engineering	4
IE 7315	Human Factors Engineering	4
EMGT 5300	Engineering/Organizational Psychology	4

#### Options

Complete one of the following options:

#### COURSE WORK OPTION

Code	Title	Hours
	Complete 16 semester hours from the course list below. (p. 192)	16

#### PROJECT OPTION

Code	Title	Hours
IE 7945	Master's Project	4
	Complete 12 semester hours from the course list below. (p. 192)	12

#### THESIS OPTION

Code	Title	Hours
IE 7990	Thesis	8
	Complete 8 semester hours from the course list below. (p. 192)	8

### Course List

Code	Title	Hours
<b>College of Engineering</b>		
IE 5137	Computational Modeling in Industrial Engineering	4
IE 5390	Structured Data Analytics for Industrial Engineering	4
IE 5630	Biosensor and Human Behavior Measurement	4
IE 5640	Data Mining for Engineering Applications	4
IE 6600	Computation and Visualization for Analytics	4
CIVE 7388	Special Topics in Civil Engineering (Urban Informatics and Processing)	4
<b>College of Social Sciences and Humanities:</b>		
ECON 7200	Topics in Applied Economics	4
ECON 7251	International Finance	4
ECON 7271	Industrial Organization	4
<b>College of Science</b>		
PSYC 5180	Quantitative Methods 1	3
PSYC 5181	Quantitative Methods 2	3
PSYC 7300	Advanced Quantitative Analysis	3
PSYC 7301	Research Methodologies Psychology	3
<b>Bouvé College of Health Sciences</b>		
PT 5600	Ergonomics and the Work Environment	3
EXSC 5210	Physical Activity and Exercise: Prescription, Measurement, and Testing	3
EXSC 5220	Advanced Exercise Physiology	3
<b>Khoury College of Computer Sciences</b>		
CS 5340	Computer/Human Interaction	4
CS 6350	Empirical Research Methods	4
<b>College of Arts, Media and Design</b>		
ARTG 5150	Information Visualization Principles and Practices	3
ARTG 5310	Visual Cognition	4
ARTG 5330	Visualization Technologies 1: Fundamentals	4
ARTG 5600	Experience Design Studio 1: Principles	4
ARTG 5610	Design Systems	4
ARTG 5640	Prototyping for Experience Design	4
	<i>Design Research Methods</i>	
ARTG 6310	Design for Behavior and Experience	4



ARTG 6320	Design of Information-Rich Environments	4
GSND 6240	Exploratory Concept Design	4
GSND 6250	Spatial and Temporal Design	4
GSND 6330	Player Experience	4
GSND 6340	Biometrics for Design	4

### Program Credit/GPA Requirements

32 total semester hours required  
 Minimum 3.000 GPA required

## Robotics, MS

MS Robotics is a multidisciplinary Master of Science program offered by the College of Engineering (COE) and the Khoury College of Computer Sciences. The program is designed to provide students comprehensive training in algorithms, sensors, control systems, and mechanisms used in robotics.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirements

Code	Title	Hours
<b>Mechanical Engineering</b>		
Complete one of the following:		4
ME 5659	Control Systems Engineering	
ME 5250	Robot Mechanics and Control	
<b>Electrical and Computer Engineering</b>		
Complete one of the following:		4
EECE 5550	Mobile Robotics	
EECE 5554	Robotics Sensing and Navigation	
<b>Computer Science</b>		
Complete one of the following:		4
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5335	Robotic Science and Systems	

#### Concentrations

Complete one of the following concentrations:

- Mechanical Engineering (p. 119)
- Electrical and Computer Engineering (p. 119)
- Computer Science (p. 119)

#### MECHANICAL ENGINEERING

Code	Title	Hours
<b>Required Course</b>		
Complete additional ME course not used to fulfill the core requirements:		4
ME 5659	Control Systems Engineering	
ME 5250	Robot Mechanics and Control	
<b>Options</b>		
Complete one of the following options:		16
<i>Course Work Option</i>		
Complete four of the following from the mechanical engineering course list. (p. 119)		

#### Thesis Option

ME 7990	Thesis
Complete two of the following from the mechanical engineering course list. (p. 119)	
<i>Project Option</i>	
ME 7945	Master's Project
Complete three of the following from the mechanical engineering course list. (p. 119)	

#### ELECTRICAL AND COMPUTER ENGINEERING

Code	Title	Hours
<b>Required Course</b>		
Complete additional EECE course not used to fulfill the core requirements:		4
EECE 5698	Special Topics in Electrical and Computer Engineering	
EECE 5698	Special Topics in Electrical and Computer Engineering	

#### Options

Complete one of the following options:		16
<i>Course Work Option</i>		
Complete four of the following from the electrical and computer engineering course list. (p. 119)		

#### Thesis Option

EECE 7990	Thesis
Complete two of the following from the electrical and computer engineering course list. (p. 119)	
<i>Project Option</i>	
EECE 7674	Master's Project
Complete three of the following from the electrical and computer engineering course list. (p. 119)	

#### COMPUTER SCIENCE

Code	Title	Hours
<b>Required Course</b>		
Complete additional CS course not used to fulfill the core requirements:		4
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5335	Robotic Science and Systems	

#### Options

Complete one of the following options:		16
<i>Course Work Option</i>		
Complete four of the following from the computer science course list. (p. 120)		

#### Thesis Option

CS 7990	Thesis (complete twice for a total of 8 credits)
Complete three of the following from the computer science course list. (p. 120)	
<i>Project Option</i>	
CS 8674	Master's Project
Complete three of the following from the computer science course list. (p. 120)	

### Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

**Course Lists****MECHANICAL ENGINEERING COURSE LIST**

Code	Title	Hours
ME 5240	Computer Aided Design and Manufacturing	
ME 5245	Mechatronic Systems	
ME 5250	Robot Mechanics and Control	
ME 5655	Dynamics and Mechanical Vibration	
ME 5659	Control Systems Engineering	
ME 5665	Musculoskeletal Biomechanics	
ME 6200	Mathematical Methods for Mechanical Engineers 1	
ME 6201	Mathematical Methods for Mechanical Engineers 2	
ME 7210	Elasticity and Plasticity	
ME 7247	Advanced Control Engineering	
ME 7253	Advanced Vibrations	
IE 5630	Biosensor and Human Behavior Measurement	
IE 7280	Statistical Methods in Engineering	
IE 7315	Human Factors Engineering	

**ELECTRICAL AND COMPUTER ENGINEERING COURSE LIST**

Code	Title	Hours
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
EECE 5580	Classical Control Systems	
EECE 5639	Computer Vision	
EECE 5642	Data Visualization	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7150	Autonomous Field Robotics	
EECE 7263	Humanoid Robotics	
EECE 7323	Numerical Optimization Methods	
EECE 7337	Information Theory	
EECE 7370	Advanced Computer Vision	
EECE 7397	Advanced Machine Learning	

**COMPUTER SCIENCE COURSE LIST**

Code	Title	Hours
CS 5006	Algorithms	
CS 5100	Foundations of Artificial Intelligence	
CS 5320	Digital Image Processing	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 6110	Knowledge-Based Systems	
CS 6120	Natural Language Processing	
CS 6130	Affective Computing	
CS 6140	Machine Learning	
CS 6350	Empirical Research Methods	
CS 7140	Advanced Machine Learning	

CS 7170	Seminar in Artificial Intelligence
DS 5220	Supervised Machine Learning and Learning Theory

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**Overview**

The Department of Mechanical and Industrial Engineering (MIE) offers comprehensive research and educational programs for students pursuing the Master of Science (MS) in Industrial Engineering. Industrial engineering (IE) applies mathematical modeling and analytical tools to make better decisions for designing and managing efficient and effective systems. IE is applied in many areas, including healthcare systems, supply chains, logistics and transportation engineering, manufacturing, sustainability, resilient systems, energy systems, and human-in-the loop systems. We partner with organizations ranging from startups to well-established corporations, to government and nongovernment organizations. For example, our supply chain resilience research is trying to understand and mitigate persistent drug shortages in the United States. Our research in healthcare systems engineering uses methods from lean six-sigma tools to advanced mathematical models to improve system and product reliability and optimize healthcare process quality, delays, cost, efficiency, and effectiveness—national priorities. Recent healthcare applications include improvements in scheduling, readmissions, cost reductions, cancer care, and health services planning. We use stochastic and simulation modeling to study environmental issues related to green manufacturing, product recovery, and end-of-life management. We use data analytics for designing prognostics and preventive strategies for manufacturing operations. Our research and teaching together are designed to develop IE practitioners who can work, innovate, and excel in a variety of businesses. These extensive programs and course work allow for the selection of a degree that meets a wide variety of personal and professional goals.

**General Degree Requirements**

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved course work (exclusive of any preparatory courses) with a minimum grade-point average (GPA) of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: course work option, project option, and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

**Academic and Research Advisors**

All nonthesis students are advised by the academic advisor designated for their respective concentration or program. Students willing to pursue the thesis option must first find a research advisor within their first year of study. The research advisor will guide the students' thesis work, and thesis reader(s) may be assigned at the discretion of their research advisor. The research advisor must be a full-time or jointly appointed faculty 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).

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Students may also petition to waive a core course by demonstrating evidence of their having passed a similar approved IE or OR graduate course. In such situations, the students must first obtain approval from their academic advisor for the course(s) they are planning to substitute.

Students pursuing study or research under the guidance of a faculty member can choose project option by taking Master's Project (IE 7945). An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

Students pursuing course work option may petition the MIE Graduate Affairs Committee to substitute up to a 4-semester-hour Independent Study (IE 7978). An independent study must be approved by the academic advisor. The petition must clearly state the instructor; the reason for taking the course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme. Students in other options (i.e., thesis or project) are not eligible to take independent study. When taking thesis or project options, the independent study course cannot be taken.

## Options for MS Students (course work only, project, or thesis)

Students accepted into any of the MS programs in the MIE department can choose one of the three options: course work only, project, or thesis. Please see the Program Requirements tab on the top menu of this page for more information. MS students who want to pursue project or thesis options must find, within the first year of their study, a faculty member or a research advisor who will be willing to direct and supervise a mutually agreed research project or MS thesis. Moreover, students who receive financial support from the university in the form of a research, teaching, or tuition assistantship must complete 8 semester hours of thesis. Students are strongly encouraged to complete their 8 semester hours of Thesis (IE 7990) over two consecutive semesters.

Students who complete the thesis option must make a presentation of their thesis before approval by the department. The MS thesis presentation shall be publicly advertised at least one week in advance and all faculty members and students may attend and participate. If deemed appropriate by the research advisor, other faculty members may

be invited to serve as thesis readers to provide technical opinions and judge the quality of the thesis and presentation.

## Change of Program/Concentration

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE graduate affairs committee, the student must be in good academic standing and have completed at least 8 semester hours of required course work in their sought program at Northeastern. See here (<http://catalog.northeastern.edu/graduate/engineering/academic-policies-procedures/petitions/>) for instructions on how to request a program or concentration change.

## Graduate Certificate Options

Students enrolled in a graduate degree program in the College of Engineering have the opportunity to pursue an engineering graduate certificate in addition to or in combination with the MS degree. For more information please refer to Graduate Certificate Programs (p. 230).

### GORDON INSTITUTE OF ENGINEERING LEADERSHIP

#### Master's Degree in Industrial Engineering with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Industrial Engineering in addition to earning a Graduate Certificate in Engineering Leadership. Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 hours of advisor-approved industrial engineering technical courses.

Engineering Leadership (p. 225)

### ENGINEERING BUSINESS

#### Master's Degree in Industrial Engineering with Graduate Certificate in Engineering Business

Students may complete a Master of Science in Industrial Engineering in addition to earning a Graduate Certificate in Engineering Business. Students must apply and be admitted to the Galante Engineering Business Program in order to pursue this option. The program requires the applicant to have earned or be in a program to earn a Bachelor of Science in Engineering from Northeastern University. The integrated 32-semester-hour degree and certificate will require 16 semester hours of the industrial engineering core courses and 16 semester hours from the outlined business-skill curriculum. The course work, along with participation in cocurricular professional development elements, earn the Graduate Certificate in Engineering Business.

Engineering Business (<http://catalog.northeastern.edu/graduate/engineering/multidisciplinary/engineering-business-graduate-certificate/>)

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
IE 6200	Engineering Probability and Statistics	4
OR 6205	Deterministic Operations Research	4

Complete 8 semester hours from the following: 8

IE 5400	Healthcare Systems Modeling and Analysis	
IE 7200	Supply Chain Engineering	
IE 7215	Simulation Analysis	
IE 7315	Human Factors Engineering	
IE 7275	Data Mining in Engineering	

**Options**

Complete one of the following options:

**COURSE WORK OPTION**

Code	Title	Hours
Complete 16 semester hours from the course list below. 16		

**PROJECT OPTION**

Code	Title	Hours
IE 7945	Master's Project	4
Complete 12 semester hours from the course list below. 12		

**THESIS OPTION**

Code	Title	Hours
IE 7990	Thesis (required for all students who receive financial support from the university in the form of a research, teaching, or tuition assistantship)	8
Complete 8 semester hours from the course list below. 8		

**Course List**

Code	Title	Hours
<b>Computer Systems Engineering</b>		
CSYE 7280	User Experience Design and Testing	
<b>Information Systems</b>		
INFO 6101	Data Science Engineering with Python	
INFO 6210	Data Management and Database Design	
<b>General Engineering</b>		
GE 5010	Customer-Driven Technical Innovation for Engineers	
GE 5100	Product Development for Engineers	
<b>Engineering Management</b>		
EMGT 5220	Engineering Project Management	
EMGT 5300	Engineering/Organizational Psychology	
EMGT 6225	Economic Decision Making	
EMGT 6305	Financial Management for Engineers	
<b>Industrial Engineering</b>		
IE 5374	Special Topics in Industrial Engineering	
IE 5617	Lean Concepts and Applications	
IE 5630	Biosensor and Human Behavior Measurement	
IE 6300	Manufacturing Methods and Processes	
IE 6600	Computation and Visualization for Analytics	
IE 7275	Data Mining in Engineering	
IE 7280	Statistical Methods in Engineering	
IE 7285	Statistical Quality Control	

IE 7290 Reliability Analysis and Risk Assessment

IE 7315 Human Factors Engineering

**Operations Research**

OR 6500 Metaheuristics and Applications

OR 7230 Probabilistic Operation Research

OR 7235 Inventory Theory

OR 7240 Integer and Nonlinear Optimization

OR 7245 Network Analysis and Advanced Optimization

OR 7310 Logistics, Warehousing, and Scheduling

Or any IE or OR courses

**Program Credit/GPA Requirements**

32 total semester hours required

Minimum 3.000 GPA required

**Engineering Management, MSEM**Website ([http://www.mie.neu.edu/degrees/ms-em/#\\_ga=12490377606902590881443725887](http://www.mie.neu.edu/degrees/ms-em/#_ga=12490377606902590881443725887))**Thomas P. Cullinane, PhD**

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**Overview**

The Master of Science in Engineering Management offers graduate students an opportunity to develop both technical expertise and business competence that is in high demand among prospective technology-based employers. Industry leaders are seeking qualified and talented individuals who are not only able to guide research and design teams but also able to direct and supervise development and production processes. The combination of technical proficiency and business skills fostered in the engineering management program is designed to provide a competitive edge for graduates seeking a wide range of positions in technology-based product or service industries, as well as in comparable local, state, and federal agencies and programs.

The program was designed by experienced high-level managers and academic leaders as an option for engineers and scientists to broaden their skill sets to include management tools and techniques that are applicable to technology-based industries. Graduates of the engineering management program work as project managers or leaders of teams in technology-based industries. Upon completion of the program, students find that their acquired skills are applicable to a wide range of industries, primarily those focused upon the development of technical products and the management of technical projects.

Graduates may assist companies in bringing a product from an idea through its development phases to its introduction to the marketplace. They may also be involved in forming and managing teams for assessing cost-effectiveness, formulating strategies to improve production, or analyzing a company's supply chain. Most of these projects cannot

be successfully completed without the skills of those possessing a background in management decision making and engineering expertise; therefore, the engineering management graduate is often a technical liaison to all levels of management. As a result, many of the assignments held by engineering management graduates have actually proven to be a gateway to upper-level management positions.

The current program of study can be taken on a part-time or full-time basis on-ground or online. There are four core courses required of all students, which have been formulated to satisfy the foundation requirements of economic decision making, decision-making mathematics, and project management. In addition to these required courses, the curriculum consists of electives that allow students to choose either a broad-based program of study or one centered on a particular concentration. Some students may elect to refresh or enhance their technical skills in engineering-based subjects such as information systems, computer systems engineering, or graduate courses from the traditional engineering disciplines. Other students may prefer to broaden their knowledge base by selecting course work in management subjects such as engineering organizational psychology, financial management, logistics and warehousing, supply chain engineering, or lean systems design. Additionally, students may also elect to complete the Gordon Engineering Leadership Program as part of their engineering management degree.

One recent graduate has observed that “Northeastern’s MSEM is like an MBA for engineers, with high-quality, dedicated professors who are proficient in their field yet are able to convey information in a way that’s easy to understand.” This graduate also noted, “My courses in project management have been key to understanding the subtleties that affect Project Managers while technical courses provide a strong background in fundamentals as well as specialty topics. My experience with co-op has been outstanding and has truly helped me further my career.”

## General Degree Requirements

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, or an equivalent field. Students in all master’s degree programs must complete a minimum of 32 semester hours of approved course work (exclusive of any preparatory courses) with a minimum grade-point average (GPA) of 3.000. Students can complete a master’s degree by pursuing any of one of the three tracks: course work option, project option, and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

## Academic and Research Advisors

All nonthesis students are advised by the academic advisor designated for their respective concentration or program. Students willing to pursue the thesis option must first find a research advisor within their first year of study. The research advisor will guide the students’ thesis work, and thesis reader(s) may be assigned at the discretion of their research advisor. The research advisor must be a full-time or jointly appointed faculty 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 the general policies, procedures, and expectations.

In order to receive proper guidance with their course work needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study (PS) to the department before enrolling in second-semester courses. This form not only helps the students manage their course work but it also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Students pursuing study or research under the guidance of a faculty member can choose project option by taking Master’s Project (EMGT 7945). An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master’s Project) and the student’s academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

Students pursuing course work option may petition the MIE Graduate Affairs Committee to substitute up to a 4-semester-hour Independent Study (EMGT 7978). An independent study must be approved by the academic advisor. The petition must clearly state the instructor; the reason for taking the course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme. Students in other options (i.e., thesis or project) are not eligible to take independent study. When taking thesis or project options, the independent study course cannot be taken.

## Options for MS Students (course work only, project, or thesis)

Students accepted into any of the MS programs in the MIE department can choose one of the three options: coursework only, project, or thesis. Please see the Program Requirements tab on the top menu of this page for more information. MS students who want to pursue project or thesis options must find, within the first year of their study, a faculty member or a research advisor who will be willing to direct and supervise a mutually agreed research project or MS thesis. Moreover, students who receive financial support from the university in the form of a research, teaching, or tuition assistantship must complete 8-semester-hours of thesis. Students are strongly encouraged to complete their 8-semester-hours of Thesis (EMGT 7990) over two consecutive semesters.

Students who complete the thesis option must make a presentation of their thesis before approval by the department. The MS thesis presentation shall be publicly advertised at least one week in advance and all faculty members and students may attend and participate. If deemed appropriate by the research advisor, other faculty members may be invited to serve as thesis readers to provide technical opinions and judge the quality of the thesis and presentation.

## Change of Program/Concentration

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE graduate affairs committee, the student must be in good academic standing and have completed at least 8 semester hours of required course work in their sought program at Northeastern.

## Graduate Certificate Options

Students enrolled in a master’s degree have the opportunity to also pursue one of the many engineering graduate certificate options in

addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 230).

### **GORDON INSTITUTE OF ENGINEERING LEADERSHIP**

#### **Master's Degree in Engineering Management with Graduate Certificate in Engineering Leadership**

Students may complete a Master of Science in Engineering Management in addition to earning a Graduate Certificate in Engineering Leadership. Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 hours of advisor-approved engineering management technical courses.

Engineering Leadership (p. 225)

### **ENGINEERING BUSINESS**

#### **Master's Degree in Engineering Management with Graduate Certificate in Engineering Business**

Students may complete a Master of Science in Engineering Management in addition to earning a Graduate Certificate in Engineering Business. Students must apply and be admitted to the Galante Engineering Business Program in order to pursue this option. The program requires the applicant to have earned or be in a program to earn a Bachelor of Science in Engineering from Northeastern University. The integrated 32-semester-hour degree and certificate will require 16 semester hours of the engineering management core courses and 16 semester hours from the outlined business-skill curriculum. The course work, along with participation in cocurricular professional development elements, earn the Graduate Certificate in Engineering Business.

Engineering Business (p. 213)

## **Program Requirements**

### **Core Requirements**

Complete all courses and requirements listed below unless otherwise indicated. Students may not register for more than 9 semester hours in the fall, spring, and summer terms.

Code	Title	Hours
<b>Required Courses</b>		
OR 6205	Deterministic Operations Research	4
EMGT 5220	Engineering Project Management	4
EMGT 6225	Economic Decision Making	4
IE 6200	Engineering Probability and Statistics	4

### **Options**

Complete one of the following options:

#### **COURSE WORK OPTION**

Code	Title	Hours
Complete 16 semester hours from the course list below. (p. 198)		16

#### **PROJECT OPTION**

Code	Title	Hours
EMGT 7945	Master's Project	4
Complete 12 semester hours from the course list below. (p. 198)		12

#### **THESIS OPTION**

Code	Title	Hours
EMGT 7990	Thesis	8
Complete 8 semester hours from the course list below. (p. 198)		8

#### **ONLINE OPTION**

Code	Title	Hours
Complete 16 semester hours from the course list below. (p. 198)		16
Courses offered online can be found on the online course list below. (p. )		

## **Course List**

Code	Title	Hours
CSYE 7250	Big Data Architecture and Governance	
CSYE 7280	User Experience Design and Testing	
EMGT 5300	Engineering/Organizational Psychology	
EMGT 6305	Financial Management for Engineers	
EMGT 7978	Independent Study	
ENSY 5000	Fundamentals of Energy System Integration	
GE 5010	Customer-Driven Technical Innovation for Engineers	
GE 5020	Engineering Product Design Methodology	
GE 5030	Iterative Product Prototyping for Engineers	
GE 5100	Product Development for Engineers	
IE 5400	Healthcare Systems Modeling and Analysis	
IE 5500	Systems Engineering in Public Programs	
IE 5617	Lean Concepts and Applications	
IE 5640	Data Mining for Engineering Applications	
IE 6300	Manufacturing Methods and Processes	
IE 7200	Supply Chain Engineering	
IE 7215	Simulation Analysis	
IE 7275	Data Mining in Engineering	
IE 7280	Statistical Methods in Engineering	
IE 7285	Statistical Quality Control	
IE 7290	Reliability Analysis and Risk Assessment	
IE 7315	Human Factors Engineering	
INFO 6101	Data Science Engineering with Python	
INFO 6210	Data Management and Database Design	
INFO 6215	Business Analysis and Information Engineering	
INFO 7245	Agile Software Development	
INFO 7285	Organizational Change and IT	
INFO 7290	Data Warehousing and Business Intelligence	
INFO 7330	Information Systems for Healthcare-Services Delivery	

INFO 7365	Enterprise Architecture Planning and Management
INFO 7385	Managerial Communications for Engineers
ME 5645	Environmental Issues in Manufacturing and Product Use
ME 6200	Mathematical Methods for Mechanical Engineers 1
OR 6500	Metaheuristics and Applications
OR 7230	Probabilistic Operation Research
OR 7235	Inventory Theory
OR 7240	Integer and Nonlinear Optimization
OR 7245	Network Analysis and Advanced Optimization
OR 7310	Logistics, Warehousing, and Scheduling
TELE 5330	Data Networking

### Electives outside the College of Engineering

A maximum of 9 semester hours may be taken from the following list toward the elective requirement:

ENR 6200	Enterprise Growth and Innovation
ENR 6212	Business Planning for New Ventures
ENR 6218	Business Model Design and Innovation
ENR 6219	Financing Ventures from Early Stage to Exit
SCHM 6214	Sourcing and Procurement
SCHM 6215	Supply Chain Analytics
SCHM 6221	Sustainability and Supply Chain Management
SCHM 6223	Managing Healthcare Supply Chain Operations
SCHM 6224	Demand Planning and Forecasting
TECE 6222	Emerging and Disruptive Technologies
TECE 6230	Entrepreneurial Marketing and Selling
TECE 6250	Lean Design and Development
TECE 6300	Managing a Technology-Based Business
TECE 6340	The Technical Entrepreneur as Leader

### Online Course List

Code	Title	Hours
EMGT 5300	Engineering/Organizational Psychology	
EMGT 6305	Financial Management for Engineers	
ENSY 5000	Fundamentals of Energy System Integration	
IE 5640	Data Mining for Engineering Applications	
IE 6300	Manufacturing Methods and Processes	
IE 7200	Supply Chain Engineering	
IE 7215	Simulation Analysis	
IE 7280	Statistical Methods in Engineering	
IE 7285	Statistical Quality Control	
IE 7290	Reliability Analysis and Risk Assessment	
IE 7315	Human Factors Engineering	
INFO 6210	Data Management and Database Design	

INFO 6215	Business Analysis and Information Engineering
ME 5645	Environmental Issues in Manufacturing and Product Use
ME 6200	Mathematical Methods for Mechanical Engineers 1
OR 7230	Probabilistic Operation Research
OR 7240	Integer and Nonlinear Optimization
OR 7310	Logistics, Warehousing, and Scheduling

### Program Credit/GPA Requirements

32 total semester hours required  
Minimum 3.000 GPA required

### Energy Systems, MSENES

Website (<http://www.coe.neu.edu/degrees/ms-es/>)

#### Hameed Metghalchi, Sc.D.

Professor and Program Director  
Editor-in-Chief, American Society of Mechanical Engineers, Journal of Energy Resources Technology  
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### Overview

The Master of Science in Energy Systems (MSENES) integrates engineering, business, and policy into a high-level signature, multidisciplinary graduate program. Energy systems students have an opportunity to learn how to leverage business skills and public policy knowledge to accomplish their engineering goals. This program is ideal for the engineer or technical business major who is interested in pursuing an industrial or public-planning-based career.

The program's mission is to educate students in current and future energy systems technologies, to integrate energy-related technologies with the economics and financial considerations required to implement them, and to develop leadership and decision-making skills to implement energy systems in either the private or public sectors of the global market. The program will expose students to a combination of academic and corporate experience in energy systems.

The program curriculum features a multidisciplinary range of electives from five different academic colleges at Northeastern. The curriculum is flexibly designed with a set of four core courses in engineering knowledge and finance in addition to four electives. The core courses help relate these electives back to energy-related engineering concepts, including power strategies, energy renewal, sustainable energy solutions, energy storage, energy conversion, and energy efficiency. By integrating concepts across these disciplines, our students learn that implementing energy solutions requires an economic solution as well as an engineering one.

Students are exposed to business educators and practicing professionals and have the opportunity to participate in a six-month co-op experience. Practicing professionals with experience in the industry who have successfully implemented energy systems or devices and policies are actively involved in the program as adjunct professors and invited speakers. Through this curriculum and interaction with practitioners, students should be prepared to effectively integrate energy system development over a broad spectrum of technologies with the financial

requirements to successfully implement them and to compete in the global energy market.

Successful graduates of the program will be involved in the decision making or policy planning that will deliver minimally polluting, energy-efficient systems to the global market. They will have the base training necessary to lead efforts within companies to plan and implement new energy-generation investments, realize energy-efficiency improvements specifically at the system level, and participate in energy and environmental markets such as cap-and-trade systems.

## General Degree Requirements

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved course work (exclusive of any preparatory courses) with a minimum grade-point average (GPA) of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: course work option, project option, and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

## Plan of Study and Course Selection

It is recommended that all new students attend orientation sessions held by the MIE department and the Graduate School of Engineering to acquaint themselves with the course work requirements and research activities of the department as well as with the general policies, procedures, and expectations.

In order to receive proper guidance with their course work needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study (PS) to the department before enrolling in second-semester courses. This form not only helps the students manage their course work but it also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Students pursuing study or research under the guidance of a faculty member can choose project option by taking Master's Project (ENSY 7945). An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

Students pursuing course work option may petition the MIE Graduate Affairs Committee to substitute up to a 4-semester-hour Independent Study (ENSY 7978). An independent study must be approved by the academic advisor. The petition must clearly state the instructor; the reason for taking the course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme. Students in other options (i.e., thesis or project) are not eligible to take independent study. When taking thesis or project options, the independent study course cannot be taken.

## Change of Program/Concentration

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE graduate affairs committee, the student must be in good

academic standing and have completed at least 8 semester hours of required course work in their sought program at Northeastern.

## Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 230).

### GORDON INSTITUTE OF ENGINEERING LEADERSHIP Master's Degree in Energy Systems with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Energy Systems in addition to earning a Graduate Certificate in Engineering Leadership. Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour degree and certificate will require 20 hours of advisor-approved energy systems technical courses.

Engineering Leadership (p. 225)

## Program Requirements

### Core Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Code	Title	Hours
<b>Required Courses</b>		
EMGT 6225	Economic Decision Making	4
ENSY 5000	Fundamentals of Energy System Integration	4
ME 6200	Mathematical Methods for Mechanical Engineers 1	4
FINA 6309	Foundations of Accounting and Finance	4

### Restricted Electives List

Code	Title	Hours
Complete a minimum of 8 semester hours from the following:		
ENSY 5100	Hydropower	
ENSY 5200	Energy Storage Systems	
ENSY 5300	Electrochemical Energy Storage	
ENSY 5400	Power Plant Design and Analysis	
ENSY 5500	Smart Grid	
ENSY 5585	Wind Energy Systems	
ME 5685	Solar Thermal Engineering	

### Other Electives List

Code	Title	Hours
An additional 8 semester hours can either be taken from the list above or from the following list below or by approval of program director.		
CHEM 5651	Materials Chemistry of Renewable Energy	
EECE 5680	Electric Drives	
EECE 5682	Power Systems Analysis 1	



EECE 5684	Power Electronics
EECE 5686	Electrical Machines
EMGT 5220	Engineering Project Management
ENGR 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage
ENSY 7374	Special Topics in Energy Systems
ENSY 7945	Master's Project
ENSY 7978	Independent Study
ME 5690	Gas Turbine Combustion
ME 7270	General Thermodynamics
ME 7300	Combustion and Air Pollution
ME 7305	Fundamentals of Combustion
SBSY 5200	Sustainable Engineering Systems for Buildings

### Online Course List

All required courses and many electives are offered as online courses.

### Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

### Energy Systems, MSENES-Academic Link Program

Website (<http://www.coe.neu.edu/degrees/ms-es/>)

#### Hameed Metghalchi, Sc.D.

Professor and Program Director

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Designing and implementing optimal methods to produce and utilize energy is one of the most pressing global issues today. Finding ways to implement these solutions that are sustainable and marketable is key. The energy systems Academic Link (AL) program is meant to provide students of non-STEM disciplines (such as English, sociology, business, etc.) with the foundation skills necessary to gain the skills needed to create and implement energy solutions. Students will begin the program by taking two core courses that cover topics across thermal sciences and math along with the general energy systems curriculum.

The Academic Link core courses will provide students with an introduction to the fundamentals that are necessary to be successful in the energy system program. Academic Link courses are integrated with our multidisciplinary energy system curriculum that integrates engineering, business, and policy. Our curriculum is flexibly designed with a set of core courses in engineering and finance complemented by a range of electives across five different academic colleges. Our core and elective courses are designed to help to prepare students to lead the efforts to implement energy systems solutions that have a long-term positive effect on businesses and communities.

### Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 230).

## Program Requirements

### General Requirements

A minimum of 40 semester hours must be earned toward completion of the MSES-AL degree. A minimum grade-point average of 3.000 is required over all courses applied toward the degree.

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
ENSY 5050	Fundamentals of Thermal Science 1	4
ENSY 5060	Fundamentals of Thermal Science 2	4
EMGT 6225	Economic Decision Making	4
ENSY 5000	Fundamentals of Energy System Integration	4
ME 6200	Mathematical Methods for Mechanical Engineers 1	4
FINA 6309	Foundations of Accounting and Finance	4

### Restricted Electives List

Code	Title	Hours
Complete a minimum of 8 semester hours from the following:		
ENSY 5100	Hydropower	4
ENSY 5200	Energy Storage Systems	4
ENSY 5300	Electrochemical Energy Storage	4
ENSY 5400	Power Plant Design and Analysis	4
ENSY 5500	Smart Grid	4
ENSY 5585	Wind Energy Systems	4
ME 5685	Solar Thermal Engineering	4

### Other Electives List

Code	Title	Hours
An additional 8 semester hours can either be taken from the list above or from the list below or by approval of the program director:		
CHEM 5651	Materials Chemistry of Renewable Energy	3
EECE 5680	Electric Drives	4
EECE 5682	Power Systems Analysis 1	4
EECE 5684	Power Electronics	4
EECE 5686	Electrical Machines	4
EMGT 5220	Engineering Project Management	4
ENGR 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage	4
ENSY 7374	Special Topics in Energy Systems	4
ENSY 7440	Energy Systems Engineering Leadership Challenge Project 1	4
ENSY 7442	Energy Systems Engineering Leadership Challenge Project 2	4
ENSY 7945	Master's Project	4
ENSY 7978	Independent Study	1-4
ME 5690	Gas Turbine Combustion	4
ME 7270	General Thermodynamics	4
ME 7300	Combustion and Air Pollution	4
ME 7305	Fundamentals of Combustion	4

SB SY 5200	Sustainable Engineering Systems for Buildings	4
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## Online Course List

All required courses and many electives are offered as online courses.

## Program Credit/GPA Requirements

40 total semester hours required

Minimum 3.000 GPA required

## Mechanical Engineering with Concentration in General Mechanical Engineering, MSME

### Marilyn L. Minus

Associate Professor and Associate Chair for Graduate Studies and Research

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## Overview

While pursuing a Master of Science (MS) in Mechanical Engineering, students may choose no concentration or what is referred to as general mechanical engineering.

## General Degree Requirements

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved course work (exclusive of any preparatory courses) with a minimum grade-point average (GPA) of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: course work option, project option, and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

## Academic and Research Advisors

All nonthesis students are advised by the academic advisor designated for their respective concentration or program. Students willing to pursue the thesis option must first find a research advisor within their first year of study. The research advisor will guide the students' thesis work, and thesis reader(s) may be assigned at the discretion of their research advisor. The research advisor must be a full-time or jointly appointed faculty 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 the general policies, procedures, and expectations.

In order to receive proper guidance with their course work needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study (PS) to the department before enrolling in second-semester

courses. This form not only helps the students manage their course work but it also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Students pursuing study or research under the guidance of a faculty member can choose project option by taking Master's Project (ME 7945). An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

Students pursuing course work option may petition the MIE Graduate Affairs Committee to substitute up to a 4-semester-hour Independent Study (ME 7978). An independent study must be approved by the academic advisor. The petition must clearly state the instructor; the reason for taking the course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme. When taking thesis or project options, the independent study course cannot be taken.

## Options for MS Students (course work only, project, or thesis)

Students accepted into any of the MS programs in the MIE department can choose one of the three options: course work only, project, or thesis. Please see the Program Requirements tab on the top menu of this page for more information. MS students who want to pursue project or thesis options must find, within the first year of their study, a faculty member or a research advisor who will be willing to direct and supervise a mutually agreed research project or MS thesis. Moreover, students who receive financial support from the university in the form of a research, teaching, or tuition assistantship must complete 8 semester hours of thesis. Students are strongly encouraged to complete their 8 semester hours of Thesis (ME 7990) over two consecutive semesters.

Students who complete the thesis option must make a presentation of their thesis before approval by the department. The MS thesis presentation shall be publicly advertised at least one week in advance and all faculty members and students may attend and participate. If deemed appropriate by the research advisor, other faculty members may be invited to serve as thesis readers to provide technical opinions and judge the quality of the thesis and presentation.

## Change of Program/Concentration

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE graduate affairs committee, the student must be in good academic standing and have completed at least 8 semester hours of required course work in their sought program at Northeastern.

## Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 230).

### GORDON INSTITUTE OF ENGINEERING LEADERSHIP

**Master's Degree in Mechanical Engineering with Concentration in General Mechanical Engineering with Graduate Certificate in Engineering Leadership**

Students may complete a Master of Science in Mechanical Engineering with Concentration in General Mechanical Engineering in addition to

earning a Graduate Certificate in Engineering Leadership. Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 hours of advisor-approved mechanical engineering technical courses.

Engineering Leadership (p. 225)

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
<b>Mathematics Competency</b>		
Complete 4 semester hours from the following:		4
ME 6200	Mathematical Methods for Mechanical Engineers 1	
ME 6201	Mathematical Methods for Mechanical Engineers 2	
<b>Thermofluids Competency</b>		
Complete 4 semester hours from the following:		4
ME 5685	Solar Thermal Engineering	
ME 5690	Gas Turbine Combustion	
ME 5695	Aerodynamics	
ME 7280	Statistical Thermodynamics	
ME 7295	Multiscale Flow and Transport Phenomena	
ME 7300	Combustion and Air Pollution	
ME 7305	Fundamentals of Combustion	
ME 7310	Computational Fluid Dynamics with Heat Transfer	
<b>Mechanics/Mechatronics Combined Competency</b>		
Complete 4 semester hours from the following:		4
EECE 5610	Digital Control Systems	
EECE 5666	Digital Signal Processing	
ME 5245	Mechatronic Systems	
ME 5250	Robot Mechanics and Control	
ME 5650	Advanced Mechanics of Materials	
ME 5655	Dynamics and Mechanical Vibration	
ME 5657	Finite Element Method	
ME 5659	Control Systems Engineering	
ME 7210	Elasticity and Plasticity	
ME 7238	Advanced Finite Element Method	
ME 7253	Advanced Vibrations	
<b>Materials Competency</b>		
Complete 4 semester hours from the following:		4
ME 5600	Materials Processing and Process Selection	
ME 5645	Environmental Issues in Manufacturing and Product Use	
or any MATL courses		

## Options

Complete one of the following options:

### COURSE WORK OPTION

Code	Title	Hours
Complete 16 semester hours in the following subject areas:		16
ME, MATL		

### PROJECT OPTION

Code	Title	Hours
ME 7945	Master's Project	4
<b>Electives</b>		
Complete 12 semester hours in the following subject areas:		12
ME, MATL		

### THESIS OPTION

Code	Title	Hours
ME 7990	Thesis (required for all students who receive financial support from the university in the form of a research, teaching, or tuition assistantship)	8
<b>Electives</b>		
Complete 8 semester hours in the following subject areas:		8
ME, MATL		

## Program Credit/GPA Requirements

32 total semester hours required  
Minimum 3.000 GPA required

## Mechanical Engineering with Concentration in Materials Science, MSME

### Teiichi Ando

Professor and Graduate Advisor  
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## Overview

While pursuing a Master of Science (MS) in Mechanical Engineering, students may choose materials science as a concentration. Materials science has been the key enabler in virtually all engineering breakthroughs that have occurred from early metal ages to the present nano age. In step with the scientific development and discovery of materials, members of the mechanical and industrial engineering (MIE) faculty are involved in interdisciplinary research to further materials processing, synthesis, and design. Research areas are aligned with Northeastern University's broad initiatives of sustainability, security, and health, as well as national initiatives in manufacturing and nanotechnology. Investigations in the areas of metals/alloys, polymers, biomaterials (including biomimetics), and composites incorporating nanoscale materials make use of experimental, theoretical, and computational techniques to tailor structure-processing-property relationships in materials for specific applications. Current areas of research include controlling synthesis and assembly processes to produce well-defined atomic structures; defect engineering; manipulating atomic/microstructures and the chemistry of materials to optimize properties for next-generation structural, electronic, and energy applications; solidification and deformation processing; and life-cycle assessments for nanocomposites/materials. Northeastern faculty and

students are committed to creative thinking and engineering innovation to propel materials development to the forefront of scientific research.

### General Degree Requirements

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved course work (exclusive of any preparatory courses) with a minimum grade-point average (GPA) of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: course work option, project option, and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

### Academic and Research Advisors

All nonthesis students are advised by the academic advisor designated for their respective concentration or program. Students willing to pursue the thesis option must first find a research advisor within their first year of study. The research advisor will guide the students' thesis work, and thesis reader(s) may be assigned at the discretion of their research advisor. The research advisor must be a full-time or jointly appointed faculty 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 the general policies, procedures, and expectations.

In order to receive proper guidance with their course work needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study (PS) to the department before enrolling in second-semester courses. This form not only helps the students manage their course work but it also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Students pursuing study or research under the guidance of a faculty member can choose project option by taking Master's Project (ME 7945). An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

Students pursuing course work option may petition the MIE Graduate Affairs Committee to substitute up to a 4-semester-hour Independent Study (ME 7978). An independent study must be approved by the academic advisor. The petition must clearly state the instructor; the reason for taking the course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme. When taking thesis or project options, the independent study course cannot be taken.

### Options for MS Students (course work only, project, or thesis)

Students accepted into any of the MS programs in the MIE department can choose one of the three options: course work only, project, or thesis. Please see the Program Requirements tab on the top menu of this page for more information. MS students who want to pursue project or thesis options must find, within the first year of their study, a faculty member or a research advisor who will be willing to direct and supervise a mutually agreed research project or MS thesis. Moreover, students who receive financial support from the university in the form of a research, teaching, or tuition assistantship must complete 8 semester hours of thesis. Students are strongly encouraged to complete their 8 semester hours of Thesis (ME 7990) over two consecutive semesters.

Students who complete the thesis option must make a presentation of their thesis before approval by the department. The MS thesis presentation shall be publicly advertised at least one week in advance and all faculty members and students may attend and participate. If deemed appropriate by the research advisor, other faculty members may be invited to serve as thesis readers to provide technical opinions and judge the quality of the thesis and presentation.

### Change of Program/Concentration

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE graduate affairs committee, the student must be in good academic standing and have completed at least 8 semester hours of required course work in their sought program at Northeastern.

### Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 230).

#### **GORDON INSTITUTE OF ENGINEERING LEADERSHIP**

##### **Master's Degree in Mechanical Engineering with Concentration in Materials Science with Graduate Certificate in Engineering Leadership**

Students may complete a Master of Science in Mechanical Engineering with Concentration in Materials Science in addition to earning a Graduate Certificate in Engineering Leadership. Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 hours of advisor-approved materials science technical courses.

Engineering Leadership (p. 225)

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirements

Code	Title	Hours
Complete 16 semester hours from the following:		16
MATL 5380	Particulate Materials Processing	4
MATL 6250	Soft Matter	4

MATL 6285	Structure, Properties, and Processing of Polymeric Materials	4
MATL 7350	Mechanical Behavior and Strengthening Mechanisms	4
MATL 7355	Thermodynamics of Materials	4
MATL 7360	Kinetics of Phase Transformations	4
MATL 7395	Fundamentals of Solidification	4
ME 5600	Materials Processing and Process Selection	4
ME 5645	Environmental Issues in Manufacturing and Product Use	4

## Options

Complete one of the following options:

### COURSE WORK OPTION

Code	Title	Hours
<b>Electives</b>		
Complete 16 semester hours in the following subject areas:		16
ME, MATL		

### PROJECT OPTION

Code	Title	Hours
MATL 7945	Master's Project	4
<b>Electives</b>		
Complete 12 semester hours in the following subject areas:		12
ME, MATL		

### THESIS OPTION

Code	Title	Hours
ME 7990	Thesis <sup>1</sup>	8
<b>Electives</b>		
Complete 8 semester hours in the following subject areas:		8
ME, MATL		

## Program Credit/GPA Requirements

32 total semester hours required

<sup>1</sup> Required for all students who receive financial support from the university in the form of a research, teaching, or tuition assistantship.

## Mechanical Engineering with Concentration in Mechanics and Design, MSME

### Ashkan Vaziri

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## Overview

While pursuing a Master of Science (MS) in Mechanical Engineering with Concentration in Mechanics and Design, the students will study the motion, deformation, and failure of solid materials in response to the action of direct forces and external fields. The students will also get a chance to conduct research with faculty and observe how these studies will lead to key engineering innovations and designs. Using complementary analytical, computational, experimental, and design tools, the M&D faculty members conduct research in the design and analysis of engineered functional materials/structures, in mechanics

of adhesion and contact, and in biomechanics and mechanobiology. For example, in our biomechanics research, we strive to close the gap between function, form, and disease in the bone by using experimental and computational techniques; also, we explore the mechanics of lipid-based drug delivery vesicles. At the small length scales, we are creating a new understanding of nanomechanics, contact mechanics, tribology, MEMS, and the application of nanomaterials for energy storage systems. Our research and teaching together are designed to prepare students to understand and exploit mechanics to enable their future engineering innovations.

## General Degree Requirements

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved course work (exclusive of any preparatory courses) with a minimum grade-point average (GPA) of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: course work option, project option, and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

## Academic and Research Advisors

All nonthesis students are advised by the academic advisor designated for their respective concentration or program. Students willing to pursue the thesis option must first find a research advisor within their first year of study. The research advisor will guide the students' thesis work, and thesis reader(s) may be assigned at the discretion of their research advisor. The research advisor must be a full-time or jointly appointed faculty 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 the general policies, procedures, and expectations.

In order to receive proper guidance with their course work needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study (PS) to the department before enrolling in second-semester courses. This form not only helps the students manage their course work but it also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Students pursuing study or research under the guidance of a faculty member can choose project option by taking Master's Project (ME 7945). An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

Students pursuing course work option may petition the MIE Graduate Affairs Committee to substitute up to a 4-semester-hour Independent

Study (ME 7978). An independent study must be approved by the academic advisor. The petition must clearly state the instructor; the reason for taking the course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme. When taking thesis or project options, the independent study course cannot be taken.

### Options for MS Students (course work only, project, or thesis)

Students accepted into any of the MS programs in the MIE department can choose one of the three options: course work only, project, or thesis. Please see the Program Requirements tab on the top menu of this page for more information. MS students who want to pursue project or thesis options must find, within the first year of their study, a faculty member or a research advisor who will be willing to direct and supervise a mutually agreed research project or MS thesis. Moreover, students who receive financial support from the university in the form of a research, teaching, or tuition assistantship must complete 8 semester hours of thesis. Students are strongly encouraged to complete their 8 semester hours of Thesis (ME 7990) over two consecutive semesters.

Students who complete the thesis option must make a presentation of their thesis before approval by the department. The MS thesis presentation shall be publicly advertised at least one week in advance and all faculty members and students may attend and participate. If deemed appropriate by the research advisor, other faculty members may be invited to serve as thesis readers to provide technical opinions and judge the quality of the thesis and presentation.

### Change of Program/Concentration

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE Graduate Affairs Committee, the student must be in good academic standing and have completed at least 8 semester hours of required course work in their sought program at Northeastern. See here (<http://catalog.northeastern.edu/graduate/engineering/academic-policies-procedures/petitions/>) for instructions on how to request a program or concentration change.

### Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 230).

#### GORDON INSTITUTE OF ENGINEERING LEADERSHIP

##### Master's Degree in Mechanical Engineering with a Concentration in Mechanics and Design with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Mechanical Engineering with a Concentration in Mechanics and Design in addition to earning a Graduate Certificate in Engineering Leadership. Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 hours of advisor-approved mechanics and design technical courses.

Engineering Leadership (p. 225)

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
<b>Mathematics Competency</b>		
Complete 4 semester hours from the following:		4
ME 6200	Mathematical Methods for Mechanical Engineers 1	
ME 6201	Mathematical Methods for Mechanical Engineers 2	
<b>Mechanics Competency</b>		
Complete 12 semester hours from the following:		12
ME 5650	Advanced Mechanics of Materials	
ME 5655	Dynamics and Mechanical Vibration	
ME 5657	Finite Element Method	
ME 5659	Control Systems Engineering	
ME 7210	Elasticity and Plasticity	

### Options

Complete one of the following options:

#### COURSE WORK OPTION

Code	Title	Hours
Complete 16 semester hours from the course list.		16

#### PROJECT OPTION

Code	Title	Hours
ME 7945	Master's Project	4
Complete 12 semester hours from the course list.		12

#### THESIS OPTION

Code	Title	Hours
ME 7990	Thesis <sup>1</sup>	8
Complete 8 semester hours from the course list.		8

#### COURSE LIST

Code	Title	Hours
ME 5240	Computer Aided Design and Manufacturing	4
ME 5374	Special Topics in Mechanical Engineering (Fracture Mechanics and Adhesion in Biological Science)	4
ME 5374	Special Topics in Mechanical Engineering (Inelasticity)	4
ME 5665	Musculoskeletal Biomechanics	4
ME 6260	Introduction to Microelectromechanical Systems (MEMS)	4
ME 7220	Mechanics of Contact and Lubrication	4
ME 7232	Theory of Plates and Shells	4
ME 7238	Advanced Finite Element Method	4
ME 7255	Continuum Mechanics	4
ME 7374	Special Topics in Mechanical Engineering	4
Any other ME or MATL course		8

#### PROGRAM CREDIT/GPA REQUIREMENTS

32 total semester hours required

Minimum 3.000 GPA required

<sup>1</sup> Required for all students who receive financial support from the university in the form of a research, teaching, or tuition assistantship.

## Mechanical Engineering with Concentration in Mechatronics, MSME

### Rifat Sipahi

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While pursuing a Master of Science (MS) in Mechanical Engineering, students may choose mechatronics as a concentration. The term mechatronics is a combination of the words mechanics and electronics. Mechatronics is a multidisciplinary approach to product design and development, merging the principles of electrical, mechanical, computer, material, chemical, and industrial engineering. The mechatronics and systems research cluster in the MIE department is concerned with systems that are typically composed of traditional mechanical and electrical components but are rendered "intelligent" by the incorporation of sensors, actuators, and computer control systems. Our primary focus in mechatronics and systems is on intelligent and integrated systems and machines along with their practical applications ranging from manufacturing systems and robotic platforms to biological systems. Our research and teaching together are designed to prepare students to understand and exploit mechatronics to enable their future engineering innovations.

### General Degree Requirements

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved course work (exclusive of any preparatory courses) with a minimum grade-point average (GPA) of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: course work option, project option, and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

### Academic and Research Advisors

All nonthesis students are advised by the academic advisor designated for their respective concentration or program. Students willing to pursue the thesis option must first find a research advisor within their first year of study. The research advisor will guide the students' thesis work, and thesis reader(s) may be assigned at the discretion of their research advisor. The research advisor must be a full-time or jointly appointed faculty 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 the general policies, procedures, and expectations.

In order to receive proper guidance with their course work needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study (PS) to the department before enrolling in second-semester courses. This form not only helps the students manage their course work but it also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Students pursuing study or research under the guidance of a faculty member can choose project option by taking Master's Project (ME 7945). An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

Students pursuing course work option may petition the MIE Graduate Affairs Committee to substitute up to a 4-semester-hour Independent Study (ME 7978). An independent study must be approved by the academic advisor. The petition must clearly state the instructor; the reason for taking the course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme. When taking thesis or project options, the independent study course cannot be taken.

### Options for MS Students (course work only, project, or thesis)

Students accepted into any of the MS programs in the MIE department can choose one of the three options: course work only, project, or thesis. Please see the Program Requirements tab on the top menu of this page for more information. MS students who want to pursue project or thesis options must find, within the first year of their study, a faculty member or a research advisor who will be willing to direct and supervise a mutually agreed research project or MS thesis. Moreover, students who receive financial support from the university in the form of a research, teaching, or tuition assistantship must complete 8 semester hours of thesis. Students are strongly encouraged to complete their 8 semester hours of Thesis (ME 7990) over two consecutive semesters.

Students who complete the thesis option must make a presentation of their thesis before approval by the department. The MS thesis presentation shall be publicly advertised at least one week in advance and all faculty members and students may attend and participate. If deemed appropriate by the research advisor, other faculty members may be invited to serve as thesis readers to provide technical opinions and judge the quality of the thesis and presentation.

### Change of Program/Concentration

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE Graduate Affairs Committee, the student must be in good academic standing and have completed at least 8 semester hours of required course work in their sought program at Northeastern.

### Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 230).

**GORDON INSTITUTE OF ENGINEERING LEADERSHIP****Master's Degree in Mechanical Engineering with a Concentration in Mechatronics with Graduate Certificate in Engineering Leadership**

Students may complete a Master of Science in Mechanical Engineering with a Concentration in Mechatronics in addition to earning a Graduate Certificate in Engineering Leadership. Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour degree and certificate will require 20 hours of advisor-approved mechatronics technical courses.

Engineering Leadership (p. 225)

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Core Requirements**

Code	Title	Hours
<b>Mathematics Competency</b>		
Complete 4 semester hours from the following:		4
ME 6200	Mathematical Methods for Mechanical Engineers 1	
ME 6201	Mathematical Methods for Mechanical Engineers 2	
ME 7205	Advanced Mathematical Methods for Mechanical Engineers	
<b>Mechanics Competency</b>		
Complete 4 semester hours from the following or other advisor-approved courses:		4
ME 5250	Robot Mechanics and Control	
ME 5650	Advanced Mechanics of Materials	
ME 5655	Dynamics and Mechanical Vibration	
ME 5657	Finite Element Method	
<b>Mechatronics Concentration</b>		
Complete 8 semester hours from the following or other advisor-approved courses:		8
ME 5245	Mechatronic Systems	
ME 5659	Control Systems Engineering	
<b>Electrical Competency</b>		
Complete 4 semester hours from the following or other advisor-approved courses:		4
EECE 5610	Digital Control Systems	
EECE 5666	Digital Signal Processing	
EECE 5680	Electric Drives	
EECE 5681	Lab for EECE 5680	
EECE 5684	Power Electronics	
EECE 5685	Lab for EECE 5684	
EECE 5686	Electrical Machines	
ME 6260	Introduction to Microelectromechanical Systems (MEMS)	

**Options**

Complete one of the following options:

**COURSE WORK OPTION**

Code	Title	Hours
Complete 12 semester hours from the course list.		12

**PROJECT OPTION**

Code	Title	Hours
ME 7945	Master's Project	4
Complete 8 semester hours from the course list.		8

**THESIS OPTION**

Code	Title	Hours
ME 7990	Thesis <sup>1</sup>	8
Complete 4 semester hours from the course list.		4

**Course List**

Code	Title	Hours
CS 5335	Robotic Science and Systems	4
CS 5340	Computer/Human Interaction	4
EECE 5115	Dynamical Systems in Biological Engineering	4
EECE 5550	Mobile Robotics	4
EECE 5552	Assistive Robotics	4
EECE 5554	Robotics Sensing and Navigation	4
EECE 5606	Micro- and Nanofabrication	4
EECE 5576	Wireless Communication Systems	4
EECE 5644	Introduction to Machine Learning and Pattern Recognition	4
EECE 5686	Electrical Machines	4
EECE 7242	Integrated Circuits for Mixed Signals and Data Communication	4
IE 5630	Biosensor and Human Behavior Measurement	4
IE 7315	Human Factors Engineering	4
IE 7615	Neural Networks and Deep Learning	4
ME 5250	Robot Mechanics and Control	4
ME 7247	Advanced Control Engineering	4
ME 5665	Musculoskeletal Biomechanics	4
ME 5240	Computer Aided Design and Manufacturing	4
ME 7253	Advanced Vibrations	4
Or any other ME or MATL course		

**Program Credit/GPA Requirements**

32 total semester hours required  
Minimum 3.000 GPA required

<sup>1</sup> Required for all students who receive financial support from the university in the form of a research, teaching, or tuition assistantship.

## Mechanical Engineering with Concentration in Thermofluids, MSME

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While pursuing a Master of Science (MS) in Mechanical Engineering, students may choose thermofluids as a concentration. Some of the representative research areas under this concentration may include thermodynamics, fluid dynamics, kinetic theory of gases, and thermophoresis of aerosols; microscale heat transfer phenomena and its effects on laser beam propagation; fundamentals of combustion such as burning speed and onset of auto-ignition measurement and flame stability analysis; development of chemistry reduction such as rate-controlled constrained-equilibrium method; formation and control of combustion-generated pollutants and greenhouse gases; chemistry, transport, and abatement of air pollution; alternative energy sources; combustion-based synthesis of materials; fire propagation, containment, and extinction; nonequilibrium thermodynamics; energy and gas turbine cooling technology; turbine blade cooling; and energy-related and calorimeter studies related to pharmaceutical developments. Our research and teaching together seek to prepare students to understand and exploit thermofluids to enable their future engineering innovations.

### General Degree Requirements

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved course work (exclusive of any preparatory courses) with a minimum grade-point average (GPA) of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: course work option, project option, and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

### Academic and Research Advisors

All nonthesis students are advised by the academic advisor designated for their respective concentration or program. Students willing to pursue the thesis option must first find a research advisor within their first year of study. The research advisor will guide the students' thesis work, and thesis reader(s) may be assigned at the discretion of their research advisor. The research advisor must be a full-time or jointly appointed faculty 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 the general policies, procedures, and expectations.

In order to receive proper guidance with their course work needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study (PS) to the department before enrolling in second-semester courses. This form not only helps the students manage their course work but it also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Students pursuing study or research under the guidance of a faculty member can choose project option by taking Master's Project (ME 7945). An MS project must be petitioned to the MIE Graduate Affairs Committee

and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

Students pursuing course work option may petition the MIE Graduate Affairs Committee to substitute up to a 4-semester-hour Independent Study (ME 7978). An independent study must be approved by the academic advisor. The petition must clearly state the instructor; the reason for taking the course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme. When taking thesis or project options, the independent study course cannot be taken.

### Options for MS Students (course work only, project, or thesis)

Students accepted into any of the MS programs in the MIE department can choose one of the three options: course work only, project, or thesis. Please see the Program Requirements tab on the top menu of this page for more information. MS students who want to pursue project or thesis options must find, within the first year of their study, a faculty member or a research advisor who will be willing to direct and supervise a mutually agreed research project or MS thesis. Moreover, students who receive financial support from the university in the form of a research, teaching, or tuition assistantship must complete 8 semester hours of thesis. Students are strongly encouraged to complete their 8 semester hours of Thesis (ME 7990) over two consecutive semesters.

Students who complete the thesis option must make a presentation of their thesis before approval by the department. The MS thesis presentation shall be publicly advertised at least one week in advance and all faculty members and students may attend and participate. If deemed appropriate by the research advisor, other faculty members may be invited to serve as thesis readers to provide technical opinions and judge the quality of the thesis and presentation.

### Change of Program/Concentration

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE Graduate Affairs Committee, the student must be in good academic standing and have completed at least 8 semester hours of required course work in their sought program at Northeastern. See here (<http://catalog.northeastern.edu/graduate/engineering/academic-policies-procedures/petitions/>) for instructions on how to request a program or concentration change.

### Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 230).

#### **GORDON INSTITUTE OF ENGINEERING LEADERSHIP** **Master's Degree in Mechanical Engineering with a Concentration in Thermofluids with Graduate Certificate in Engineering Leadership**

Students may complete a Master of Science in Mechanical Engineering with a Concentration in Thermofluids in addition to earning a Graduate Certificate in Engineering Leadership. Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with

multiple mentors. The integrated 36-semester-hour degree and certificate will require 20 hours of advisor-approved thermofluids technical courses.

Engineering Leadership (p. 225)

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### General Requirements

Code	Title	Hours
<b>Required Core Courses</b>		
ME 6200	Mathematical Methods for Mechanical Engineers 1	4
or ME 6201	Mathematical Methods for Mechanical Engineers 2	
ME 7270	General Thermodynamics	4
ME 7275	Essentials of Fluid Dynamics	4
ME 7285	Heat Conduction and Thermal Radiation	4
or ME 7290	Convective Heat Transfer	
<b>Thermofluids Concentration Course</b>		
Complete 4 semester hours from the following:		4
ME 5685	Solar Thermal Engineering	
ME 5690	Gas Turbine Combustion	
ME 5695	Aerodynamics	
ME 7280	Statistical Thermodynamics	
ME 7295	Multiscale Flow and Transport Phenomena	
ME 7300	Combustion and Air Pollution	
ME 7305	Fundamentals of Combustion	
ME 7310	Computational Fluid Dynamics with Heat Transfer	

### Options

Complete one of the following options:

#### COURSE WORK OPTION

Code	Title	Hours
Complete 12 semester hours from the course list.		12

#### PROJECT OPTION

Code	Title	Hours
ME 7945	Master's Project	4
Complete 8 semester hours from the course list.		8

#### THESIS OPTION

Code	Title	Hours
ME 7990	Thesis <sup>1</sup>	8
Complete 4 semester hours from the course list.		4

#### COURSE LIST

Code	Title	Hours
ME 5685	Solar Thermal Engineering	
ME 5690	Gas Turbine Combustion	
ME 5695	Aerodynamics	
ME 7280	Statistical Thermodynamics	
ME 7295	Multiscale Flow and Transport Phenomena	

ME 7300	Combustion and Air Pollution
ME 7305	Fundamentals of Combustion
ME 7310	Computational Fluid Dynamics with Heat Transfer
Or any ME or MATL course	

### PROGRAM CREDIT/GPA REQUIREMENTS

32 total semester hours required

Minimum 3.000 GPA required

<sup>1</sup> Required for all students who receive financial support from the university in the form of a research, teaching, or tuition assistantship.

## Operations Research, MSOR

### Ozlem Ergun

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### Overview

The Department of Mechanical and Industrial Engineering (MIE) offers comprehensive research and educational programs for students pursuing the Master of Science (MS) in Operations Research (OR). OR deals with the application of scientific method to decision making. Its practitioners develop and solve mathematical and computer models of systems using optimization and statistical methods. OR methodologies are being used to improve efficiency, reduce costs, and increase profitability in all organizations whether in manufacturing, transportation, logistics and supply chains, healthcare, or financial institutions. Upon graduation, students who pursue this program may work in industry or may continue their studies by pursuing the PhD in Industrial Engineering. These extensive programs and course work allow for the selection of a degree that meets a wide range of personal and professional goals.

### General Degree Requirements

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved course work (exclusive of any preparatory courses) with a minimum grade-point average (GPA) of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: course work option, project option, and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

### Academic and Research Advisors

All nonthesis students are advised by the academic advisor designated for their respective concentration or program. Students willing to pursue the thesis option must first find a research advisor within their first year of study. The research advisor will guide the student's thesis work, and thesis reader(s) may be assigned at the discretion of their research advisor. The research advisor must be a full-time or jointly appointed faculty 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 the general policies, procedures, and expectations.

In order to receive proper guidance with their course work needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study (PS) to the department before enrolling in second-semester courses. This form not only helps the students manage their course work but it also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Students may also petition to waive a core course by demonstrating evidence of their having passed a similar approved IE or OR graduate course. In such situations, the students must first obtain approval from their academic advisor for the course(s) they are planning to substitute.

Students pursuing study or research under the guidance of a faculty member can choose project option by taking Master's Project (OR 7945). An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

Students pursuing course work option may petition the MIE Graduate Affairs Committee to substitute up to a 4-semester-hour Independent Study (OR 7978). An independent study must be approved by the academic advisor. The petition must clearly state the instructor; the reason for taking the course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme. Students in other options (i.e., thesis or project) are not eligible to take independent study. When taking thesis or project options, the independent study course cannot be taken.

## Options for MS Students (course work only, project, or thesis)

Students accepted into any of the MS programs in the MIE department can choose one of the three options: course work only, project, or thesis. Please see the Program Requirements tab on the top menu of this page for more information. MS students who want to pursue project or thesis options must find, within the first year of their study, a faculty member or a research advisor who will be willing to direct and supervise a mutually agreed research project or MS thesis. Moreover, students who receive financial support from the university in the form of a research, teaching, or tuition assistantship must complete 8 semester hours of Thesis (ME 7990). Students are strongly encouraged to complete their 8 semester hours of Thesis (ME 7990) over two consecutive semesters.

Students who complete the thesis option must make a presentation of their thesis before approval by the department. The MS thesis presentation shall be publicly advertised at least one week in advance, and all faculty members and students may attend and participate. If deemed appropriate by the research advisor, other faculty members may be invited to serve as thesis readers to provide technical opinions and judge the quality of the thesis and presentation.

## Change of Program/Concentration

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no

sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE Graduate Affairs Committee, the student must be in good academic standing and have completed at least 8 semester hours of required course work in their sought program at Northeastern.

## Graduate Certificate Options

Students enrolled in a graduate degree program in the College of Engineering have the opportunity to pursue an engineering graduate certificate in addition to or in combination with the MS degree. For more information please refer to Graduate Certificate Programs (p. 230).

### GORDON INSTITUTE OF ENGINEERING LEADERSHIP

#### Master's Degree in Operations Research with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Operations Research in addition to earning a Graduate Certificate in Engineering Leadership. Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 hours of advisor-approved operations research technical courses.

Engineering Leadership (p. 225)

### ENGINEERING BUSINESS

#### Master's Degree in Operations Research with Graduate Certificate in Engineering Business

Students may complete a Master of Science in Operations Research in addition to earning a Graduate Certificate in Engineering Business. Students must apply and be admitted to the Galante Engineering Business Program in order to pursue this option. The program requires the applicant to have earned or be in a program to earn a Bachelor of Science in Engineering from Northeastern University. The integrated 32-semester-hour degree and certificate will require 16 semester hours of the operations research core courses and 16 semester hours from the outlined business-skill curriculum. The course work, along with participation in cocurriculum professional development elements, earn the Graduate Certificate in Engineering Business.

Engineering Business (p. 213)

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
IE 6200 or MATH 7241	Engineering Probability and Statistics Probability 1	4
OR 6205	Deterministic Operations Research	4
OR 7245 or MATH 7234	Network Analysis and Advanced Optimization Optimization and Complexity	4
OR 7230 or MATH 7341	Probabilistic Operation Research Probability 2	4

## Options

Select one of the following options:

**COURSE WORK OPTION**

Code	Title	Hours
Complete 16 semester hours from the course list below.		16

**PROJECT OPTION**

Code	Title	Hours
OR 7945	Master's Project	4
Complete 12 semester hours from the course list below.		12

**THESIS OPTION**

Code	Title	Hours
OR 7990	Thesis (required for all students who receive financial support from the university in the form of a research, teaching, or tuition assistantship)	8
Complete 8 semester hours from the course list below.		8

**Course List**

Code	Title	Hours
<b>Civil Engineering and Environmental Engineering</b>		
CIVE 7100	Time Series and Geospatial Data Sciences	
<b>Computer Science</b>		
CS 5800	Algorithms	
CS 6140	Machine Learning	
CS 7805	Theory of Computation	
<b>Computer Systems Engineering</b>		
CSYE 7280	User Experience Design and Testing	
<b>Data Science</b>		
DS 5220	Supervised Machine Learning and Learning Theory	
DS 5230	Unsupervised Machine Learning and Data Mining	
<b>General Engineering</b>		
GE 5010	Customer-Driven Technical Innovation for Engineers	
GE 5100	Product Development for Engineers	
<b>Electrical and Computer Engineering</b>		
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
<b>Engineering Management</b>		
EMGT 5220	Engineering Project Management	
EMGT 5300	Engineering/Organizational Psychology	
EMGT 6225	Economic Decision Making	
EMGT 6305	Financial Management for Engineers	
<b>Industrial Engineering</b>		
IE 5374	Special Topics in Industrial Engineering (Data Visualization Engineering)	
IE 5374	Special Topics in Industrial Engineering (Human Performance in Sociotechnical Systems)	
IE 5400	Healthcare Systems Modeling and Analysis	
IE 5500	Systems Engineering in Public Programs	
IE 5617	Lean Concepts and Applications	

IE 5630	Biosensor and Human Behavior Measurement
IE 6300	Manufacturing Methods and Processes
IE 7200	Supply Chain Engineering
IE 7215	Simulation Analysis
IE 7275	Data Mining in Engineering
IE 7280	Statistical Methods in Engineering
IE 7285	Statistical Quality Control
IE 7290	Reliability Analysis and Risk Assessment
IE 7315	Human Factors Engineering

**Information Systems**

INFO 6101	Data Science Engineering with Python
INFO 6210	Data Management and Database Design

**Mathematics**

MATH 7233	Graph Theory
MATH 7342	Mathematical Statistics
MATH 7346	Time Series
MATH 7349	Stochastic Calculus and Introduction to No-Arbitrage Finance

**Operations Research**

OR 6500	Metaheuristics and Applications
OR 7235	Inventory Theory
OR 7240	Integer and Nonlinear Optimization
OR 7310	Logistics, Warehousing, and Scheduling

Or any other IE, OR, MATH, CS, and graduate engineering courses

**Program Credit/GPA Requirements**

32 total semester hours required  
Minimum 3.000 GPA required

**Data Analytics Engineering, Graduate Certificate**

The Data Analytics Engineering Graduate Certificate program focuses on fundamental concepts, tools and techniques to extract information from large data sets in order to support effective decision making. This program is designed to provide opportunities for students to master high-demand data intelligence skills through hands-on experience on data storage, data retrieval, data visualization and prediction.

This four-course graduate certificate enables the students to apply the fundamentals of engineering knowledge and skills to database design, data pre- and post-processing for further analysis, data visualization for impactful infographics, statistical concepts for quantitative analysis and data mining techniques and algorithms for knowledge discovery.

Note: MS in Data Analytics students are not eligible for this graduate certificate.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
<b>Required Courses</b>		
IE 6600	Computation and Visualization for Analytics	4
IE 7275	Data Mining in Engineering	4
IE 7280	Statistical Methods in Engineering	4
INFO 6210	Data Management and Database Design	4

## Program Credit/GPA Requirements

16 total semester hours required  
Minimum 3.000 GPA required

### Energy Systems, Graduate Certificate

The Graduate Certificate in Energy Systems focuses on the combination of analysis and integration of energy systems engineering technology with financial planning and attention to business aspects and effective implementation.

This four-course graduate certificate seeks to offer students opportunities to apply the fundamentals of engineering knowledge and skills to analyze energy systems to propose effective and efficient technology solutions based on data-driven and economic-based decisions.

*Note:* Students enrolled in the master's in energy systems program are not eligible for this graduate certificate.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
EMGT 6225	Economic Decision Making	4
EMGT 6305	Financial Management for Engineers	4
ENSY 5000	Fundamentals of Energy System Integration	4

## Elective

Code	Title	Hours
Complete one of the following: 4		
ENSY 5100	Hydropower	
ENSY 5200	Energy Storage Systems	
ENSY 5300	Electrochemical Energy Storage	
ENSY 5400	Power Plant Design and Analysis	
ENSY 5500	Smart Grid	
ENSY 5585	Wind Energy Systems	
ME 5645	Environmental Issues in Manufacturing and Product Use	
ME 5685	Solar Thermal Engineering	

## Program Credit/GPA Requirements

16 total semester hours required  
Minimum 3.000 GPA required

### Energy Systems Management, Graduate Certificate

The Graduate Certificate in Energy Systems Management focuses on the combination of analysis and integration of energy systems engineering technology with a focus on the art and the science of planning, organizing, allocating, directing, and controlling the activities and resources of organizations engaged in engineering activities and technology development.

This four-course graduate certificate seeks to provide students with opportunities to apply the fundamentals of engineering knowledge and skills in a management setting to analyze energy systems and to propose effective and efficient technology solutions based on data-driven and economic-based decisions.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
ENSY 5000	Fundamentals of Energy System Integration	4
EMGT 5220	Engineering Project Management	4

## Electives

Code	Title	Hours
Complete one of the following: 4		
EMGT 6225	Economic Decision Making	
EMGT 6305	Financial Management for Engineers	
Complete one of the following: 4		
ENSY 5100	Hydropower	
ENSY 5200	Energy Storage Systems	
ENSY 5300	Electrochemical Energy Storage	
ENSY 5400	Power Plant Design and Analysis	
ENSY 5500	Smart Grid	
ENSY 5585	Wind Energy Systems	
ME 5685	Solar Thermal Engineering	

## Program Credit/GPA Requirements

16 total semester hours required  
Minimum 3.000 GPA required

### Engineering Business, Graduate Certificate

The Graduate Certificate in Engineering Business involves eight courses with academic and participation elements. The program offers students opportunities to apply the technical aspects of an engineering skill foundation in start-up, consulting, small business, and/or corporate settings. This equips them to manage projects, lead people, make data-driven and market-based decisions, and advance economically sound initiatives.

Students apply to the engineering business program any time from the end of their sophomore year to the first year of their Master of Science in Engineering Management, Operations Research, Data Analytics Engineering, Industrial Engineering, or Construction Management, once accepted into the respective graduate program. To earn the Graduate Certificate in Engineering Business, students must have completed in good standing a BS in engineering and an MS in one of the five

master's programs listed above at Northeastern or a combined BS/MS program in engineering and one of the above programs, respectively. In addition, students must make application and be accepted into the Galante Engineering Business Program and will participate in the Galante Engineering Business Program cocurricular elements. Each of the master's programs above have their core courses; the engineering business core consists of four specified business-skill courses in the College of Engineering graduate school as listed under the Program Requirements tab. These four courses count as the electives required for each of the programs above.

Refer to the Galante Engineering Business Program webpage (<http://www.coe.neu.edu/galante/>) for additional details and description.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
Complete four courses from at least three of the following categories. Students can only take one class from outside the College of Engineering.		15

#### Business Innovation Development

ENTR 6200	Enterprise Growth and Innovation	
ENTR 6212	Business Planning for New Ventures	
ENTR 6218	Business Model Design and Innovation	
GE 5010	Customer-Driven Technical Innovation for Engineers	
GE 5030	Iterative Product Prototyping for Engineers	
GE 5100	Product Development for Engineers	
TECE 6230	Entrepreneurial Marketing and Selling	
TECE 6300	Managing a Technology-Based Business	
TECE 6340	The Technical Entrepreneur as Leader	

#### Organizational Excellence

EMGT 5300	Engineering/Organizational Psychology	
EMGT 6600	Engineering Team Performance	
IE 5617	Lean Concepts and Applications	
SCHM 6201	Operations and Supply Chain Management	
SCHM 6223	Managing Healthcare Supply Chain Operations	
TECE 6250	Lean Design and Development	

#### Financial Analysis

ACCT 6200	Financial Reporting and Managerial Decision Making 1	
EMGT 6225	Economic Decision Making	
EMGT 6305	Financial Management for Engineers	
ENTR 6219	Financing Ventures from Early Stage to Exit	

#### Information and Business Analysis

CS 6140	Machine Learning	
CS 6220	Data Mining Techniques	
DA 5030	Introduction to Data Mining/Machine Learning	

DS 5110	Introduction to Data Management and Processing
IE 5640	Data Mining for Engineering Applications
IE 7275	Data Mining in Engineering
INFO 6210	Data Management and Database Design
INFO 6215	Business Analysis and Information Engineering
INFO 7290	Data Warehousing and Business Intelligence

## Program Credit/GPA Requirements

15 total semester hours required

Minimum 3.000 GPA required

### Engineering Economic Decision Making, Graduate Certificate

The Graduate Certificate in Engineering Economic Decision Making focuses on developing economic decision-making skills in the context of engineering operations and projects with attention to decision-making models, causes of risk and uncertainty, decisions under uncertainty, and ways to change and influence the degree of risk and uncertainty.

This four-course graduate certificate seeks to provide students with opportunities to apply the fundamentals of engineering knowledge and skills in a management setting to build decision-making models and to make data-driven, financial-based, and economic-based decisions.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirements

Code	Title	Hours
EMGT 6225	Economic Decision Making	4
EMGT 6305	Financial Management for Engineers	4
IE 6200	Engineering Probability and Statistics	4
OR 6205	Deterministic Operations Research	4

## Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

### Engineering Management, Graduate Certificate

The Graduate Certificate in Engineering Management focuses on bridging the gaps between the fields of engineering, technology, and business with a focus on the art and the science of planning, organizing, allocating, directing, and controlling the activities and resources of organizations engaged in engineering activities and technology development.

This four-course graduate certificate seeks to provide students with opportunities to apply the fundamentals of engineering knowledge and skills in a management setting to build decision-making models and make data-driven and/or economic-based decisions.

Note: Students enrolled in the master's in engineering management program are not eligible for this graduate certificate.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
<b>Required Courses</b>		
EMGT 5220	Engineering Project Management	4
EMGT 6225	Economic Decision Making	4
IE 6200	Engineering Probability and Statistics	4

### Elective

Code	Title	Hours
Complete one of the following:		
EMGT 5300	Engineering/Organizational Psychology	4
EMGT 6305	Financial Management for Engineers	4
OR 6205	Deterministic Operations Research	4

### Program Credit/GPA Requirements

16 total semester hours required  
Minimum 3.000 GPA required

### Lean Six Sigma, Graduate Certificate

The Graduate Certificate in Lean Six Sigma focuses on enhancing engineering knowledge and skills with the fundamentals of lean manufacturing thinking and six sigma concepts to improve business processes through optimizing flow, eliminating waste, and emphasizing quality.

This four-course graduate certificate seeks to provide students with opportunities to apply the fundamentals of lean six sigma concepts across an enterprise to contribute to an organization's continuous improvement initiatives by identifying and employing lean and quality tools and techniques, along with utilizing statistical methods to achieve quality control.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
IE 5617	Lean Concepts and Applications	4
IE 6200	Engineering Probability and Statistics	4
IE 7280	Statistical Methods in Engineering	4
IE 7285	Statistical Quality Control	4

### Program Credit/GPA Requirements

16 total semester hours required  
Minimum 3.000 GPA required

### Renewable Energy, Graduate Certificate

The Graduate Certificate in Renewable Energy focuses on the combination of analysis and integration of energy systems engineering technology with key renewable engineering technology, including solar and wind generation, with environmental protection and manufacturing considerations.

This four-course graduate certificate seeks to provide students with opportunities to apply the fundamentals of engineering knowledge and skills to analyze energy systems with a specific focus on renewable energy technologies along with EPA regulatory structure, including the LEED certification program, as well as industrial ecology, including life-cycle analysis and technical cost modeling.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
ENSY 5000	Fundamentals of Energy System Integration	4
ENSY 5585	Wind Energy Systems	4
ME 5685	Solar Thermal Engineering	4

### Elective

Code	Title	Hours
Complete one of the following:		
ENSY 5100	Hydropower	4
ENSY 5200	Energy Storage Systems	4
ENSY 5300	Electrochemical Energy Storage	4
ENSY 5500	Smart Grid	4

### Program Credit/GPA Requirements

16 total semester hours required  
Minimum 3.000 GPA required

### Sustainable Energy Systems, Graduate Certificate

The Graduate Certificate in Sustainable Energy Systems focuses on the integration of energy systems engineering technology with sustainable building systems, including the design and operation of buildings with minimal energy and environmental impact.

This four-course graduate certificate seeks to provide students with opportunities to apply the fundamentals of engineering knowledge and skills to analyze energy systems as they relate to sustainable engineering building design with a focus on renewable energy with LEED certification or with a focus on industrial ecology, including life-cycle analysis and technical cost modeling.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
SBSY 5200	Sustainable Engineering Systems for Buildings	4
ENSY 5000	Fundamentals of Energy System Integration	4

### Electives

Code	Title	Hours
Complete two of the following:		
ENSY 5100	Hydropower	4
ENSY 5200	Energy Storage Systems	4

ENSY 5300	Electrochemical Energy Storage
ENSY 5585	Wind Energy Systems
ME 5685	Solar Thermal Engineering

### Program Credit/GPA Requirements

16 total semester hours required  
Minimum 3.000 GPA required

### Supply Chain Engineering Management, Graduate Certificate

The Graduate Certificate in Supply Chain focuses on acquiring and applying the knowledge and skills associated with designing, analyzing, managing, and improving supply chains within technology companies with attention on optimizing parts of a supply chain for effective and efficient functioning.

This four-course graduate certificate seeks to provide students with opportunities to apply the fundamentals of engineering knowledge and skills to supply chains using deterministic and probabilistic decision-making models, lean concepts, mass customization principles, and methods of manufacturing including logistics, warehousing, and scheduling.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
IE 5617	Lean Concepts and Applications	4
IE 7200	Supply Chain Engineering	4

### Electives

Code	Title	Hours
Complete two of the following:		8
EMGT 5300	Engineering/Organizational Psychology	
IE 6200	Engineering Probability and Statistics	
IE 6300	Manufacturing Methods and Processes	
OR 7310	Logistics, Warehousing, and Scheduling	

### Program Credit/GPA Requirements

16 total semester hours required  
Minimum 3.000 GPA required

### Technology Systems Management, Graduate Certificate

The Graduate Certificate in Technology Systems Management focuses on bridging the fields of technology, engineering, and business with a focus on the art and the science of managing organizational activities, including project and human resources engaged in engineering and technology development.

This four-course graduate certificate seeks to provide students with opportunities to apply technological knowledge and skills in a management setting to make data-driven, financial-based, and economic-based decisions.

Note: This certificate is for graduate engineering students as well as non-engineers and non-graduate engineering students.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
EMGT 5220	Engineering Project Management	4
EMGT 5300	Engineering/Organizational Psychology	4
EMGT 6225	Economic Decision Making	4
EMGT 6305	Financial Management for Engineers	4

### Program Credit/GPA Requirements

16 total semester hours required  
Minimum 3.000 GPA required

### Multidisciplinary Programs

Website (<http://www.coe.neu.edu/graduate-school/multidisciplinary/>)

Dana Research Center, 5th Floor  
617.373.6775

The multidisciplinary graduate engineering Master of Science (MS) programs integrate engineering solutions from the fields of technology and business by developing technical and engineering skills through advanced course work and complex technical projects. Each program focuses on the application of knowledge and skills to business and industrial settings. The software, data, and network systems programs blend academic and corporate experience to enable students to enhance their professional capabilities, thereby facilitating career transformation. Given an applied focus, each program provides learning opportunities to develop the skills needed to create innovative, practical, and effective solutions that can be easily applied to current professional challenges.

The multidisciplinary graduate engineering programs are designed to prepare students for direct entry into the workforce. Students who are seeking preparation for entry into PhD programs should consider specific department MS programs (p. 121) aligned with their research interests.

### Graduate Certificate Options

Students enrolled in a graduate degree program in the College of Engineering have the opportunity to pursue an engineering graduate certificate in addition to or in combination with the MS degree. For more information please refer to Graduate Certificate Programs (p. 230).

### GORDON INSTITUTE OF ENGINEERING LEADERSHIP OPTION

Students have the opportunity to pursue the Gordon Engineering Leadership Program (p. 224) in combination with the MS degree.

### Programs

#### Master of Science in Computer Systems Engineering (MSCSE)

- Computer Systems Engineering with Concentration in Software Design Engineering (p. 217)

#### Master of Science in Information Systems (MSIS)

- Information Systems (p. 218)



## Master of Science (MS)

- Cyber-Physical Systems (p. 219)
- Data Architecture and Management (p. 220)
- Telecommunication Networks (p. 221)

## Graduate Certificates

- Blockchain and Smart Contract Engineering (p. 222)
- Broadband Wireless Systems (p. 223)
- Computer Systems Engineering (p. 223)
- IP Telephony Systems (p. 223)

### Computer Systems Engineering with Concentration in Software Design Engineering, MSCSE

Website (<http://www.coe.neu.edu/degrees/ms-cse/>)

#### Kal Bugarra, PhD

Senior Program Director  
 Dana Hall 5th Floor  
 kmb@coe.neu.edu

Our computer systems engineering program takes a sociotechnical, engineering approach to software. This engineering foundation is designed to enable students to embrace real-world complexity as a golden opportunity, especially for the more technically advanced student. We are committed to shaping our students to be intuitive problem solvers, experienced engineering architects, and result leaders who will have a great impact at the exciting three-way intersection of computer science, engineering, and ethics.

Our program offers a multitude of courses in big-data engineering and analytics in addition to supplementary courses that are required to deliver the data-analytics results in a meaningful way to management. We cover data management, advanced data management, business intelligence, column databases, data science, and big-data engineering. We offer advanced functional programming using the powerful Scala language and a course on advanced data science as well as cloud computing. Multi-thread concurrent computing is also offered as it is important for synchronizing a huge set of servers working in parallel to do large-scale analytics to make things run faster by a hundredfold increase in speed. Due to the high-level mathematical operations required to run these programs, only software engineers have the capacity to work in such complicated areas. Only they can make the necessary mathematical algorithms execute quickly enough to get the finest results.

Our engineers become fluent in data science for the sake of building the actual system. They study how to write machine-learning algorithms on top of statistical packages.

- Students study the fundamentals of logical computing formulation and program construction as well as the mathematical modeling and analysis of algorithms—an essential aspect of data science analytics.
- Students study clustering techniques, along with topic modeling and classification and logical regression techniques, as well as Bayesian statistics.
- Students study how to configure and operate a Hadoop environment (large clusters of commodity hardware) and in the process how to integrate data from diverse sources, to move and manage data through big-data platforms (in-house or in the cloud). Data ingestion, the filtering and firing of millions of operations to run over large clusters of commodity hardware, is a software-engineering technique

that we teach our students how to perform through Scala, multi-threading, Spark programming, and “map-reduce” techniques.

- We show students how to make the business case for analytics projects and how to follow an execution road map that involves understanding the architectures underpinning such gigantic platforms as well as the resourcing and cost issues.

## Graduate Certificate Options

### GORDON INSTITUTE OF ENGINEERING LEADERSHIP

#### Master’s Degree in Computer Systems Engineering with Concentration in Software Design Engineering with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Computer Systems Engineering with Concentration in Software Design Engineering in addition to earning a Graduate Certificate in Engineering Leadership. Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 hours of advisor-approved software design engineering technical courses.

Engineering Leadership (p. 225)

## Program Requirements

### Core Requirements

Code	Title	Hours
<b>Required Core</b>		
The program does not accept any transfer credit. All 32 credits must be completed from the IS and CSYE program course work specified.		
CSYE 6200	Concepts of Object-Oriented Design	4
INFO 6205	Program Structure and Algorithms	4

### Options

Complete one of the following options:

#### COURSE WORK OPTION

Code	Title	Hours
<b>CSYE Courses</b>		
A minimum of 16 and a maximum of 24 semester hours may be taken from the following list toward the elective requirement:		16 to 24
CSYE (CSYE 6510 and CSYE 6530 excluded)		
<b>INFO Courses</b>		
A maximum of 8 semester hours may be taken from the following list toward the elective requirement:		0 to 8
INFO (INFO 6250 excluded)		

#### THESIS OPTION <sup>1</sup>

Code	Title	Hours
CSYE 7990	Thesis	8
<b>CSYE Courses</b>		
A minimum of 8 and a maximum of 16 semester hours may be taken from the following list toward the elective requirement:		8 to 16
CSYE (CSYE 6510 and CSYE 6530 excluded)		
<b>INFO Courses</b>		

A maximum of 8 semester hours may be taken from the following list toward the elective requirement:

0 to 8

INFO (INFO 6250 excluded)

## Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

<sup>1</sup> Students who elect to pursue the thesis option must first propose a topic and advisor for their thesis and receive approval from the program director.

## Information Systems, MSIS

Website (<http://www.coe.neu.edu/degrees/ms-is/>)

### Kal Bugrara, PhD

Senior Program Director

Dana Hall 5th Floor

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.

The program offers a wide range of courses that reflect current and future industry trends:

- Cryptocurrency and Smart Contract Engineering
- Engineering of Big-Data Systems
- Business Intelligence and Data Analytics
- Cyber-Security Engineering and Development
- Digital Business
- Full-Stack Software Engineering
- User Experience Design
- Data Science and Machine Learning Systems Engineering

## Graduate Certificate Options

Students enrolled in the MSIS program in the College of Engineering have the opportunity to pursue the graduate certificate in Engineering Leadership or the Graduate Certificate in Computer Systems Engineering (p. 223) in addition to or in combination with the MS degree.

### GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Information Systems with Graduate Certificate in Engineering Leadership

Students may complete a master's degree in Information Systems in addition to earning a Graduate Certificate in Engineering Leadership. Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16 semester-hour-curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry based challenge project with multiple mentors. The integrated 32 semester hour degree and certificate will require 16 hours of advisor-approved Information Systems technical courses.

Engineering Leadership (p. 225)

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated. Students may not register for more than 9 semester hours in the fall, spring, and summer terms. All 32 credits must be completed from the IS and CSYE program course work specified. The MSIS program does not accept any transfer credit.

## Core Requirements

Code	Title	Hours
INFO 5100 and INFO 5101	Application Engineering and Development and Lab for INFO 5100	4

## Concentrations

Seattle and Silicon Valley students will complete the General Information Systems (p. 218) concentration.

Students on the Boston campus may complete one of the following concentrations:

- General Information Systems (p. 218)
- User Experience (p. 218)
- Big Data Systems and Analytics (p. 218)
- Smart Contracts (p. 219)
- Intelligent Systems (p. 219)

## GENERAL INFORMATION SYSTEMS

Code	Title	Hours
<b>Seattle and Silicon Valley Students</b>		

Complete 16 semester hours from the respective lists below (Seattle Campus List or Silicon Valley Campus List) 16

### Boston Campus Students

Complete 16 semester hours in INFO subject code except INFO 6101 & INFO 7290. 16

## USER EXPERIENCE

Code	Title	Hours
CSYE 7280	User Experience Design and Testing	4
INFO 6150	Web Design and User Experience Engineering	4
INFO 6245	Planning and Managing Information Systems Development	4
INFO 6350	Smartphones-Based Web Development	4

## BIG DATA SYSTEMS AND ANALYTICS

Code	Title	Hours
CSYE 6225	Network Structures and Cloud Computing	4
CSYE 7245	Big-Data Systems and Intelligence Analytics	4

INFO 7250	Engineering of Big-Data Systems	4
INFO 7390	Advances in Data Sciences and Architecture	4

**SMART CONTRACTS**

Code	Title	Hours
Complete four from the following:		
INFO 7500	Cryptocurrency and Smart Contract Engineering	16
INFO 7510	Smart Contract Application Engineering and Development	
INFO 7520	Engineering of Advanced Cryptocurrency Systems	
INFO 7525	Regulatory Aspects of Smart Contract Automation	
INFO 7535	Digital Smart Contracts Product Innovations	

**INTELLIGENT SYSTEMS**

Code	Title	Hours
CSYE 7280	User Experience Design and Testing	4
INFO 7375	Special Topics in Artificial Intelligence Engineering and Applications	4
INFO 7390	Advances in Data Sciences and Architecture	4
INFO 7610	Special Topics in Natural Language Engineering Methods and Tools	4

**Electives**

Complete 12 semester hours from the respective course list.

**BOSTON CAMPUS STUDENTS**

Code	Title	Hours
Choose courses from the subject codes of INFO or CYSE except CYSE 6220, 6510, and 6530.		

**SEATTLE CAMPUS LIST**

Code	Title	Hours
CSYE 6225	Network Structures and Cloud Computing	4
CSYE 7245	Big-Data Systems and Intelligence Analytics	4
CSYE 7280	User Experience Design and Testing	4
INFO 6105	Data Science Engineering Methods and Tools	4
INFO 6150	Web Design and User Experience Engineering	4
INFO 6205	Program Structure and Algorithms	4
INFO 6210	Data Management and Database Design	4
INFO 6215	Business Analysis and Information Engineering	4
INFO 6250	Web Development Tools and Methods	4
INFO 6350	Smartphones-Based Web Development	4
INFO 7250	Engineering of Big-Data Systems	4
INFO 7390	Advances in Data Sciences and Architecture	4

**SILICON VALLEY CAMPUS LIST**

Code	Title	Hours
INFO 6105	Data Science Engineering Methods and Tools	4
INFO 6205	Program Structure and Algorithms	4
INFO 6215	Business Analysis and Information Engineering	4
INFO 6250	Web Development Tools and Methods	4
INFO 6350	Smartphones-Based Web Development	4
INFO 7500	Cryptocurrency and Smart Contract Engineering	4
INFO 7510	Smart Contract Application Engineering and Development	4

**Program Credit/GPA Requirements**

32 total semester hours required

Minimum 3.000 GPA required

**Cyber-Physical Systems, MS**

Website (<http://www.coe.neu.edu/degrees/ms-cse-iot/>)

**Peter O'Reilly, PhD**

Program Director

Dana Hall 5th Floor

617.373.5548

[poreilly@coe.neu.edu](mailto:poreilly@coe.neu.edu) ([p.oreilly@northeastern.edu](mailto:p.oreilly@northeastern.edu))

The Master of Science in Cyber-Physical Systems with a concentration in the Internet of Things (IoT) prepares our graduates for a world of connected devices. This innovative multidisciplinary program is designed to meet the demand for a new kind of specialist, one who can engineer and develop new interactive services; acquire, fuse, and process the data collected from sensors, actuators, controllers, and other devices; and develop architectures to interconnect these elements as part of larger, more diverse systems. It is expected that careers in this rapidly evolving area will encompass industry sectors ranging from energy, healthcare, transportation, infrastructure, to manufacturing.

This concentration integrates the study of wireless networking, protocols, sensor networks, security, software development, embedded systems, data analytics, and big data to provide students with the knowledge and tools to develop IoT applications, to analyze and design IoT architectures for different application domains, and to develop data analytic tools to analyze the large amounts of data generated by the massive deployment of IoT devices.

**Degree Requirements**

The program requires that a mix of core required courses and elective courses be taken—16 semester hours of core course work and a minimum of 16 semester hours of elective course work. Although there are some dependencies among the core courses, the program may be started in either the fall or spring semester. The core courses in data networks and/or concepts of object oriented design may be waived only if a student can demonstrate a satisfactory knowledge of either of these topic areas. The other two core courses may not be waived.

Special topics courses, as well as other courses not in the list of electives, may be used as electives with prior approval of the program director. A maximum of two courses from the Khoury College of Computer Sciences may be used as electives. Before taking any

computer science course, prior approval is required from the program director.

Independent Study (CSYE 7978), usually 1 or 2 semester hours, or Software Engineering Project (CSYE 7945) in the Internet of Things must be carried out under the supervision of a professor and must have prior approval of the program director. Proposals for independent study or a software engineering project (IoT) need to be submitted at least one month before the start of the semester.

## Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 230).

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated. Students may not register for more than 10 semester hours in the fall and spring terms and 4 semester hours in each of the three summer terms. Any exceptions must be approved by the program director.

### Core Requirements

Code	Title	Hours
CSYE 6200	Concepts of Object-Oriented Design	4
CSYE 6510	Fundamentals of the Internet of Things	4
CSYE 6530	Connected Devices	4
TELE 5330 and TELE 5331	Data Networking and Lab for TELE 5330	4

### Electives

Code	Title	Hours
Complete four of the following. A maximum of 8 semester hours of nontechnical electives may be taken. Students may take elective course work outside these lists only with the prior approval of the program director. A maximum of 9 semester hours may be taken outside of the College of Engineering.		16

#### Technical Electives

CSYE 6225	Network Structures and Cloud Computing
CSYE 6230	Operating Systems
CSYE 7215	Foundations of Parallel, Concurrent, and Multithreaded Programming
CSYE 7374	Special Topics in Computer Systems Engineering (Internet of Things)
CSYE 7945	Software Engineering Project (Internet of Things)
CSYE 7978	Independent Study (Internet of Things)
DS 5220	Supervised Machine Learning and Learning Theory
DS 5230	Unsupervised Machine Learning and Data Mining
EECE 5155	Wireless Sensor Networks and the Internet of Things
EECE 7390	Computer Hardware Security
IE 5640	Data Mining for Engineering Applications
or IE 7275	Data Mining in Engineering

INFO 6101	Data Science Engineering with Python
INFO 6105	Data Science Engineering Methods and Tools
INFO 6150	Web Design and User Experience Engineering
INFO 6205	Program Structure and Algorithms
INFO 7290	Data Warehousing and Business Intelligence
TELE 5360	Internet Protocols and Architecture
<b>Nontechnical Electives</b>	
EMGT 5220	Engineering Project Management
INFO 6660	Business Ethics and Intellectual Property for Engineers

## Program Credit/GPA Requirements

32 total semester hours required  
Minimum 3.000 GPA required

## Data Architecture and Management, MS

### Kal Bugarra, PhD

Senior Program Director  
Dana Hall 5th Floor  
kmb@coe.neu.edu

Many MS programs in the data area deal with data collection and analysis but do not however address a crucial activity that data scientists, data analysts, business analysts and many software engineers need to perform to make that data valuable, namely, data integration. That activity may also be referred to as data preparation, data curation, application integration and data engineering based on the integration of use cases and integration persona. The MS program in Data Architecture and Management focuses on these activities.

Data systems engineering occurs because data is fragmented and usually scattered across many data sources. However, even if all the data one needed were in one place, there is still an intensive need for integration. Information is data in context and the context of data as collected is different than the many ways it needs to be transformed so as to generate useful information.

Data engineering field could be thought of as a superset of business intelligence and data warehousing that brings in more elements from software engineering. This discipline also integrates specialization around the operation of so called "big data" distributed systems, along with concepts around the extended Hadoop ecosystem, stream processing, and in computation at scale.

The MS in Data Architecture and Management program offers a multitude of courses in data engineering in addition to supplementary courses that are required to deliver the data results in a meaningful way to management. We plan to cover data management, advanced data management, data warehousing and business intelligence, column data bases, data science engineering, and big-data engineering. On the software engineering side, we offer advanced big-data programming using the powerful Scala language and a course on advanced data science as well as cloud computing. Multi-thread concurrent computing is also offered as it is important for synchronizing a huge set of servers working in parallel to do large scale analytics to make things run faster by 100's fold increase in speed. Due to the high-level mathematical operations required to make these programs run, only software engineers have the capacity to work in these complicated areas. Only they can

make the necessary mathematical algorithms execute quickly enough to get the finest results.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
INFO 6105	Data Science Engineering Methods and Tools	4
INFO 6210	Data Management and Database Design	4
INFO 7370	Designing Advanced Data Architectures for Business Intelligence	4
INFO 7250	Engineering of Big-Data Systems	4

### Electives

Code	Title	Hours
Complete 16 semester hours from the following:		16
CSYE 7200	Big-Data System Engineering Using Scala	
CSYE 7245	Big-Data Systems and Intelligence Analytics	
CSYE 7250	Big Data Architecture and Governance	
INFO 6215	Business Analysis and Information Engineering	
INFO 6245	Planning and Managing Information Systems Development	
INFO 6255	Software Quality Control and Management	
INFO 6660	Business Ethics and Intellectual Property for Engineers	
INFO 7255	Advanced Big-Data Applications and Indexing Techniques	
INFO 7290	Data Warehousing and Business Intelligence	
INFO 7300	Engineering Cybersecure Software Systems	
INFO 7325	Introduction to Information Technology Auditing	
INFO 7390	Advances in Data Sciences and Architecture	

### Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

## Telecommunication Networks, MS

Website (<http://www.coe.neu.edu/degrees/ms-tsm/>)

### Peter O'Reilly, PhD

Program Director  
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617.373.5548

[poreilly@coe.neu.edu](mailto:poreilly@coe.neu.edu) ([p.oreilly@northeastern.edu](mailto:p.oreilly@northeastern.edu))

The Master of Science in Telecommunication Networks is designed for professionals currently in the telecommunications or networking field who either wish to enhance their technical skills and credentials or who wish to make a transition to the business side of telecommunications or networking. We also welcome applications from prospective students with limited industry experience. This program, which may be pursued on a full- or part-time basis, is one of only a very few master's programs in telecommunications and networking in the United States that is truly multidisciplinary, giving students the flexibility to tailor the curriculum to their specific interests, backgrounds, and career goals.

### Degree Requirements

The program requires that a mix of core required courses and elective courses be taken—16 semester hours of core course work and a minimum of 16 semester hours of elective course work. Although there are some dependencies among the core courses, the program may be started in either the fall or spring semester. The four core courses each carry 4 semester hours of credit.

The technical electives include courses on network and communications technology and on the development of software systems and applications. The business electives are focused on engineering management and entrepreneurship. Electives come from approved lists of courses supplied by the colleges of engineering, business, and computer sciences. These electives must be courses of at least 3 semester hours. Students may take elective course work outside these lists only with the prior approval of the program director.

It is expected that students beginning this program will have an adequate background in the following areas: C, C++, or Java programming languages; probability and statistics; and differential and integral calculus.

Special topics courses, as well as other courses from outside the program, may be used as electives with prior approval of the program director.

Independent Study (TELE 5978), usually 1 or 2 semester hours, or Master's Project (TELE 6945) is sometimes available for students and must be carried out under the supervision of a professor and must have prior approval of the program director. Proposals for Independent Study or a Master's Project need to be submitted at least one month before the start of the semester.

Directed Study (TELE 5976), also for 1 or 2 semester hours, is sometimes available for students. For directed study projects, a student follows a prescribed curriculum, usually with some form of an exam at the end of the semester.

### Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 230).

### GORDON INSTITUTE OF ENGINEERING LEADERSHIP Master's Degree in Telecommunication Networks with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Telecommunications Networks in addition to earning a Graduate Certificate in Engineering Leadership. Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which

includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate require 12 hours of technical core courses from the telecommunication networks program and 4 hours from the technical course list provided for this program.

Engineering Leadership (p. 225)

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated. Students may not register for more than 10 semester hours in the fall and spring terms and 4 semester hours in each of the three summer terms. Any exceptions must be approved by the program director.

### Core Requirements

Code	Title	Hours
TELE 5330 and TELE 5331	Data Networking and Lab for TELE 5330	4
TELE 5340	Telecommunications Public Policy and Business Management	4
TELE 5350	Telecom and Network Infrastructure	4
TELE 5360	Internet Protocols and Architecture	4

### Electives

Code	Title	Hours
Complete a minimum of 16 semester hours from the course lists below. At least one elective course must be taken from the technical course list. (p. 222)		16

### BUSINESS COURSE LIST

Code	Title	Hours
EMGT 5220	Engineering Project Management	
EMGT 6225	Economic Decision Making	
EMGT 6305	Financial Management for Engineers	
ENTR 6200	Enterprise Growth and Innovation	
ENTR 6212	Business Planning for New Ventures	
ENTR 6218	Business Model Design and Innovation	
ENTR 6219	Financing Ventures from Early Stage to Exit	
HRMG 6200	Managing People and Organizations	
INFO 6245	Planning and Managing Information Systems Development	
MGMT 6214	Negotiations	
MKTG 6200	Creating and Sustaining Customer Markets	
TECE 6222	Emerging and Disruptive Technologies	
TECE 6230	Entrepreneurial Marketing and Selling	
TECE 6250	Lean Design and Development	
TECE 6300	Managing a Technology-Based Business	

### TECHNICAL COURSE LIST

Code	Title	Hours
CS 5520	Mobile Application Development	
CS 6710	Wireless Network	
CY 5150 and CY 5151	Network Security Practices and Lab for CY 5150	
CY 6740	Network Security	
CSYE 6200	Concepts of Object-Oriented Design	

CSYE 6225	Network Structures and Cloud Computing
CSYE 6510	Fundamentals of the Internet of Things
EECE 5155	Wireless Sensor Networks and the Internet of Things
EECE 5576	Wireless Communication Systems
EECE 7364	Mobile and Wireless Networking
INFO 6205	Program Structure and Algorithms
INFO 6210	Data Management and Database Design
INFO 6350	Smartphones-Based Web Development
TELE 5600	Linux/UNIX Systems Management for Network Engineers
TELE 6100	Mobile Wireless Communications and Networking
TELE 6350	IP Telephony
TELE 6400	Software-Defined Networking
TELE 6603	Special Topics—Networking

### Program Credit/GPA Requirements

Minimum of 32 total semester hours required

Minimum 3.000 GPA required

## Blockchain and Smart Contract Engineering, Graduate Certificate

The Graduate Certificate in Blockchain and Smart Contract Engineering addresses the rapidly growing and revolutionary field of distributed ledger (blockchain) technology. Companies from different industries are preparing to enhance their business practices through cryptocurrency, decentralized computing, digital security, smart contracts, and more. The certificate program covers blockchain platforms such as Ethereum that bring about transparency and trust to all participants in complex multiparty relationships. The implication is tremendous—from new currency and incentive systems to faster, less expensive, and more efficient transactions of all kinds, from banking to healthcare. Students have an opportunity to learn how blockchain platforms and their underlying trust models will impact the future of legally binding multiparty contracts. In addition, students also have an opportunity to learn how crypto-engineering techniques can be used to create digital trust fabrics that could safely facilitate the movement of any kind of transactions.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
<b>Required Courses</b>		
INFO 7500	Cryptocurrency and Smart Contract Engineering	4
INFO 7510	Smart Contract Application Engineering and Development	4
INFO 7520	Engineering of Advanced Cryptocurrency Systems	4
INFO 7525	Regulatory Aspects of Smart Contract Automation	2

INFO 7535	Digital Smart Contracts Product Innovations	2
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### Program Credit/GPA Requirements

16 total semester hours required  
Minimum 3.000 GPA required

#### Broadband Wireless Systems, Graduate Certificate

The broadband wireless systems graduate certificate program focuses on the fundamentals of wireless communications, IP networks and protocols, and telecommunications infrastructure as preparation for developing expertise in ongoing developments in mobile networking, broadband wireless communications, and mobile apps.

The four-course graduate certificate requires that two TNET core technical courses be taken along with two other specified courses. With the approval of the certificate director, one of the core courses may be waived with another technical course taken in its place. Mobile Wireless Communications and Networking (TELE 6100) may not be waived under any circumstances.

*Note:* Master of Science in Telecommunication Systems Management/Telecommunication Networks students are eligible for this graduate certificate.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirements

Code	Title	Hours
TELE 5330 and TELE 5331	Data Networking and Lab for TELE 5330	4
TELE 5350	Telecom and Network Infrastructure	4
TELE 6100	Mobile Wireless Communications and Networking	4
EECE 5576	Wireless Communication Systems	4

### Program Credit/GPA Requirements

16 total semester hours required  
Minimum 3.000 GPA required

#### Computer Systems Engineering, Graduate Certificate

The Graduate Certificate in Computer Systems Engineering focuses on the sociotechnical approach to software engineering with attention on using engineering tools and considering real-world complexities to design and construct practical and viable software solutions.

This four-course graduate certificate seeks to provide students with opportunities to apply the fundamentals of engineering knowledge and skills to software development with attention on enterprise design and integration, secure systems design and creation, and data integration and architecture.

*Note:* MS in Computer Systems Engineering students are not eligible for this graduate certificate.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirements

Code	Title	Hours
<b>Required Courses</b>		
CSYE 6200	Concepts of Object-Oriented Design	4
INFO 6205	Program Structure and Algorithms	4

#### Electives

Code	Title	Hours
Complete two of the following:		
CSYE 6225	Network Structures and Cloud Computing	8
CSYE 7215	Foundations of Parallel, Concurrent, and Multithreaded Programming	
CSYE 7250	Big Data Architecture and Governance	
CSYE 7280	User Experience Design and Testing	

### Program Credit/GPA Requirements

16 total semester hours required  
Minimum 3.000 GPA required

#### IP Telephony Systems, Graduate Certificate

The Graduate Certificate in IP Telephony Systems focuses on the fundamental knowledge in communications, IP networks and protocols, media transport, and signaling as preparation to developing expertise into ongoing developments in VoIP networks and services, the IP Multimedia Subsystem (IMS), unified communications, and video networks.

The four-course graduate certificate requires that three TNET core technical courses be taken along with a specified fourth course. With the approval of the certificate director, one of the core courses may be waived with another technical course taken in its place. IP Telephony (TELE 6350) may not be waived under any circumstance.

*Note:* Master of Science in Telecommunication Systems Management/Telecommunication Networks students are not eligible for this graduate certificate.

### Program Requirements

#### Core Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Code	Title	Hours
TELE 5330 and TELE 5331	Data Networking and Lab for TELE 5330	4
TELE 5350	Telecom and Network Infrastructure	4
TELE 5360	Internet Protocols and Architecture	4
TELE 6350	IP Telephony	4

### Program Credit/GPA Requirements

16 total semester hours required  
Minimum 3.000 GPA required

## Gordon Institute of Engineering Leadership

Website (<http://www.northeastern.edu/gordonleadership/>)

### Simon Pitts

Institute Director

415 Stearns Center

617.373.6052

617.373.7680 (fax)

Amy Manley, Director of Admissions and Marketing,  
[a.manley@northeastern.edu](mailto:a.manley@northeastern.edu) or [gordonleadership@northeastern.edu](mailto:gordonleadership@northeastern.edu)

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.

### Programs

#### Graduate Certificate: Stand-Alone or Combined with Existing MS Degree

The Graduate Certificate in Engineering Leadership can be pursued as a stand-alone certificate, or the certificate can be earned in conjunction with existing Master of Science degrees offered by the College of Engineering.

Departments across the College of Engineering have developed graduation requirements that enable students to earn both the MS degree and the engineering leadership graduate certificate. Please contact your faculty mentor for details.

#### CORE REQUIREMENTS

Complete all courses and requirements listed below unless otherwise indicated.

Code	Title	Hours
ENLR 5121	Engineering Leadership 1	2
ENLR 5122	Engineering Leadership 2	2
ENLR 5131	Scientific Foundations of Engineering 1	2
ENLR 5132	Scientific Foundations of Engineering 2	2
ENLR 7440	Engineering Leadership Challenge Project 1	4
ENLR 7442	Engineering Leadership Challenge Project 2	4

#### PROGRAM CREDIT/GPA REQUIREMENTS

16 total semester hours required



Minimum 3.000 GPA required

### The following MS programs can be taken in conjunction with the Engineering Leadership Graduate Certificate

- Master of Science in Bioengineering (<http://www.northeastern.edu/gordonleadership/degree/ms-in-bioengineering/>)
- Master of Science in Biotechnology (<http://www.northeastern.edu/gordonleadership/degree/ms-in-biotechnology/>)
- Master of Science in Chemical Engineering (<http://www.northeastern.edu/gordonleadership/degree/chemical-engineering/>)
- Master of Science in Civil Engineering—Select Master of Science concentration (<http://www.northeastern.edu/gordonleadership/degree/ms-in-civil-engineering-2/>)
- Master of Science in Computer Systems Engineering (<http://www.northeastern.edu/gordonleadership/degree/computer-systems-engineering/>)
- Master of Science in Data Analytics Engineering (<http://www.northeastern.edu/gordonleadership/degree/ms-in-data-analytics-engineering/>)
- Master of Science in Electrical and Computer Engineering—Select Master of Science concentration (<http://www.northeastern.edu/gordonleadership/degree/electrical-and-computer-engineering/>)
- Master of Science in Electrical and Computer Engineering Leadership (<http://www.northeastern.edu/gordonleadership/degree/electrical-and-computer-engineering-leadership/>)
- Master of Science in Energy Systems (<http://www.northeastern.edu/gordonleadership/degree/energy-systems/>)
- Master of Science in Engineering and Public Policy with a Concentration in Energy and Environment (<http://www.northeastern.edu/gordonleadership/degree/ms-in-engineering-and-public-policy-with-a-concentration-in-energy-environment/>)
- Master of Science in Engineering and Public Policy with a Concentration in Infrastructure Resilience (<http://www.northeastern.edu/gordonleadership/degree/ms-in-engineering-and-public-policy-with-a-concentration-in-infrastructure-resilience/>)
- Master of Science in Environmental Engineering (<http://www.northeastern.edu/gordonleadership/degree/ms-in-environmental-engineering/>)
- Master of Science in Engineering Management (<http://www.northeastern.edu/gordonleadership/degree/engineering-management/>)
- Master of Science in Industrial Engineering (<http://www.northeastern.edu/gordonleadership/degree/industrial-engineering/>)
- Master of Science in Information Systems (<http://www.northeastern.edu/gordonleadership/degree/ms-in-information-systems/>)
- Master of Science in Information Assurance and Cyber Security (<http://www.northeastern.edu/gordonleadership/degree/information-assurance-and-cyber-security/>)
- Master of Science in Mechanical Engineering—Select Master of Science concentration (<http://www.northeastern.edu/gordonleadership/degree/mechanical-engineering-2/>)
- Master of Science in Operations Research (<http://www.northeastern.edu/gordonleadership/degree/operationsresearch/>)

- Master of Science in Sustainable Building Systems (<http://www.northeastern.edu/gordonleadership/degree/ms-in-sustainable-building-systems/>)
- Master of Science in Telecommunication Networks (p. 221)

For engineering leadership certificate and MS combined course requirements, please refer to the Certificate and Degree Options (<http://www.northeastern.edu/gordonleadership/prospective-students/degree-options/>) found on the Gordon Institute of Engineering Leadership website.

### Engineering Leadership, Graduate Certificate

The Gordon Engineering Leadership Program is a transformational, technical, and challenging graduate-level learning experience targeted for engineering professionals.

The Gordon Institute offers a **Graduate Certificate in Engineering Leadership** as formal recognition of midlevel engineers' leadership acumen and broadened cross-functional capabilities.

Pursuing the graduate certificate allows participants to:

- Take part in a hands-on curriculum taught by industry-experienced professors
- Work with peers from across engineering fields on leadership skills development
- Receive one-on-one mentoring from industry experts and faculty

The Gordon Engineering Leadership Program anchors around an intense, market-worthy challenge project based on your organization's strategic needs. This is a unique opportunity to apply your classroom experience in a professional setting, potentially further accelerating your career.

#### How to Earn a Graduate Certificate in Engineering Leadership

If you already have a Master of Science, then you can complete the one-year program to earn a Graduate Certificate in Engineering Leadership.

If you do not have a Master of Science, then you can still be considered for the Graduate Certificate in Engineering Leadership if you have at least three years of engineering work experience.

Additional Information can be found on the Gordon Engineering Leadership Program website. (<http://www.northeastern.edu/gordonleadership/>)

#### Beyond a Graduate Certificate

Most candidates pursue the Gordon Engineering Leadership Program as part of a Master of Science degree in the engineering discipline of their choice. Upon completion, they earn both the Master of Science degree and a Graduate Certificate in Engineering Leadership.

Additional Information on Master of Science degrees in conjunction with a Graduate Certificate in Engineering Leadership can be found here (p. 224).

#### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

**Core Requirements**

Code	Title	Hours
ENLR 5121	Engineering Leadership 1	2
ENLR 5122	Engineering Leadership 2	2
ENLR 5131	Scientific Foundations of Engineering 1	2
ENLR 5132	Scientific Foundations of Engineering 2	2
ENLR 7440	Engineering Leadership Challenge Project 1	4
ENLR 7442	Engineering Leadership Challenge Project 2	4

**The following MS programs can be taken in conjunction with the Engineering Leadership Graduate Certificate**

- Master of Science in Bioengineering (<http://www.northeastern.edu/gordonleadership/degree/ms-in-bioengineering/>)
- Master of Science in Biotechnology (<http://www.northeastern.edu/gordonleadership/degree/ms-in-biotechnology/>)
- Master of Science in Chemical Engineering (<http://www.northeastern.edu/gordonleadership/degree/chemical-engineering/>)
- Master of Science in Civil Engineering—Select Master of Science concentration (<http://www.northeastern.edu/gordonleadership/degree/ms-in-civil-engineering-2/>)
- Master of Science in Computer Systems Engineering (<http://www.northeastern.edu/gordonleadership/degree/computer-systems-engineering/>)
- Master of Science in Data Analytics Engineering (<http://www.northeastern.edu/gordonleadership/degree/ms-in-data-analytics-engineering/>)
- Master of Science in Electrical and Computer Engineering—Select Master of Science concentration (<http://www.northeastern.edu/gordonleadership/degree/electrical-and-computer-engineering/>)
- Master of Science in Electrical and Computer Engineering Leadership (<http://www.northeastern.edu/gordonleadership/degree/electrical-and-computer-engineering-leadership/>)
- Master of Science in Energy Systems (<http://www.northeastern.edu/gordonleadership/degree/energy-systems/>)
- Master of Science in Engineering and Public Policy with a Concentration in Energy and Environment (<http://www.northeastern.edu/gordonleadership/degree/ms-in-engineering-and-public-policy-with-a-concentration-in-energy-environment/>)
- Master of Science in Engineering and Public Policy with a Concentration in Infrastructure Resilience (<http://www.northeastern.edu/gordonleadership/degree/ms-in-engineering-and-public-policy-with-a-concentration-in-infrastructure-resilience/>)
- Master of Science in Engineering Management (<http://www.northeastern.edu/gordonleadership/degree/engineering-management/>)
- Master of Science in Environmental Engineering (<http://www.northeastern.edu/gordonleadership/degree/ms-in-environmental-engineering/>)
- Master of Science in Industrial Engineering (<http://www.northeastern.edu/gordonleadership/degree/industrial-engineering/>)
- Master of Science in Information Systems (<http://www.northeastern.edu/gordonleadership/degree/ms-in-information-systems/>)

- Master of Science in Information Assurance and Cyber Security (<http://www.northeastern.edu/gordonleadership/degree/information-assurance-and-cyber-security/>)
- Master of Science in Mechanical Engineering—Select Master of Science concentration (<http://www.northeastern.edu/gordonleadership/degree/mechanical-engineering-2/>)
- Master of Science in Operations Research (<http://www.northeastern.edu/gordonleadership/degree/operationsresearch/>)
- Master of Science in Sustainable Building Systems (<http://www.northeastern.edu/gordonleadership/degree/ms-in-sustainable-building-systems/>)
- Master of Science in Telecommunication Networks (<http://www.northeastern.edu/gordonleadership/degree/ms-in-telecommunication-networks/>)

For the Graduate Certificate in Engineering Leadership and MS combined course requirements please refer to the Certificate and Degree Options (<http://www.northeastern.edu/gordonleadership/prospective-students/degree-options/>) found on the Gordon Institute of Engineering Leadership website.

**Program Credit/GPA Requirements**

16 total semester hours required  
Minimum 3.000 GPA required

**Interdisciplinary PhD Programs****Doctor of Philosophy (PhD)**

- Cybersecurity (p. 107)
- Cybersecurity - Advanced Entry (p. 108)
- Interdisciplinary Engineering (p. 226)
- Network Science (p. 227)
- Population Health (p. 229)

**Interdisciplinary Engineering, PhD**

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617.373.2711

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

**Program Requirements**

In order to pursue an individually designed interdisciplinary graduate program, a student must have been accepted into an approved graduate program that will serve as the administrative home unit for the interdisciplinary program. Students who have been dismissed from any of the COE departments will not be able to enroll into the interdisciplinary PhD program with the department from which they were dismissed as either home or participating department. Successful application for admission to an individually designed interdisciplinary program

consists of a written proposal describing the areas of proposed study and research. Part of this proposal will be a list of courses to be taken, a description of the qualifying and comprehensive examination process to be used, a timeline, and any other requirements of the program.

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

### Qualifying Examination and Degree Candidacy

Interdisciplinary PhD students must register for and pass the doctoral qualifying examination of their home department. In some cases, if deemed necessary by the interdisciplinary committee, students may be required to take some part of the doctoral qualifying examinations of the other department(s) involved with the student's program of study. To qualify as an interdisciplinary doctoral candidate, students must successfully complete the doctoral qualifying examinations in addition to all their required course work.

### Dissertation

Students must present their dissertation proposal no more than 12 months after successfully completing their doctoral qualifying examinations. In addition, the presentation of the dissertation proposal and the actual dissertation defense shall be no less than six months apart. Interdisciplinary PhD students must follow the dissertation guidelines of their home department.

### Residency Requirement

After achieving PhD candidacy, students must complete at least two successive semesters of full-time study on campus to establish residency. The total effort for a PhD program involves a minimum of three years of full-time work beyond the bachelor's degree. Students who enter the doctoral program with a Master of Science degree may complete the requirements in less time but should anticipate at least two years of full-time effort.

### Language Requirement

Each doctoral candidate must be proficient in technical writing and oral presentation in the English language. The qualifying examination committee may require additional course work in the case of any deficiency in these areas.

## Network Science, PhD

Website (<http://www.networkscienceinstitute.org>)

### David Lazer, PhD

Distinguished Professor  
College of Social Sciences and Humanities and College of Computer and Information Science

Network Science Program  
177 Huntington Avenue, 10th Floor

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[networkscience@northeastern.edu](mailto:networkscience@northeastern.edu)

The PhD program in network science aims to enhance our understanding of networks arising from the interplay of human behavior, sociotechnical infrastructures, information diffusion, and biological agents. This is an intrinsically multidisciplinary activity, with members of the network science community representing a wide range of fields including computer science, information science, complexity, physics, sociology, communication, organizational behavior, political science, and epidemiology. This is an interdisciplinary doctoral program focused on training students in network science across several colleges—including the College of Science, the Khoury College of Computer Sciences, 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 research and subject to prior approval by their faculty advisor. Required course work includes the following: three foundational courses in network science—Complex Networks and Applications (PHYS 5116); Network Science Data (PHYS 7331); and Social Networks (POLS 7334)—at least one supplemental course in network science—Network Science Data 2 (PHYS 7332); Social Networks (POLS 7334); or Data Mining Techniques (CS 6220)—12 semester hours of elective course work defined by their area of research; 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 are expected to maintain a cumulative GPA of 3.000 or better in all course work. Students are not allowed to retake courses. A student who does not maintain the 3.000 GPA, or is not making satisfactory progress on their dissertation research, may be recommended for termination by the graduate program committee.

Each student will have one primary research advisor from the network science doctoral program faculty.

Students will be expected to select their research advisor by the end of the spring semester of their second year in the program.

The dissertation committee consists of at least four members: the dissertation advisor, one additional network science doctoral program faculty member, one member expert in the specific topic of research (can be from outside the university), and one additional tenured/tenure-track faculty member from the concentration department/conferring college. The dissertation advisor must be a full-time tenured or tenure-track member of the Northeastern University faculty. Students may repeat the comprehensive examination once if they are unsuccessful.

### Degree Candidacy

A student is considered a PhD candidate upon completion of all required course work with a minimum cumulative GPA of 3.000, satisfactory completion of the qualification exam, and satisfactory completion of the comprehensive exam.

## Qualifying Examination

The qualification exam will be an oral examination of the material during the students' course work. The exam will be an hour in length and consist of questions selected by network science faculty who comprise the qualifying examination and dissertation committee. Students will receive 50 to 80 potential questions, which they must be prepared to answer, one month before the exam. The exam will consist of a subset of these questions. The qualifying exam will be offered twice annually, in the fall and spring term. All students are required to initially sit for the exam in the fall, typically in their third year of the PhD program. Students who do not pass the qualifying exam on their first attempt are expected to retake the exam in the spring term. Students may sit for the qualifying exam no more than twice.

Students who fail to complete the qualifying examination but who have completed all the PhD program's required 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.

## Comprehensive Examination

Students must submit a written dissertation proposal to the qualifying examination and dissertation committee. The proposal should identify relevant literature, 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.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

Annual review  
Qualifying exam  
Dissertation committee  
Dissertation proposal  
Dissertation defense

### Core Requirements

Code	Title	Hours
<b>Networks</b>		
PHYS 5116	Complex Networks and Applications	4
PHYS 7331	Network Science Data	4
PHYS 7335	Dynamical Processes in Complex Networks	4
Choose one of the following:		4
PHYS 7332	Network Science Data 2	
CS 6220	Data Mining Techniques	
POLS 7334	Social Networks	
<b>Research</b>		
Complete the following (repeatable) course twice:		
NETS 8984	Research	1-4

## Specializations

Choose one of the following specializations or 12 semester hours of elective course work from the electives course list:

- Computer Science (p. )
- Political Science (p. )
- Epidemiology (p. 228)
- Physics (p. 228)
- Math (p. 228)
- Electives (p. 228)

### COMPUTER SCIENCE

Code	Title	Hours
Choose three from the following:		
CS 6140	Machine Learning	12
CS 6220	Data Mining Techniques	
CS 6240	Large-Scale Parallel Data Processing	
CS 7800	Advanced Algorithms	

### POLITICAL SCIENCE

Code	Title	Hours
POLS 7200	Perspectives on Social Science Inquiry	4
POLS 7201	Research Design	4
POLS 7202	Quantitative Techniques	4

### EPIDEMIOLOGY

Code	Title	Hours
PHTH 5202	Introduction to Epidemiology	3
PHTH 6224	Social Epidemiology	3
Electives: Choose two from the elective course list below.		6-8

### PHYSICS

Code	Title	Hours
Choose three from the following:		
PHYS 5318	Principles of Experimental Physics	
PHYS 7305	Statistical Physics	
PHYS 7731	Biological Physics 1	
PHYS 7321	Computational Physics	

### MATH

Code	Title	Hours
MATH 7241	Probability 1	4
MATH 7233	Graph Theory	4
MATH 7733	Readings in Graph Theory	4

### ELECTIVES

Complete a minimum of 12 semester hours of elective course work related to your area of research. Common electives include the following:

Code	Title	Hours
NETS 7341	Network Economics	4
NETS 7350	Bayesian and Network Statistics	4
NETS 7983	Topics	4
NETS 8941	Network Science Literature Review Seminar	2
MATH 7233	Graph Theory	4
CS 5800	Algorithms	4
CS 6140	Machine Learning	4
CS 7180	Special Topics in Artificial Intelligence	4

CS 7295	Special Topics in Data Visualization	4
INSH 5301	Introduction to Computational Statistics	4
PHYS 7337	Statistical Physics of Complex Networks	4

### Dissertation

Code	Title	Hours
Complete the following (repeatable) course twice:		
NETS 9990	Dissertation	

### Program Credit/GPA Requirements

32 total semester hours required  
 Minimum 3.000 GPA required

### Population Health, PhD

This program seeks to train students to become public health researchers and leaders through simultaneous examination of multiple determinations of health, including social, environmental, nutritional, and behavioral risk factors. Our students investigate the underlying causes of adverse health, including disease, disparities, and disability, through training in core population health disciplines—biostatistics, epidemiology, and health services—together with individual-specific and specialized training in topics related to student research. Importantly, our students are mentored by Northeastern’s distinguished faculty, who individually and together conduct innovative, solution-focused research in critical population health topics.

Our population health doctoral students have an opportunity to learn to conduct research that addresses five key health determinants:

1. Social and community contexts
2. Environment and neighborhoods
3. Health and healthcare delivery
4. Education
5. Economic stability

Our diverse faculty has expertise in numerous population health disciplines, including health services research, health disparities, environmental and social epidemiology, biostatistics, exercise science, medical sociology, public policy, personal health technologies, and mental health. Students have the opportunity to work side by side with faculty in conducting cutting-edge, transdisciplinary research in these fields.

Please visit Bouvé College Learning Outcomes for the specific student learning outcomes for this program.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

- Qualifying examination
- Annual review
- Dissertation committee
- Dissertation proposal
- Dissertation defense

### Core Requirements

Code	Title	Hours
<b>Health Services</b>		
PHTH 5232	Evaluating Healthcare Quality	3
or PHTH 5234	Economic Perspectives on Health Policy	
<b>Population Health</b>		
PHTH 6400	Principles of Population Health 1	3
PHTH 6410	Principles of Population Health 2	3
<b>Epidemiology</b>		
PHTH 5202	Introduction to Epidemiology	3
PHTH 6202	Intermediate Epidemiology	3
<b>Research Ethics</b>		
BIOL 6381	Ethics in Biological Research	2
or PHSC 5212	Research Skills and Ethics	
<b>Research and Analysis</b>		
PHTH 5210	Biostatistics in Public Health	3
PHTH 6210	Applied Regression Analysis	3

### Options

Complete one of the following options:

#### SOCIAL AND ENVIRONMENTAL DETERMINANTS OF HEALTH OPTION

Code	Title	Hours
PHTH 6224	Social Epidemiology	3
PHTH 6440	Advanced Methods in Biostatistics	3
PHTH 6800	Causal Inference in Public Health Research	3
Electives		2-4

#### HEALTH SERVICES AND POLICY OPTION

Code	Title	Hours
ECON 5110	Microeconomic Theory	4
PHTH 5234	Economic Perspectives on Health Policy	3
Electives		3-4

### Electives

Code	Title	Hours
CS 6220	Data Mining Techniques	
CS 7280	Special Topics in Database Management	
ECON 5110	Microeconomic Theory	
ECON 5140	Applied Econometrics	
ECON 7200	Topics in Applied Economics	
EXSC 5200	Cardiopulmonary Physiology	
EXSC 5220	Advanced Exercise Physiology	
EXSC 5230	Physical Activity and Exercise: Effects on Musculoskeletal Health and Disease	
HINF 5200	Theoretical Foundations in Personal Health Informatics	
HRMG 6220	Health Organization Management	
PHSC 6216	Human Physiology and Pathophysiology	
PHTH 5212	Public Health Administration and Policy	
PHTH 5214	Environmental Health	

PHTH 5226	Strategic Management and Leadership in Healthcare
PHTH 5230	Global Health
PHTH 5440	Community-Based Participatory Research: Environmental Health
PHTH 5540	Health Education and Program Planning
PHTH 6200	Principles and History of Urban Health
PHTH 6204	Society, Behavior, and Health
PHTH 6208	Urban Community Health Assessment
PHTH 6320	Qualitative Methods in Health and Illness
PPUA 7247	U.S. Healthcare Reform: Past, Present, and Future
SOCL 7257	Contemporary Issues in Sociology
SOCL 7287	Social Movements in Health
STRT 6220	Strategic Management for Healthcare Organizations

### Dissertation

Code	Title	Hours
Complete the following (repeatable) course twice:		
PHTH 9990	Dissertation	

### Program Credit/GPA Requirements

33 total semester hours required

Minimum 3.000 GPA required

## Graduate Certificate Programs

### Graduate School of Engineering Certificates

The College of Engineering offers numerous graduate engineering certificates for professionals at every career stage. These certificates may be completed as stand-alone credentials or in combination with a graduate degree. They typically consist of 16 to 20 credits and allow the learner to quickly gain a credential to advance their skills and knowledge, meet an emerging career market need, or add to their professional preparation. In many cases, graduate course work completed as part of a certificate program may be applied toward a graduate degree in the College of Engineering. Whether you are a working professional seeking new career opportunities, or a full-time graduate student looking to enhance your credentials, our broad and continuously expanding range of certificates are ready to help move your preparation forward.

### Programs

The College of Engineering offers numerous graduate certificates that may be completed alone or in combination with an MS degree. Please see the Overview tab for Certificate Policies and Procedures (p. 230) for detailed information regarding College of Engineering graduate certificates.

### Chemical Engineering

- Process Safety Engineering (p. 137)

### Computer Systems Engineering

- Computer Systems Engineering (p. 223)

### Mechanical and Industrial Engineering

- Energy Systems (p. 213)
- Energy Systems Management (p. 213)
- Renewable Energy (p. 215)
- Sustainable Energy Systems (p. 215)

### Engineering Business

- Engineering Business (p. 213)

### Engineering Management

- Engineering Economic Decision Making (p. 214)
- Engineering Management (p. 214)
- Lean Six Sigma (p. 215)
- Supply Chain Engineering Management (p. 216)
- Technology Systems Management (p. 216)

### Gordon Institute of Engineering Leadership

- Engineering Leadership (p. 225)

### Multidisciplinary

- Blockchain and Smart Contract Engineering (p. 222)

### Telecommunication Networks

- IP Telephony Systems (p. 223)
- Broadband Wireless Systems (p. 223)

# Bouvé College of Health Sciences

Website (<https://bouve.northeastern.edu/>)

TBA, Dean

215 Behrakis Health Sciences Center

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The Bouvé College of Health Sciences strongly supports the mission of Northeastern University as a practice-oriented, student-centered, experiential research institution. The college is committed to the goals of the university, which include excellence in education, research, scholarship, clinical practice, experiential learning, access to educational opportunities, and a strong professional orientation.

Bouvé offers students an education in health, health profession fields, and public health that features a curriculum of highly relevant, closely integrated, basic and applied courses in the physical, biological, behavioral, social, environmental, and health systems sciences. Students engage in interprofessional patient care, interdisciplinary translational research, and experiential learning opportunities through service-learning, research, and global experiences.

Bouvé leverages interdisciplinary and interprofessional collaboration to tackle the world's most pressing health challenges. The college seeks to prepare students to become clinicians, researchers, and leaders in healthcare and in the promotion of health of individuals and populations.

Students are provided a broad range of services and programs to ensure their academic success and professional development. Faculty are deeply committed to student success, as students interact with world-class healthcare and educational institutions nationally and globally, to advance health for all.

## Academic Policies and Procedures

- Health Certification (p. 231)
- Requirements for Clinical, Internships, and Practicum Courses (p. 231)
- Background Checks (p. 232)
- Liability Insurance (p. 233)
- Advising (p. 233)
- Transfer of Credit (p. 233)
- Course Substitution (p. 233)
- Academic Progression (p. 233)
- Student's Academic Standing (p. 234)
- Academic Probation Policy (p. 234)
- Academic Affairs Appeals Process (p. 234)
- Financial Awards (p. 236)

- Graduation Policies (p. 236)
- Academic Dismissal (p. 236)

## Health Certification

All new students must complete the University Health Report form following acceptance to the university. This form may be obtained at the University Health and Counseling Services (UHCS) located at 135 Forsyth Building or downloaded from the UHCS website (<https://www.northeastern.edu/uhcs/forms/>).

As a condition of matriculation at Northeastern University, all students are required to submit the completed University Health Report form to UHCS. Consult the UHCS website (<https://www.northeastern.edu/uhcs/forms/>) for deadlines to submit the University Health Report form. UHCS will block the registration of those students who do not file the correct forms. All documentation must be signed by a medical doctor, nurse practitioner, or physician assistant. Medical documentation and health certification are maintained by UHCS. Please refer to the University Health Report form for further information.

Programs in the Bouvé College of Health Sciences may require additional medical documentation and health certification. This varies among programs; consult your program handbook or your program advisor for more information. Additional requirements may include exam or statement of good health prior to registration, annual proof of physical examination, and/or proof of additional immunities. Additional clinical clearance(s) may be required by some programs prior to being present in any clinical setting. Students should consult their program director or clinical coordinator for more information.

*These policies and/or procedures apply to Bouvé's undergraduate and graduate students, unless specifically indicated otherwise in this section of the catalog.*

## Requirements for Clinical, Internships, and Practicum Courses

- n-siteCourses offered at affiliated hospitals, clinics, schools, medical facilities, or other institutions involve contractual agreements with these agencies. Students assigned to an institution for instruction are expected to adhere to the rules and regulations of that institution. Failure to adhere to these rules may result in dismissal from that institution.
- Evidence of health clearance is required for experiential courses (including clinicals, internships, and practicums) in their field of study. All students, regardless of age, must have a current physical exam, tuberculin test, and documentation of immunity on file at University Health and Counseling Services (UHCS (<https://www.northeastern.edu/uhcs/>)) and provide such documentation to their on-campus clinical coordinator/clinical placement office.
- School of Nursing students must provide evidence of health documentation utilizing an immunization tracker in order to ensure that documents are updated on a yearly basis. All fees required for the immunization tracking will be paid by the student directly to the tracking service. Graduate international nursing students must have a current U.S. nursing license.

- Students must meet the health clearance requirements of their academic program and any site-specific requirements prior to entering the clinical setting. This means that students must make arrangements for their physical exams and immunizations months before they are scheduled for a clinical course or rotation. Students who do not present the appropriate health certification will be blocked from registering for, or attending, a clinical course or rotation until satisfactory evidence is provided.
- More specific guidelines are available from University Health and Counseling Services in 135 Forsyth, online at UHCS (<https://www.northeastern.edu/uhcs/forms/clinical-clearance/>), or from the individual program's clinical placement office. Guidelines are updated periodically and students must meet the most current guidelines or they will not be allowed into a clinical area.
- In preparation for clinical education experiences, all students will complete on-site training in universal precautions and safe practices offered by the Office of Environmental Health and Safety (<https://www.northeastern.edu/ehs/>) or training vetted and approved by the Office of Environmental Health and Safety and offered by their program. Students must also complete an annual online refresher course in blood-borne pathogens exposure.
- Students completing experiential courses may also be required to submit and to successfully clear criminal history/background checks.
- Students in F-1 visa status must consult with the university's Office of Global Services (<https://international.northeastern.edu/ogs/>) before enrolling in clinical, internship, or practicum courses in order to discuss proper documentation for these curriculum requirements.
- All students are required by federal and state law to respect the confidentiality of the patients' records to which they may be privy. This includes, but is not limited to, patient identity and identifiers, diagnostic tests performed, medical history, and medications prescribed. For more information, students should contact their program advisor.
- Students should be aware that, while participating in any form of clinical practice, they continue to be under the jurisdiction of the university. Any breaches of conduct committed by a student in a clinical setting that would be a violation of the university Code of Student Conduct (<http://www.northeastern.edu/osccr/code-of-student-conduct/>) shall also be considered a cause for disciplinary action against the student.
- Evaluation for clinical courses will be based on established guidelines and policies that students will receive prior to the clinical component. Periodic performance evaluations will take place during the course of the academic term. See specific program clinical policies and procedures handbooks or course syllabi.
- The university is affiliated with numerous clinical sites across the country. Depending on the program, students may be required to travel outside of Massachusetts to complete clinical courses. Students are responsible for any costs associated with transportation and/or housing.

### Academic, Professional, or Research Misconduct

The healthcare professions represented by the programs in Bouvé College require more of their members than simple mastery of technical knowledge and skills. Equally important is the ability to earn the respect and confidence of those who seek medical care. The nearly universal existence of codes of conduct, ethics, etc., among the various health

professions is evidence that certain types of conduct are expected in order to promote this respect and confidence. Fundamental to most of these codes is an understanding that healthcare professions require individuals who conduct their activities in a manner that reflects a total concern for the well-being of the patient. Violations of ethical conduct may be grounds for dismissal from the program. Students are expected to learn and practice the conduct that is appropriate to their professions and promotes the physical and mental well-being of the patient.

Bouvé students are expected to adhere to the highest academic and professional standards. The university Code of Student Conduct (<http://www.northeastern.edu/osccr/code-of-student-conduct/>) sets forth the university's expectations of behavior that promote the safety and welfare of the Northeastern University community.

Failure to meet these standards, including misconduct in academic, professional, or research activities, will result in disciplinary action. Such actions may include a lowered or failing grade in the course, probation, suspension, or immediate dismissal from the program. **Students found responsible for academic, professional, or research misconduct will have a letter placed in their permanent file stating the pertinent findings of their case.** No student may withdraw from a course in which they have been notified that they will fail for a specific finding of academic dishonesty.

The university Code of Student Conduct defines various aspects of academic misconduct, such as cheating and plagiarism. **Lack of knowledge of these definitions does not negate the student's responsibility for upholding them.** Academic misconduct is regarded as a serious violation of ethical standards and may result in the student's immediate dismissal from the program.

In addition to maintaining complete honesty in all academic work, students admitted to clinical or professional programs in the Bouvé College of Health Sciences are expected to familiarize themselves with the code of ethical conduct of the professional discipline they are entering and to agree to uphold these principles.

Similarly, students who participate in research programs are expected to familiarize themselves with the code of ethics in research. Such a code is outlined in Guidelines for the Conduct of (<https://oir.nih.gov/sourcebook/ethical-conduct/research-ethics/nih-guidelines/>) *Research*. Ethical codes of conduct for researchers are also presented in the National Academy of Sciences' (<http://www.nap.edu/readingroom/books/obas/>) *On Being a Scientist, Responsible Conduct in Research* (<https://www.nap.edu/catalog/12192/on-being-a-scientist-a-guide-to-responsible-conduct-in/>). Violations of research ethics can include, but are not limited to, falsification or fabrication of data, plagiarism, malicious allegations of misconduct in science, covering up or failing to report misconduct, obstructing due process in investigations of misconduct, and reprisals against those revealing misconduct.

***These policies and/or procedures apply to Bouvé's undergraduate and graduate students, unless specifically indicated otherwise in this section of the catalog.***

### Background Checks

An increasing number of clinical sites require background checks for employees, as well as for students who come to their facilities. Northeastern University students need to have background checks done if their assigned clinical agency requires it. Some sites may also require drug testing. The college contracts with a national company,



CastleBranch, (<https://www.castlebranch.com/>) to perform these checks/screenings. CastleBranch (<https://www.castlebranch.com/>) charges fees to conduct background checks/screenings, which will vary depending on the type of background check needed. All fees will be paid by the student directly to CastleBranch (<https://www.castlebranch.com/>).

All background check information is confidential. Results are posted to the CastleBranch (<https://www.castlebranch.com/>) website in a secure, tamperproof environment. You will be able to view your own results online using a password. You will be contacted by your on-campus clinical coordinator only if there is a question about your results. Neither you nor CastleBranch (<https://www.castlebranch.com/>) is required to reveal the actual results of your background check to the clinical site or anyone else at the university. However, you may not be able to be placed at that clinical site based on the site's requirements.

If your assigned clinical site requires students to have a background check, your on-campus clinical coordinator/clinical placement office will inform you of the requirements and provide you with instructions and a deadline for completing the check. To assure adequate processing time prior to the start of your clinical experience, it is crucial that you complete the check by the deadline you are given. Failure to complete the check in a timely manner could jeopardize your progression in your academic program.

*These policies and/or procedures apply to Bouvé's undergraduate and graduate students, unless specifically indicated otherwise in this section of the catalog.*

## Liability Insurance

All students on clinicals, practicum, or internships must register each semester to be covered by Northeastern University's liability insurance, for which students pay an annual fee. This insurance covers injury to third parties by students who are doing work or completing professional studies outside of Northeastern University's premises. These activities must clearly be part of the student's assigned duties. The liability insurance does not cover willful misconduct. Students or the clinical placement coordinator can request the Office of Risk Services (<https://www.northeastern.edu/risk-services/>) to send evidence confirming coverage to their field site. Students should consult their clinical 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 Risk Services ([http://www.northeastern.edu/risk\\_services/](http://www.northeastern.edu/risk_services/)).

## Advising

The unit director or another faculty member will be appointed by the program director to serve as the student's academic advisor throughout their course of study at the Bouvé graduate school.

The advisor will assist the student in understanding program requirements and in defining career goals and objectives of graduate work. The advisor will also monitor the student's progress toward successful completion of the degree.

## Student Advisement Responsibilities

Students share responsibility with their advisor for successful matriculation and progression in their graduate program. In many programs, students are required to make appointments for academic advisement at least twice a year and must regularly update their

curriculum plan with their advisor. The curriculum plan is kept on file in the respective program's office. Both student and advisor retain a copy of the curriculum plan. Students must contact their academic advisor prior to making changes to their curriculum plan and must seek assistance regarding academic issues in a timely manner.

## Transfer of Credit

For general regulations concerning transfer credit in Northeastern's graduate degree programs, please visit Regulations Applying to All Degree Programs (p. 10).

Students who wish to take a course for transfer at another institution while enrolled at Bouvé should first receive pre-approval from their academic advisor and the Bouvé Office of Graduate Student Services. The Graduate Petition to Transfer Credit form can be found at the Office of the University Registrar (<http://www.northeastern.edu/registrar/forms-gs-xfer-cred.pdf>).

**A Bouvé student may not complete during the last term of the student's program course work at another institution intended to transfer to complete that student's program.**

## Course Substitution

A student must obtain approval from the student's academic advisor and the Bouvé Office of Graduate Student Services to substitute a graduate course completed for a prior degree for the student's program requirement. The student must provide official transcripts of completed course work, accompanied by the respective course syllabi, to the advisor in order to verify its equivalency to the proposed course substitution. The student then must submit the signed Course Substitution form and the official transcript to the Bouvé Office of Graduate Student Services. If the Course Substitution form is approved, the student must still complete a course of equivalent number of credits as a replacement for the substituted course to fulfill the program's academic requirements. The course must be listed in this catalog as either a core or elective course for the program. Contact the Office of Bouvé Graduate Student Services for the Course Substitution form.

## Academic Progression

### Program Status and Progression

All degree requirements must be completed within a maximum of seven years of matriculation, although individual academic programs may require completion in a shorter time frame. Each student is responsible for reviewing the requirements for the student's particular program. A student's failure or inability to register does not extend the amount of time allowed to complete the program. Students should be registered by the first week of each semester (fall, spring, and, where indicated, summer). Course credits earned in programs of graduate study are valid for a maximum of seven years, unless an extension is granted by the program director and the Bouvé associate dean of graduate education.

After establishment of candidacy for the PhD degree, a maximum of five years will be allowed for completion of the degree requirements, unless an extension is granted. In order to progress in clinical courses that are sequenced, a student must receive a passing grade in all prior courses in the sequence. In the event that a student fails a clinical course that is not part of a sequence, progression is at the discretion of the student's academic advisor and/or the program director. When a student fails a clinical course that is part of a sequence of courses, the course instructor

must notify the Bouvé Office of Graduate Student Services. Course material related to the student's failure (e.g., examination reports, clinical reports) must be made available to the student for review.

### PROVISIONAL AND CONDITIONAL ACCEPTANCES

A student who is accepted *conditionally* to a graduate program at Bouvé College of Health Sciences must meet the conditions set in the acceptance letter *before* the student matriculates into the program and prove that he or she has fulfilled the stated condition(s). Examples of conditions include receipt of official verification of previous degree completion, completion of missing prerequisite courses, receipt of a missing recommendation, receipt of standardized test scores, and translation of international documents.

A matriculated student who is accepted *provisionally* to a graduate program at Bouvé College of Health Sciences must meet the conditions set forth in the acceptance letter. Examples of provisions include maintenance of a GPA of 3.000 and completion of all prerequisites as outlined in the acceptance letter.

### PROGRAM EXTENSION PROCEDURES

Students may seek extension beyond the seven years to complete their program of study only under documented extenuating circumstances. The student must complete the program extension form and an action plan to complete the degree requirements. The program extension form is available from the Bouvé Office of Graduate Student Services. The form and the proposed action plan must be submitted to the program director and to the Bouvé Office of Graduate Student Services for approval. After the form is reviewed, a program extension may be granted.

### LEAVE OF ABSENCE

If a student plans on being absent for more than one semester, the student must notify the Bouvé Office of Graduate Student Services and submit the leave of absence request through myNortheastern (<https://my.northeastern.edu/>). Students should meet with their academic advisor to discuss their intention to submit a request for a leave of absence. After meeting with their academic advisor, the student should submit the petition through the myNortheastern (<https://my.northeastern.edu/>) portal. Students returning from a leave of absence should notify the Bouvé Office of Graduate Student Services of their intent to return at least one month prior to the start of the semester. Students with an approved leave of absence who do not return at the end of the leave of absence period will be withdrawn by the university. Please refer to the Graduate Schools Academic Policies (p. 27) section of the catalog for more information and policies on leave of absences.

### WITHDRAWAL PROCEDURES

Students can withdraw from the university only through the myNortheastern (<https://my.northeastern.edu/>) portal. *Students are responsible for dropping any courses in which they are currently registered and should have an exit interview with their financial aid advisor.* Faculty members are not responsible to notify the university of a student's withdrawal. For information about withdrawal and refund policies, please refer to the Student Financial Services website (<http://www.northeastern.edu/financialaid/policies/>).

### GRADING POLICIES

Requirements for fulfillment of a degree in the Bouvé College of Health Sciences graduate school vary by program. Students must consult their individual academic program's requirements, as well as program directors (*if applicable*), for specific credit and noncredit requirements necessary to earn a specific degree.

## Student's Academic Standing

Academic standing in Bouvé is determined by the student's cumulative grade-point average (GPA) and performance in academic and clinical courses that are required by the student's program. All Bouvé students are expected to maintain a cumulative GPA of 3.000 each semester to remain in good academic standing and to progress toward graduation. Students who do not maintain a cumulative GPA of 3.000 each semester will be placed on probation. Individual programs may have additional requirements; consult the program's requirements page in this catalog for details. To transfer credit, students must also earn a grade of B (3.000) or better in graduate courses completed at another institution.

## Academic Probation Policy

Academic probation is a period of time when a student must address and remediate academic deficiencies. An action plan to clear the deficiency must be developed by the student, the student's academic advisor, and the specific program graduate committee (if applicable). A student placed on probation will receive written notification from the Bouvé Office of 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 the student's academic advisor. The plan should document how the deficiency will be remediated. This action plan must be signed by the advisor and the student and placed in the student's file in the Bouvé Office of Graduate Student Services within one month from the date of the written notification of probation. The student's failure to file an action plan may be cause for dismissal from the program. The action plan must specify the date by which the deficiency will be cleared.

A Bouvé graduate student may repeat a course only once to achieve a passing grade and may repeat only two courses during his or her entire program of study. A student may be on probation for only two semesters, or until the course is offered again, unless the advisor approves an action plan that specifies a longer (but definite) period. A student may only be placed on probation twice during enrollment in Bouvé and must correct all deficiencies, as specified, in each respective action plan during the applicable probationary period. Failure to remediate the deficiency within the agreed time may result in dismissal from the program. During the period of probation, the student must earn a GPA of 3.000 or better each semester, or the student is subject to dismissal from Bouvé. Note that individual graduate programs may have additional requirements that must be included in the probation action plan.

A student will be removed from academic probation after the student has attained a cumulative GPA of 3.000, earned a passing grade in a repeated course, and/or demonstrated satisfactory performance in a clinical course.

## Academic Affairs Appeals Process

### Purpose of the Bouvé College Academic Affairs Committee

- Northeastern University affirms that it is essential to provide an appeals mechanism to students who believe that they have been erroneously, capriciously, or otherwise unfairly treated.
- The college Academic Affairs Committee (AAC) acts on matters relating to the academic and professional standing of all Bouvé students in the college who have already appeared before the

unit's Academic Standing Committee (ASC) and school dean/representative.

- Issues pertaining to academic and co-op status and professional behaviors violations, including but not limited to warning, probation, permission to resume studies, changes in requirements, and repeating courses, fall within the jurisdiction of the AAC. The AAC also considers student appeals relative to academic or cooperative education judgments by faculty, coordinators, or others acting on behalf of the university, when such appeals arise from a violation, misinterpretation, or inequitable application of the academic provisions outlined in the University Catalog, Cooperative Education Handbook, or student handbooks.
- The Office of Institutional Diversity and Inclusion handles appeals arising from allegations of discrimination on the basis of sex, sexual orientation, race, color, age, religion, national origin, handicap, or marital status. The Office for Gender Equity and Compliance handles issues related to Title IX. If other allegations remain at the conclusion of those inquiries then the student may refer them to the dean for review by the AAC of the college.

### Student Appeals Procedures

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 by a graduate student 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 (<https://ori.hhs.gov/>)) Possible incidences of misconduct are to be reported immediately to the Office Student Conduct and Conflict Resolution, who will initiate the appropriate procedures. Findings of scientific or research misconduct cannot be appealed through the process below.

### Levels of the Appeal Process

- Prior to submitting an appeal to the college AAC, the student must attempt to resolve the problem with the faculty member, coordinator, or other individual acting on behalf of the university, according to procedures outlined in the university catalogs and/or Student handbooks.
- **Unit Level:** Students who feel they have been erroneously, capriciously, or otherwise unfairly treated with the informal

communication and decision in the previous step may proceed with an appeal through their unit's Academic Affairs Committee (AAC). Students must follow the process in accordance with unit policies and procedures. If the timeline is not defined, a student shall submit a request for an appeal within 20 business days. The unit's AAC must provide the student with a written report of the finding(s) and decision within 10 business days.

- **School Level:** If the student believes he or she has been erroneously, capriciously, or otherwise unfairly treated with the committee's decision, he or she may pursue a secondary appeal to the school dean. In schools where a dean is not in place, the department chair or equivalent will serve in this role. The student must request, in writing, within 10 business days an appeal hearing. The school dean, or representative, shall provide the student or involved faculty member with a written report of his or her finding(s) and decision within 10 business days.
- **College Level:** The college AAC hears cases that have been unsatisfactorily resolved at the prior school and unit levels and that have met the requirements of appeals set forth by the university, which refers to an appeal mechanism for "students who believe that they have been erroneously, capriciously, or otherwise unfairly treated." The student must request in writing within 10 business days a request for an appeal hearing.
- **University Level:** If the student believes he or she has been erroneously, capriciously, or otherwise unfairly treated with the college dean's disposition of the matter, he or she may pursue the matter further, if applicable, in accordance with university's student catalogs and/or student handbooks.

### College-Level AAC Appeal Process

#### Initiation of Action

- Students wishing to bring an appeal before the college AAC must first consult with their appointed academic advisor, or when the appeal involves the academic advisor, a member of the Bouvé graduate office or the Office of Student Services (OSS); from here on called the appeal advisor. The student must submit all appropriate documents to their appeal advisor, including a Bouvé College of Health Sciences General Petition form, all previous appeal decisions, and academic transcripts. The appeal advisor will notify the chair of the college AAC that a student has submitted an appeal for review. The appeal advisor will inform the student of the time and place of the college's AAC meeting.
- The chair of the college AAC will ensure a panel is convened to hear the appeal within 10 business days.
  - The Academic Affairs Committee Appeals Panel (the College Appeal Panel) includes three voting members of the AAC that appropriately represent the breadth and depth of programs within the college. At minimum, two schools will be represented on the panel and at least one member teaches within a similar degree-level program. Members of the panel shall have no known conflicts of interest with the student.
  - The chair for the College Appeal Panel shall be selected from among the panel members.

#### Review of Appeals

- The appeal advisor will submit copies of the student's appeal to the chair of the College Appeal Panel prior to the meeting. Documents will be circulated to the panel members.

- The chair of the department or unit's ASC for the student presenting the appeal shall be invited by the chair of the College Appeal Panel to attend the meeting. If the chair is unable to attend, a representative of the department or unit ASC may attend in his or her place.
- The student's appeal advisor shall be invited by the chair of the College Appeal Panel to attend the meeting.
- The student is required to appear before the College Appeal Panel to present or discuss his or her appeal in person but may forfeit this right in writing. Student advocates, as defined by the university, are not permitted to attend a student's appeal meeting.
- Deliberation of the appeal will be made by the College Appeal Panel during the scheduled meeting, assuming that all relevant and appropriate information has been made available to the panel by the parties involved. If more information is needed, the decision may be postponed until a future meeting.
- The chair of the College Appeal Panel will notify the college dean of the findings and recommended decision. The college dean will have the final decision.
- The college dean will notify the student and other relevant parties of the decision in writing no later than 10 business days after the decision.
- If the student believes he or she has been erroneously, capriciously, or otherwise unfairly treated with the college dean's disposition of the matter, he or she may pursue the matter further, if applicable, in accordance with the university's student catalogs and/or student handbooks.

## Financial Awards

Northeastern University and the Bouvé College of Health Sciences offer a variety of financial awards to graduate students. For further information about awards, please refer to the Financial Aid Assistance (p. 23) section of this catalog and the Student Financial Services (<https://studentfinance.northeastern.edu/applying-for-aid/graduate/>) website.

If a student is offered other grant aid from the university, he or she will only receive the scholarship of higher value.

## Graduation Policies

### Eligibility to Graduate

Students are eligible for graduation under the following conditions:

- The student is in good academic standing with a cumulative grade-point average of 3.000 or above.
- The student has earned at least the minimum number of credits required to complete the student's program of study.
- The student has fulfilled other program requirements and any outstanding issues.

### Apply to Graduate

The student must apply to graduate through myNortheastern (<https://my.northeastern.edu/>) and set up a meeting with his or her academic advisor for academic clearance.

### Issuance of Diplomas and Certificates

Diplomas and certificates are issued three times a year (December, May, and, August), but there is only a spring Commencement ceremony. Please visit the Commencement Office website (<https://www.northeastern.edu/>

commencement/) to confirm eligibility to participate in the spring Commencement ceremony.

### Completing a Thesis for a Master's Program

Students completing a thesis as part of the program's academic requirements are required to complete the following at least five business days before the final grade submission deadline for the academic term:

- Upon successful defense of the thesis, the student must have the Thesis Approval form signed by the members of the thesis committee. Contact the Bouvé Office of Graduate Student Services for the Thesis Approval form.
- The student must submit an electronic copy of the thesis to ProQuest, following the directions outlined at the University Library (<http://library.northeastern.edu/get-help/theses-dissertations/submit-your-thesis-or-dissertation/>) website.
- The student must have the Thesis Approval form approved by a representative from the Bouvé Office of Graduate Student Services.

### PhD Program Completion

PhD degree completion has additional requirements.

- The PhD hooding and degree conferral ceremony is only held during the spring semester. PhD students may not be hooded until they have successfully defended their dissertations and completed all academic requirements.
- Students completing a dissertation must complete the following at least five business days before the final grade submission deadline for the academic term:
  - Upon successful defense of the dissertation, the student must have the Dissertation Approval form signed by the dissertation committee members. Contact the Bouvé Office of Graduate Student Services for the Dissertation Approval form.
  - The student must submit an electronic copy of the dissertation to ProQuest, following the directions outlined in the University Library (<http://library.northeastern.edu/get-help/theses-dissertations/submit-your-thesis-or-dissertation/>) website.
  - The student must meet with a representative from the Bouvé Office of Graduate Student Services for the exit interview, at which time the Dissertation Approval form will be approved.
  - Students must submit a copy of the Survey of Earned Doctorates Certification of Completion (<https://sed-ncses.org/login.aspx>) (SED) to the Bouvé Office of Graduate Student Services before graduation. Instructions for submission of the survey will be sent to the student prior to the end of the student's last term.

### Academic Dismissal

A student may be dismissed from a graduate program when he or she has failed to maintain academic requirements or has violated a policy that specifies immediate dismissal. All students shall have an opportunity to correct academic deficiencies during an appropriate probationary period before dismissal is instituted, except when the policy specifies "immediate dismissal."

Students may be subject to dismissal under the following conditions. (Note: Additional requirements that are not included in this list, but are specific to the student's major, may also apply.)

- The student exhibits unethical behavior or misconduct in their academic program, practicum, internship, or research.
- The faculty instructor and/or the clinical supervisor determines that the student has demonstrated unsafe or inappropriate behavior in a clinical setting.
- The student does not register for at least one class for two consecutive semesters and does not have an approved leave of absence.
- The student has a cumulative grade-point average below 3.000 at the end of the probationary period specified by the action plan.
- The student does not demonstrate satisfactory performance in achieving the objectives of a clinical course.
- The student fails to meet all the requirements of the program within the specified time limit mandated by the program and has not been approved for a formal extension.
- The student in a PhD program fails to successfully complete the PhD qualifying/comprehensive exams as stipulated by the program.
- The student fails to progress satisfactorily in research or fails to identify a committee for their thesis or dissertation within the time specified by the policies of the specific program.
- The student has failed to file an action plan within one month of notification of probation.
- The student has failed to meet the requirements of the action plan, including requirements that are specific to the student's major.
- The student has failed three courses or has failed the same course twice.

## Dismissal Procedures

Dismissal of a student is initiated by the program director once the basis for the dismissal is provided to and reviewed by the Bouvé Office of Graduate Student Services. The program director will then notify the student of the dismissal. Students may then appeal the dismissal via the Bouvé College Academic Affairs Appeals Process (p. 234).

## Interdisciplinary

### Programs

#### Doctor of Philosophy (PhD)

- Personal Health Informatics (p. 111)

#### Master of Science (MS)

- Health Informatics (p. 114)

### Dual Degree

- Law and Public Health, JD/MPH (p. 241)
- Pharmacy and Public Health, PharmD/MPH (p. 258)
- Physician Assistant Studies and Health Informatics, MS/MS (p. 242)
- Physician Assistant Studies and Master of Public Health, MS/MPH (p. 259)
- Public Health and Exercise Science with Concentration in Physical Activity and Public Health, MPH/MS (p. 260)
- Public Health and Health Informatics, MPH/MS (p. 243)

### Graduate Certificate

- Early Intervention (p. 244)
- Health Informatics Management and Exchange (p. 244)

- Health Informatics Privacy and Security (p. 245)
- Health Informatics Software Engineering (p. 245)

## Personal Health Informatics, PhD

Northeastern's Doctor of Philosophy (PhD) in Personal Health Informatics (PHI) is a transdisciplinary doctoral program focused on educating top researchers in the theoretical underpinnings, design, evaluation, and dissemination of consumer- and patient-focused health systems. Personal health technologies are those that non-health professionals interact with *directly*, both in and out of a clinical setting and in various life stages of illness and wellness.

Examples include:

- Assistive technologies that aid persons with disabilities
- Consumer wellness promotion technologies
- Patient education and counseling systems
- Interfaces for reviewing personal health records
- Advanced ambulatory monitoring for supporting health
- Automated elder care systems that monitor health and support independent living
- Social networking systems connecting families and their social and medical support networks

Developing personal health interface technologies requires that professionals have skills and experience designing systems for individual patients and consumers with a wide range of backgrounds in different contexts using a variety of media, while ensuring that fielded technologies are effective, reliable, and responsive to the needs of at-risk and patient populations. Critical skills and knowledge include needs assessment, theories of interface design and health behavior, rapid prototyping and implementation, experimental design with human subjects in challenging settings, and statistical data analysis and validation. Moreover, these skills must be deployed while working with, or leading, transdisciplinary teams.

The interdisciplinary nature of the program targets students who are interested in improving health and wellness using novel technologies that directly impact the lives of consumers and patients. This is a program for students who are not only technically strong but also socially conscious, design oriented, and interested in rigorously evaluating the technologies they imagine and build. The program provides a path for technical students to acquire more experience in the deployment and evaluation of health technologies in the field but also a path for students with health backgrounds to develop the technical skills needed to prototype and assess creative ideas they envision for improving care. The expected length of study is five years after the bachelor's degree.

## Admission Requirements

Students will be accepted with either of the following:

- A bachelor's or higher degree in a technical discipline (e.g., computer science or information science, computer systems engineering) with either academic or work experience demonstrating a commitment to working in health.
- A bachelor's or higher degree in a health science discipline (e.g., nursing, medicine, physical therapy, pharmacy, public health) with either some academic 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 grade-point average (GPA)
- A minimum total GRE score of 300 or equivalent
- A minimum GRE academic writing score of 3.5
- For international applicants, a minimum TOEFL score of 105

## Minimum Academic Standards and Requirements

### RESIDENCY REQUIREMENT

The residency requirement will follow the University Graduate Council By-Law policy.

### 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 personal health informatics doctoral program faculty members, each overseeing one part of the exam. The research core of the exam is fulfilled with submission of a high-quality paper to a strong peer-reviewed conference or journal. The health component of the exam is fulfilled when the student passes a written exam developed by a faculty member with a health sciences background, and the technical component of the exam is fulfilled when the student passes an exam developed by a faculty member with a technical background. The content of the written exams and the paper topic are developed in consultation with each faculty member.

### DEGREE CANDIDACY

A student is considered a PhD degree candidate upon meeting these conditions:

- Completion of core courses with a minimum GPA of 3.000 overall on the core courses
- Completion of the qualifying examination

### COMPREHENSIVE EXAM

A PhD student must submit a written dissertation proposal to the dissertation committee. The proposal should identify the research problem, the research plan, and its potential impact on the field. A presentation of the proposal will be made in an open forum, and the student must successfully defend it before the dissertation committee.

### DISSERTATION DEFENSE

A PhD student must complete and defend a dissertation that involves original research in personal health informatics.

## Curriculum Requirements

### REQUIRED AND ELECTIVE COURSES

The curriculum is designed to provide all PhD students with a strong foundation in principles critical to the design and evaluation of personal

health interfaces. All students take six core courses (24 semester hours) and the user-interface practicum (1 semester hour). 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, or 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.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

Qualifying examinations (3)  
Annual review  
Dissertation proposal  
Dissertation committee  
Dissertation defense

## Core Requirements

Code	Title	Hours
<b>Foundations</b>		
HINF 5200	Theoretical Foundations in Personal Health Informatics	4
<b>Program Design and Development</b>		
CS 5010	Programming Design Paradigm	4
CS 5340	Computer/Human Interaction	4
HINF 5300	Personal Health Interface Design and Development	4
<b>Methods and Statistics</b>		
CS 6350	Empirical Research Methods	4
PHTH 5210	Biostatistics in Public Health	3
<b>Evaluation</b>		
HINF 8982	Readings	1-8

HINF 5301	Personal Health Technologies: Field Deployment and System Evaluation	4
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**Electives**

Code	Title	Hours
Complete 6 to 8 semester hours in the following subject area: (Note: Please see faculty advisor for other acceptable elective courses.)		6-8
HINF		

**Dissertation**

Code	Title	Hours
Complete the following (repeatable) course twice:		
CS 9990	Dissertation	

**Program Credit/GPA Requirements**

48 total semester hours required  
Minimum 3.000 GPA required

**Plan of Study**

**Sample Curriculum**

Year 1			
Fall	Hours	Spring	Hours
HINF 5200	4	CS 5010 or 5520	4
CS 5340	4	CS 6350	4
		Additionally, students should participate in the Personal Health Informatics Usability Evaluation Practicum	1
		8	9
Year 2			
Fall	Hours	Spring	Hours
HINF 5300	4	HINF 5301	4
PHTH 5210 (or PHTH 6210 or CAEP 7712 or CAEP 7716)	3	PHI elective	3-4
		7	7-8
Year 3			
Fall	Hours	Spring	Hours
HINF 9990	2-4	HINF 9990	2-4
HINF 8982	1-8	PHI elective	3-4
		3-12	5-8
Year 4			
Fall	Hours	Spring	Hours
HINF 9996	0	HINF 9996	0
		0	0
Year 5			
Fall	Hours	Spring	Hours
HINF 9996	0	HINF 9996	0
		0	0

Total Hours: 39-52

**Health Data Analytics, MS**

The digitization of healthcare systems in clinical settings, in combination with the explosion of personal data collection devices, provides the opportunity of using data for revolutionizing approaches to care at all levels with an emphasis on precision medicine and person-centered care. The ability to take advantage of this “Big Data” opportunity, however, requires expertise at the intersection of health informatics, data science, and computational modeling. The Master of Science in Health Data Analytics is designed to prepare students to succeed in this emerging field. This program offers a strong, competency-based curriculum that addresses data analytics ranging from data acquisition from traditional and emerging data streams, data aggregation methods, data mining algorithms, predictive computational modeling, and visualization techniques. Students can expect to amass a broad and deep understanding of the various methods, software tools, and topical expertise needed to discover meaningful patterns in health-related data and effectively communicate their implications to a number of diverse stakeholders. Successful graduates of the Master of Science in Health Data Analytics will be effective practitioners and leaders in the rapidly developing domain of data analytics with a focus on health and healthcare.

The interdisciplinary Master of Science in Health Data Analytics consists of 12 courses, drawn from the Khoury College of Computer Sciences and the Bouvé College of Health Science; a capstone project; and an ongoing series of seminars on topics in health data analytics. Two tracks will be available to matriculating students: standard and research based.

**LEARNING OUTCOMES**

- Proficiency in the health and healthcare ecosystem, including stakeholder roles such as payers, providers, and government; social determinants of health; wellness promotion; acute vs. chronic care
- Ability to acquire, store, and validate data; familiarity with common health-related data sources and formats
- Proficiency in analyzing data using statistical, epidemiological, and data-mining methods along with appropriate software tools and programming languages
- Ability to interpret and present analytical results to nontechnical stakeholders using visualization and accessible narrative structures

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Core Requirements**

Code	Title	Hours
<b>Analytics/Modeling/Statistics</b>		
DA 5020	Collecting, Storing, and Retrieving Data	4
DA 5030	Introduction to Data Mining/Machine Learning	4
HINF 6400	Introduction to Health Data Analytics	3
INSH 5301	Introduction to Computational Statistics	4
INSH 5302	Information Design and Visual Analytics	4
<b>Healthcare</b>		
HINF 5102	Data Management in Healthcare	3
HINF 5105	The American Healthcare System	3
HINF 6500	Predictive Analytics and Modeling	3

## Thesis/Capstone

Code	Title	Hours
Complete either Thesis or Capstone:		3
<i>Thesis</i>		
HINF 6101	Thesis	
<i>Capstone</i>		
HINF 7701	Health Informatics Capstone Project	

## Electives

At least one course must be chosen from the methods list.

Code	Title	Hours
<b>Methods</b>		
Complete 3–6 semester hours from the following:		3-6
PHTH 6202	Intermediate Epidemiology	
PHTH 6210	Applied Regression Analysis	
PHTH 6440	Advanced Methods in Biostatistics	
CS 6350	Empirical Research Methods	
CAEP 7712	Intermediate Statistical Data Analysis Techniques	
CAEP 7716	Advanced Research and Data Analyses 2	
<b>Other Electives</b>		
Complete 0–4 semester hours from the following:		0-4
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 6320	Design of Information-Rich Environments	
HINF 5200	Theoretical Foundations in Personal Health Informatics	
HINF 5300	Personal Health Interface Design and Development	
HINF 6215	Project Management	
HINF 6220	Database Design, Access, Modeling, and Security	
PHTH 5226	Strategic Management and Leadership in Healthcare	
PHTH 5232	Evaluating Healthcare Quality	
PHTH 5234	Economic Perspectives on Health Policy	

## Program Credit/GPA Requirements

37 total semester hours required  
Minimum 3.000 GPA required

### Health Informatics, MS

Northeastern's interdisciplinary Master of Science in Health Informatics was the first MS in the field. The program seeks to prepare students to address the combined clinical, technical, and business needs of health-related professionals. Successful students graduate with the knowledge of how technology, people, health, and the healthcare system interrelate; the ability to use technology and information management to improve healthcare delivery and outcomes; and the skills to communicate effectively among healthcare practitioners, administrators, and information technology professionals.

With approval from the health informatics program director, selected students can substitute one course from the Graduate Certificate in Data Analytics for a technical core requirement in the MS in Health Informatics degree, and up to two more courses from the Graduate Certificate in Data Analytics can be counted as electives for the MS in Health Informatics degree.

Northeastern also offers graduate certificate programs in health informatics. Three certificate programs enable you to choose the one that addresses your specific goals. These programs are listed separately in this catalog:

- Graduate Certificate in Health Informatics Management and Exchange
- Graduate Certificate in Health Informatics Privacy and Security
- Graduate Certificate in Health Informatics Software Engineering

Courses in the certificate program also apply toward master's degree requirements. This gives you the flexibility to complete a certificate and be well on your way to earning a degree if you decide later to continue your education.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

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

Code	Title	Hours
<b>Required Core</b>		
HINF 5101	Introduction to Health Informatics and Health Information Systems	3
HINF 5105	The American Healthcare System	3
HINF 7701	Health Informatics Capstone Project	3
<b>Business Management</b>		
Complete two courses from the following:		6
HINF 6201	Organizational Behavior, Work Flow Design, and Change Management	
HINF 6202	Business of Healthcare Informatics	
HINF 6215	Project Management	
HINF 6335	Management Issues in Healthcare Information Technology	
HINF 6240	Improving the Patient Experience through Informatics	
PHTH 5226	Strategic Management and Leadership in Healthcare	
<b>Health Informatics</b>		
Complete two courses from the following:		6
HINF 5102	Data Management in Healthcare	
HINF 5110	Global Health Information Management	
HINF 5200	Theoretical Foundations in Personal Health Informatics	
HINF 6205	Creation and Application of Medical Knowledge	
HINF 6350	Public Health Surveillance and Informatics	
HINF 6404	Patient Engagement Informatics and Analytics	



HINF 6405	Quantifying the Value of Informatics
PHTH 5232	Evaluating Healthcare Quality

**Technical**

Complete two courses from the following: 6

HINF 6220	Database Design, Access, Modeling, and Security
HINF 6355	Key Standards in Health Informatics Systems
HINF 6400	Introduction to Health Data Analytics
PHTH 5202	Introduction to Epidemiology
PHTH 5210	Biostatistics in Public Health
PHTH 6210	Applied Regression Analysis
PHTH 6400	Principles of Population Health 1
PHTH 6440	Advanced Methods in Biostatistics

One course from the following may count toward the technical core requirement:

DA 5020	Collecting, Storing, and Retrieving Data
DA 5030	Introduction to Data Mining/Machine Learning
INSH 5301	Introduction to Computational Statistics
INSH 5302	Information Design and Visual Analytics

**Electives**

**Code Title Hours**  
Complete two courses from the following. Any course not taken to complete a core requirement may be taken as an elective. 6

HINF 6345	Design for Usability in Healthcare
DA 5020	Collecting, Storing, and Retrieving Data
DA 5030	Introduction to Data Mining/Machine Learning
INSH 5301	Introduction to Computational Statistics
INSH 5302	Information Design and Visual Analytics

**Program Credit/GPA Requirements**

Minimum 33 total semester hours required  
Minimum 3.000 GPA required

**Law and Public Health, JD/MPH**

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 (MPH) recognizes the growing need for professionals trained to respond to unique public health challenges and opportunities facing urban populations. The MPH program brings together interdisciplinary faculty (from the School of Law, D’Amore-McKim School of Business, College of Social Sciences and Humanities, Khoury College of Computer Sciences, and the Bouvé College of Health Sciences) with expertise in collaborating with diverse urban populations to offer students an opportunity to obtain practice-based knowledge, skills, and experience needed to address urban public health problems.

See JD/MPH program page (<http://www.northeastern.edu/law/academics/jd/dual-degrees/jdmph-bouve.html>) for more information.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Core Requirements**

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

Code	Title	Hours
<b>Required Core</b>		
PHTH 5120	Race, Ethnicity, and Health in the United States	3
PHTH 5202	Introduction to Epidemiology	3
PHTH 5210	Biostatistics in Public Health	3
PHTH 5212	Public Health Administration and Policy	3
PHTH 5214	Environmental Health	3
PHTH 5540	Health Education and Program Planning	3
PHTH 6200	Principles and History of Urban Health	3
PHTH 6204	Society, Behavior, and Health	3
PHTH 6208	Urban Community Health Assessment	3
<b>Practicum</b>		
PHTH 6966	Practicum	3
<b>Capstone</b>		
PHTH 6910	Public Health Capstone	3

**Electives**

**Code Title Hours**  
Complete 9 semester hours from the following. In consultation with your faculty advisor, you may complete electives from another discipline: 9

LAW 7300	Administrative Law	
LAW 7329	Environmental Law	
LAW 7335	Health Law	
LAW 7350	Negotiation	
LAW 7351	Prisoners’ Rights Clinic	
LAW 7362	Poverty Law and Practice Clinic	
LAW 7410	Domestic Violence Clinic	
LAW 7428	State Local Government	
LAW 7463	Non-Profit Organizations	
LAW 7469	Disability Law	
LAW 7491	International Human Rights and the Global Economy	
LAW 7494	Bioethics and the Law	
LAW 7512	Problems in Public Health Law	
LAW 7514	Natural Resources Law	
LAW 7525	Law and Economic Development	
LAW 7527	Public Health Legal Clinic	
LAW 7526	Juvenile Courts: Delinquency, Abuse, Neglect	
LAW 7550	Refugee and Asylum Law	
LAW 7561	Private Litigation in the Public Interest	
LAW 7582	Elder Law	
LAW 7588	Reproductive and Sexual Rights and Health	

LAW 7600	Current Issues in Health Law and Policy
LAW 7602	Bioproperty
LAW 7606	Drug Law and Policy
LAW 7617	Economic Perspectives on Health Policy

### Program Credit/GPA Requirements

42 total semester hours required for MPH. Please contact the School of Law (<https://www.northeastern.edu/law/academics/jd/dual-degrees/>) for JD requirements.

Minimum 3.000 GPA required

### Plan of Study

#### Year 1

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
First-year law courses		First-year law courses		Law co-op	
	0		0		0

#### Year 2

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHTH 5202	3	PHTH 5120	3	PHTH 5540	3
PHTH 5210	3	PHTH 5212	3	LAW 7443	3
PHTH 6200	3	PHTH 5214	3		
PHTH 6204	3	PHTH 6208	3		
	12		12		6

#### Year 3

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHTH 6966	3	Law school courses		Law school courses	
Law co-op		Law co-op			
	3		0		0

#### Year 4

Fall	Hours	Spring	Hours
PHTH 6910	3	February bar exam	
	3		0

Total Hours: 36

### Physician Assistant Studies and Health Informatics, MS/MS

The Northeastern University health informatics and physician assistant combined program allows qualified and interested students to achieve their goal of obtaining a more robust understanding of healthcare technology while also completing robust clinical training in the physician assistant program. This prepares a select group of exceptionally qualified clinicians to become leaders in healthcare technology application and development and fosters interdisciplinary collaboration in order to address problems in the healthcare and health information environments both locally and across the globe. The joint program is designed to provide students a greater understanding of technological issues in clinical practice, quantitative methods, and the use of scientific evidence and cutting-edge technology to optimize clinical workflows and improve patient outcomes.

This dual degree takes 34 months to complete (as opposed to 48, if each degree were pursued separately), and a total number of 8 credits are shared between both degrees.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Physician Assistant Requirements

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

Code	Title	Hours
<b>Required Core</b>		
PA 6208	Professional Issues for Physician Assistants	2
PA 6326	Aspects of Primary Care	4
PA 6327	Emergency Medicine and Critical Care	2
PA 6328	Aging and Rehabilitation Medicine	2
PA 6329	Healthcare Delivery	2
<b>Anatomy &amp; Physiology</b>		
PA 6200	Anatomy and Physiology 1	3
PA 6201	Anatomy and Physiology 2	3
<b>Diagnosis &amp; Evaluation</b>		
PA 6203	Physical Diagnosis and Patient Evaluation 1	3
PA 6204	Physical Diagnosis and Patient Evaluation 2	3
<b>Pharmacology</b>		
PA 6205	Pharmacology 1	2
PA 6206	Pharmacology 2	2
PA 6207	Clinical Laboratory and Diagnostic Methods	4
<b>Principles</b>		
PA 6311	Principles of Medicine 1	4
PA 6312	Principles of Medicine 2	4
PA 6313	Principles of Medicine 3	4
PA 6320	Principles of Obstetrics and Gynecology	2
PA 6321	Principles of Surgery	2
PA 6322	Principles of Orthopedics	2
PA 6323	Clinical Neurology	2
PA 6324	Principles of Pediatrics	2
PA 6325	Principles of Psychiatry	2
<b>Clinical</b>		
PA 6400	Applied Study in Medicine	5
PA 6401	Applied Study in Ambulatory Medicine	5
PA 6402	Applied Study in Family Practice	5
PA 6403	Applied Study in Emergency Medicine	5
PA 6404	Applied Study in Obstetrics and Gynecology	5
PA 6405	Applied Study in Pediatrics	5
PA 6406	Applied Study in Surgery	5
PA 6407	Applied Study in Mental Health	5
PA 6408	Applied Study Elective	5

### Health Informatics Requirements

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

Code	Title	Hours
<b>Required Core</b>		
HINF 7701	Health Informatics Capstone Project	3
<b>Business Management</b>		
Complete two courses from the following:		6
HINF 6201	Organizational Behavior, Work Flow Design, and Change Management	
HINF 6202	Business of Healthcare Informatics	
HINF 6215	Project Management	
HINF 6240	Improving the Patient Experience through Informatics	
HINF 6335	Management Issues in Healthcare Information Technology	
PTH 5226	Strategic Management and Leadership in Healthcare	
<b>Health Informatics</b>		
Complete two courses from the following:		6
HINF 5102	Data Management in Healthcare	
HINF 5110	Global Health Information Management	
HINF 5200	Theoretical Foundations in Personal Health Informatics	
HINF 6205	Creation and Application of Medical Knowledge	
HINF 6350	Public Health Surveillance and Informatics	
HINF 6404	Patient Engagement Informatics and Analytics	
HINF 6405	Quantifying the Value of Informatics	
PTH 5232	Evaluating Healthcare Quality	
<b>Technical</b>		
PTH 5202	Introduction to Epidemiology	3
PTH 5210	Biostatistics in Public Health	3
<b>Electives</b>		
Complete two courses from the following:		6
HINF 6345	Design for Usability in Healthcare	
DA 5020	Collecting, Storing, and Retrieving Data	
DA 5030	Introduction to Data Mining/Machine Learning	
INSH 5301	Introduction to Computational Statistics	
INSH 5302	Information Design and Visual Analytics	

## Program Credit/GPA Requirements

128 total semester hours required  
Minimum 3.000 GPA required

### Public Health and Health Informatics, MPH/MS

Website (<https://bouve.northeastern.edu/health-sciences/programs/ms-hinf-mp/>)

The Master of Public Health (MPH) and Master of Science in Health Informatics (MSHI) combined program allows qualified and interested students to prepare to lead healthcare at the nexus between public health and health informatics. Graduates of this program will be well-educated in the complex issues associated with improvements in information

technology, as well as changes to the public health and healthcare delivery systems. Recognizing the increasing overlap between health informatics and public health, this program incorporates course work from both the MPH and MSHI curricula for both degrees, reducing tuition costs and saving one year of study compared to obtaining both degrees individually.

The Northeastern University Master of Public Health program is accredited by the Council on Education for Public Health (CEPH). CEPH is an independent agency recognized by the U.S. Department of Education to accredit schools of public health and public health programs outside of schools of public health.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

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

## Public Health Requirements

Code	Title	Hours
<b>Required Core</b>		
PTH 5202	Introduction to Epidemiology	3
PTH 5210	Biostatistics in Public Health	3
PTH 5212	Public Health Administration and Policy	3
PTH 5214	Environmental Health	3
PTH 5540	Health Education and Program Planning	3
or PPUA 6509	Techniques of Program Evaluation	
PTH 6204	Society, Behavior, and Health	3
<b>Urban Health</b>		
PTH 5120	Race, Ethnicity, and Health in the United States	3
PTH 6200	Principles and History of Urban Health	3
PTH 6208	Urban Community Health Assessment	3

## Health Informatics Requirements

Code	Title	Hours
<b>Required Core</b>		
HINF 5101	Introduction to Health Informatics and Health Information Systems	3
HINF 6220	Database Design, Access, Modeling, and Security	3
HINF 6240	Improving the Patient Experience through Informatics	3
HINF 6355	Key Standards in Health Informatics Systems	3
HINF 6405	Quantifying the Value of Informatics	3

## Capstone and Practicum

Code	Title	Hours
PTH 6910	Public Health Capstone	3
PTH 6966	Practicum	3

## Electives

Code	Title	Hours
Complete three of the following, with at least one course completed from each group:		9

### Group 1

HINF 6201	Organizational Behavior, Work Flow Design, and Change Management
HINF 6202	Business of Healthcare Informatics
HINF 6215	Project Management
<b>Group 2</b>	
PHTH 5226	Strategic Management and Leadership in Healthcare
PHTH 5232	Evaluating Healthcare Quality
HINF 6404	Patient Engagement Informatics and Analytics

### Program Credit/GPA Requirements

57 total semester hours required  
Minimum 3.000 GPA required

### Biopharmaceutical Analytical Sciences, Graduate Certificate

The Graduate Certificate in Biopharmaceutical Analytical Sciences has been designed in response to a need in the biotechnology industry for individuals with an advanced knowledge of the principles and practices of state-of-the-art analyses of protein with focus on the characterization of innovator and biosimilars. Individuals, particularly those who are working in the various sectors of biotechnology including basic research of biological systems, discovery, development, and manufacturing of biopharmaceuticals, have an opportunity to improve their competency and learn new practical skills that enable them to increase productivity and further contribute to their professions. In addition, the certificate was designed for both individuals with and without experience in biopharmaceuticals and their analysis.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
CHEM 5616	Protein Mass Spectrometry	3
CHEM 5617	Protein Mass Spectrometry Laboratory	3
CHEM 5550	Introduction to Glycobiology and Glycoprotein Analysis	3
CHEM 5660	Analytical Biochemistry	3

### Program Credit/GPA Requirements

12 total semester hours required  
Minimum 3.000 GPA required

### Early Intervention, Graduate Certificate

Northeastern University's Certificate Program in Early Intervention is an interdisciplinary, preservice training program that is designed to fulfill requirements for certification as an early intervention specialist, at the advanced provisional level, as set forth by the Massachusetts Department of Public Health (DPH).

The interdisciplinary nature of the program is facilitated by the interaction of graduate students from several disciplines (including school psychology, counseling psychology, and speech-language pathology); undergraduate students from majors such as speech-language pathology and audiology and psychology; and working professionals in the field. Personnel working in the field may use their work sites for field training.

The program is delivered in a hybrid format. Classes meet on campus one day each month, and additional course content is delivered online.

This graduate certificate program can be completed by non-degree-seeking students or integrated with master's or clinical doctoral degree programs. Application of course work from certain degree programs will be approved to apply to requirements of this graduate certificate; students are encouraged to speak with their academic advisors early in their programs to explore these options.

The goals for the early intervention certificate program are:

- To prepare personnel to provide services to infants and toddlers with disabilities and their families, from linguistically and culturally diverse backgrounds in urban environments
- To prepare personnel who have attained all competencies relative to early intervention, specified by the Massachusetts DPH, and that are consistent with best practice and research
- To prepare personnel in an interdisciplinary manner, drawing from Northeastern University's multidisciplinary resources
- To prepare personnel to function effectively across teams (individualized family service plan teams, community teams, interagency teams) and to understand the roles of their interdisciplinary teammates

Upon graduation, students are eligible for employment in an early intervention service delivery setting.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

A grade of B or higher is required in all courses.

Code	Title	Hours
<b>Required Core</b>		
CAEP 5150	Early Intervention: Family Systems	3
CAEP 5151	Early Intervention: Infant and Toddler Development, Risk, and Disability	3
SLPA 5152	Early Intervention: Planning and Evaluating Services	3
CAEP 5153	Early Intervention: Assessment and Intervention	3
<b>Practicum</b>		
SLPA 5154	Early Intervention Practicum 1 (Early Intervention Practicum 1)	2
SLPA 5155	Early Intervention Practicum 2 (Early Intervention Practicum 2)	2

### Program Credit/GPA Requirements

16 total semester hours required  
Minimum 3.000 GPA required

### Health Informatics Management and Exchange, Graduate Certificate

The certificate program in health informatics management and exchange offers you the opportunity to obtain the knowledge needed to support the collection, management, retrieval, and exchange of electronic health

data. It is designed to prepare you for a position as a specialist in data management, interoperability standards, and health database design.

- Eight-month program
- Five courses, 15 semester hours

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

A grade of B– or higher is required in all course work.

Code	Title	Hours
<b>Required Core</b>		
HINF 5101	Introduction to Health Informatics and Health Information Systems	3
HINF 5102	Data Management in Healthcare	3
<b>Management and Exchange</b>		
HINF 6205	Creation and Application of Medical Knowledge	3
HINF 6220	Database Design, Access, Modeling, and Security	3
HINF 6355	Key Standards in Health Informatics Systems	3

### Program Credit/GPA Requirements

15 total semester hours required  
Minimum 3.000 GPA required

### Health Informatics Privacy and Security, Graduate Certificate

The certificate program in health informatics privacy and security combines knowledge of health informatics with a strong foundation in important information security issues. Northeastern's status as a National Security Agency Center of Excellence for Information Security Education and Research ensures the program is both relevant and of high academic quality.

- Eight-month program
- Five courses, 18 semester hours

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

A grade of B– or higher is required in all course work.

Code	Title	Hours
<b>Required Core</b>		
HINF 5101	Introduction to Health Informatics and Health Information Systems	3
HINF 5102	Data Management in Healthcare	3
<b>Privacy and Security</b>		
CY 5130	Computer System Security	4
CY 5150	Network Security Practices	4
CY 5200	Security Risk Management and Assessment	4

### Program Credit/GPA Requirements

18 total semester hours required  
Minimum 3.000 GPA required

### Health Informatics Software Engineering, Graduate Certificate

This certificate program offers software engineers the background in health informatics (as well as interchange and interoperability standards) needed to better understand the context in which they work and perform effectively in a health-related organization. Program design is flexible to allow completion on a rapid schedule or a slower pace that is more compatible with full-time workers.

- Eight-month program
- Five courses, 15 semester hours

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

A grade of B– or higher is required in all course work.

Code	Title	Hours
<b>Required Core</b>		
HINF 5101	Introduction to Health Informatics and Health Information Systems	3
HINF 5102	Data Management in Healthcare	3
<b>Management and Exchange</b>		
HINF 6205	Creation and Application of Medical Knowledge	3
HINF 6345	Design for Usability in Healthcare	3
HINF 6355	Key Standards in Health Informatics Systems	3

### Program Credit/GPA Requirements

15 total semester hours required  
Minimum 3.000 GPA required

### Applied Psychology

Website (<http://www.northeastern.edu/bouve/ap/>)

#### Robert J. Volpe, PhD

Professor & Interim Chair

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Graduate programs in the Department of Applied Psychology (including two doctoral programs accredited by the American Psychological Association) reflect Northeastern University's tradition of practice-oriented education with an ecological and multicultural focus. Faculty and students come from diverse ethnic and cultural backgrounds, providing an enriching learning experience. The department is a scientist-practitioner-based unit that generates new psychological knowledge through research, and the translation of research, to applications that:

1. Optimize development and learning
2. Promote mental and physical health across the life span

The Bouvé College of Health Sciences emphasizes experiential and field-based learning, interdisciplinary and global knowledge, and integration of science and practice. The Department of Applied Psychology seeks to 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. Bouvé students have an opportunity to acquire knowledge and competency needed for a lifetime of personal fulfillment and professional achievement.

## Programs

### Doctor of Philosophy (PhD)

- Counseling Psychology (p. 246)
- School Psychology (p. 247)

### Certificate of Advanced Graduate Studies (CAGS)

- Applied Behavior Analysis (p. 248)
- Counseling Psychology (p. 248)
- School Psychology (p. 250)

### Master of Science (MS)

- Applied Behavior Analysis (p. 249)
- School Psychology (p. 250)

### Master of Science in Counseling Psychology (MSCP)

- Counseling Psychology (p. 249)

### Graduate Certificate

- Applied Behavior Analysis (p. 251)

## Counseling Psychology, PhD

The Doctor of Philosophy in Counseling Psychology program is accredited by the American Psychological Association (APA). It is designed to train the next generation of mental health professionals. The program offers doctoral education and training in psychology and seeks to prepare students for entry-level practice in counseling psychology. Doctoral-level counseling psychologists conduct research, teach at the university level, supervise students and professionals, consult with community agencies, and provide clinical services to people across the developmental life span. Counseling psychologists also enhance the science of health promotion and health psychology and emphasize community-based interventions. It is the mission of the PhD in Counseling Psychology program to train multiculturally competent counseling psychologists who are clinically adept in multiple settings with a variety of psychological and health-related issues and who are able to conceptualize, conduct, and evaluate research across biological, cultural, and relational systems in numerous social contexts, such as families, schools, neighborhoods, and communities.

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/bchs/about/learning-outcomes/>) for the specific student learning outcomes for this program.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

Annual review

Four qualifying examinations completed in the first three years—research, ethics, assessment, and intervention

Research team during the first year (two consecutive semesters)

Dissertation committee

Dissertation proposal

Dissertation defense

### Core Requirements

A grade of B or higher is required in all course work.

Code	Title	Hours
<b>Basic</b>		
CAEP 6390	History and Systems of Psychology	3
CAEP 6394	Advanced Multicultural Psychology	3
CAEP 7750	Biological Bases of Behavior	3
CAEP 7755	Cognitive and Affective Bases of Behavior	3
CAEP 7756	Social Psychology in an Organizational and Ecological Context	3
<b>Fieldwork</b>		
Complete 8 semester hours from the following:		8
CAEP 7741	Advanced Fieldwork 1	
CAEP 7742	Advanced Fieldwork 2	
CAEP 7743	Advanced Fieldwork 3	
CAEP 7744	Advanced Fieldwork 4	
<b>Clinical</b>		
CAEP 6350	Introduction to Cognitive Assessment	3
CAEP 6352	Personality Assessment	3
CAEP 6360	Consultation and Program Evaluation	3
CAEP 7710	Advanced Clinical Assessment	3
CAEP 7720	Advanced Clinical Interventions	3
CAEP 7758	Doctoral Seminar in Contemporary Theories of Psychotherapy	3
<b>Elective</b>		
Three semester hours can be chosen from any graduate level CAEP course or combination of graduate level CAEP courses outside of the PhD in Counseling Psychology program of study. Other electives may be chosen upon approval of the program director and faculty advisor:		3
<b>Professional</b>		
Complete 6 semester hours from the following:		6
CAEP 7701	Doctoral Seminar in Counseling Psychology (Repeatable 3 times for 1 credit and 3 times for 0 credits)	
CAEP 7732	Legal and Ethical Issues in Community and Educational Settings	
<b>Research</b>		
CAEP 7711	Measurement: Advanced Psychometric Principles	3
CAEP 7712	Intermediate Statistical Data Analysis Techniques	3

CAEP 7716	Advanced Research and Data Analyses 2	3
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**Internship**

Complete 3 semester hours from the following:		
CAEP 7798	Doctoral Internship 1	3
CAEP 7799	Doctoral Internship 2	

**Dissertation**

Code	Title	Hours
Complete the following (repeatable) course twice:		
CAEP 9990	Dissertation	0

**Program Credit/GPA Requirements**

62 total semester hours required  
 Minimum 3.000 GPA required

**School Psychology, PhD**

Northeastern University’s Doctor of Philosophy in School Psychology program is accredited by the American Psychological Association (APA) and the National Association of School Psychologists (NASP). The program is designed to prepare the next generation of leaders in school psychology. The ecological perspective and scientist-practitioner training model provide the foundation for the program’s educational goals. Students have an opportunity to learn how to conduct research, to use research to inform practice, and to contribute to the scientific foundation of professional practice.

Please visit Bouvé College Learning Outcomes (<https://nam05.safelinks.protection.outlook.com/?url=https%3A%2F%2Fbouve.northeastern.edu%2Fbchs%2Fabout%2Flearning-outcomes%2F&data=02%7C01%7Ch.daly%40northeastern.edu%7C29ec2ed1b2d5466eed8f08d6a6e60554%7Ca8eec281aaa34daec9b9a35%2F%2BrbA%2FnPIxPWQff6c%3D&reserved=0/>) for the specific student learning outcomes for this program.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Milestones**

- Comprehensive examination
- Annual review
- Mentored research project
- Dissertation committee
- Dissertation proposal
- Dissertation defense

**Core Requirements**

A grade of B or higher is required in all course work.

Code	Title	Hours
<b>Professional</b>		
CAEP 6365	Seminar in School Psychology	3
CAEP 7732	Legal and Ethical Issues in Community and Educational Settings	3
<b>Basic</b>		
CAEP 6206	Learning Principles	3
CAEP 6390	History and Systems of Psychology	3

CAEP 6218	Infant, Child, and Adolescent Development	3
or CAEP 6220 Development Across the Life Span		
CAEP 7750	Biological Bases of Behavior	3
CAEP 7755	Cognitive and Affective Bases of Behavior	3
CAEP 7756	Social Psychology in an Organizational and Ecological Context	3
<b>Multicultural Competency</b>		
CAEP 6203	Understanding Culture and Diversity	3
CAEP 6394	Advanced Multicultural Psychology	3
<b>Assessment and Intervention</b>		
<i>Course Work</i>		
CAEP 6247	Child and Adolescent Psychopathology	3
CAEP 6345	Learning Problems: Educational, Biological, and Ecological Perspectives	3
CAEP 6347	Behavior Management	3
CAEP 6350	Introduction to Cognitive Assessment	3
CAEP 6353	Curriculum-Based Assessment and Instruction	3
CAEP 6354	Social, Emotional, and Behavioral Assessment	3
CAEP 6360	Consultation and Program Evaluation	3
CAEP 6399	Clinical Skills in Counseling Psychology	3
CAEP 6401	Counseling Children and Adolescents in Schools 1	3
CAEP 6402	Counseling Children and Adolescents in Schools 2	3
CAEP 7710	Advanced Clinical Assessment	3
CAEP 7720	Advanced Clinical Interventions	3
<i>Practicum</i>		
CAEP 6400	Prepracticum in School Psychology	1
CAEP 8415	Practicum in School Psychology 1	2
CAEP 8416	Practicum in School Psychology 2	2
<i>Fieldwork (minimum of 2 SH required per course, for a total of 8 SH)</i>		
CAEP 7741	Advanced Fieldwork 1	1,2
CAEP 7742	Advanced Fieldwork 2	1,2
CAEP 7743	Advanced Fieldwork 3	1,2
CAEP 7744	Advanced Fieldwork 4	1,2
<i>Internship (complete 3 SH)</i>		
CAEP 7798	Doctoral Internship 1	1-3
CAEP 7799	Doctoral Internship 2	2
<b>Research</b>		
CAEP 6202	Research, Evaluation, and Data Analysis	3
CAEP 7711	Measurement: Advanced Psychometric Principles	3
CAEP 7712	Intermediate Statistical Data Analysis Techniques	3
CAEP 7777	Doctoral Seminar: Program Planning and Evaluation	3
CAEP 7716	Advanced Research and Data Analyses 2	3

## Dissertation

Code	Title	Hours
CAEP 9990	Dissertation	

Complete the following (repeatable) course twice:

## Program Credit/GPA Requirements

97 total semester hours required

Minimum 3.000 GPA required

### Applied Behavior Analysis, CAGS

The Certificate of Advanced Graduate Study (CAGS) program prepares graduates to assume supervisory behavior analyst roles in schools and agencies and to serve as independent consultants. Additionally, it seeks to give graduates expertise in a specific clinical area related to applied behavior analysis, such as early intervention, public policy, or assessment. This program is designed for the student who possesses a graduate degree in either Psychology or Education. The Behavior Analyst Certification Board (BACB) has verified this course sequence as meeting the course requirements for eligibility to take the Board Certified Behavior Analyst (BCBA) examination.

This program includes 7 core courses in behavior analysis that explore the principles and procedures of applied behavior analysis in-depth and address its philosophical underpinnings. The 7 core courses are followed by 3 additional courses in a specific content area related to behavior analysis. These courses, which are related, explore the related clinical issue in-depth. Students may elect to complete their supervised experience hours by taking Intensive Practicum in Applied Behavior Analysis 1 (CAEP 8417) and Intensive Practicum in Applied Behavior Analysis 2 (CAEP 8418), in addition to the 10 required courses.

Courses are delivered in an online format. Students attend lectures virtually and view supplementary material on their own schedules, taking advantage of technological advances that promote student learning and increase student-to-instructor and student-to-student communication.

Students take one or two courses each academic term, and courses are offered during the fall, spring, and summer full semesters. Behavioral Concepts and Principles (CAEP 6326) and Service Administration (CAEP 6329) serve as prerequisite courses to the remaining courses in the program.

## Professional Portfolio

The capstone for the program is the professional portfolio. This portfolio, which is compiled electronically, documents the student's acquisition of critical behavioral procedures and competency in critical clinical skills. These skills, each of which is associated with a specific project, include:

- Preference and reinforcer assessment
- Functional assessment of problem behavior
- Task analysis
- Discrete trial
- Stimulus equivalence
- Consequence reinforcement
- Conditioned reinforcement
- Literature review

Each semester, students complete assignments associated with the above clinical skills, and each assignment culminates in professional documents to be included in the student's professional portfolio. A faculty member reviews and signs each assignment in the professional

portfolio. The faculty member's signature indicates that the student has achieved the faculty-established standards for the project. Graduates are encouraged to use their professional portfolio when applying for employment.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

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

Code	Title	Hours
<b>Basic</b>		
CAEP 6326	Behavioral Concepts and Principles	3
CAEP 6329	Service Administration	3
CAEP 6327	Behavior Assessment	3
CAEP 6328	Research and Design Methods	3
CAEP 6331	Advanced Learning Seminar 1	3
CAEP 6334	Applied Programming Seminar 1	3
CAEP 6336	Systematic Inquiry 1	3
<b>Specialization Area</b>		
Complete specialization area in consultation with your faculty advisor.		9

## Practicum

Note: The intensive practicum is optional. Consult your faculty advisor.

Code	Title	Hours
CAEP 8417	Intensive Practicum in Applied Behavior Analysis 1	2
CAEP 8418	Intensive Practicum in Applied Behavior Analysis 2	2

## Program Credit/GPA Requirements

30 total semester hours required

Minimum 3.000 GPA required

### Counseling Psychology, CAGS

The Certificate of Advanced Graduate Study (CAGS) in Counseling Psychology is for students with a highly related master's degree seeking to enhance their professional skills. This program does not meet licensure requirements in Massachusetts. It is a 30-semester-hour course of study. This program is individually tailored to fulfill a student's professional focus.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

A grade of B or higher is required in all course work.

Code	Title	Hours
<b>Required Core</b>		
In consultation with faculty advisor, complete 24 semester hours in the following subject area:		24
CAEP		
<b>Internship</b>		



CAEP 8510	Internship in Counseling Psychology 1	3
CAEP 8511	Internship in Counseling Psychology 2	3

## Program Credit/GPA Requirements

30 total semester hours required  
Minimum 3.000 GPA required

### Applied Behavior Analysis, MS

The Master of Science in Applied Behavior Analysis (ABA) program prepares graduates to assume supervisory behavior analyst roles in schools and service agencies and to serve as independent consultants. The Association for Behavior Analysis International has verified the following courses toward the coursework requirements for eligibility to take the Board Certified Behavior Analyst® or Board Certified Assistant Behavior Analyst® examination. Applicants will need to meet additional requirements before they can be deemed eligible to take the examination. While retaining a practitioner focus, this program gives students in-depth knowledge of topics such as conditioned reinforcement, motivational influences on behavior, and errorless teaching procedures. Courses explore the principles and procedures of applied behavior analysis in-depth and address its philosophical underpinnings. With this background, graduates are prepared to address the most complex behavior problems and learning challenges. Students complete 7 core courses, plus an additional 3 courses that extend the student's familiarity with clinical procedures and with the research supporting their use. Students may elect to complete their supervised experience hours by taking Intensive Practicum in Applied Behavior Analysis 1 (CAEP 8417) and Intensive Practicum in Applied Behavior Analysis 2 (CAEP 8418), in addition to the 10 required courses.

Courses are delivered in an online format. Students attend lectures virtually and view supplementary material on their own schedules, taking advantage of technological advances that promote student learning and increase student-to-instructor and student-to-student communication.

Students take one or two courses each academic term, and courses are offered during the fall, spring, and summer full semesters. Behavioral Concepts and Principles (CAEP 6326) and Service Administration (CAEP 6329) serve as prerequisite courses to the remaining courses in the program.

### Professional Portfolio

The capstone for the program is the professional portfolio. This portfolio, which is compiled electronically, documents the student's acquisition of critical behavioral procedures. This portfolio documents the student's behavioral competency in critical clinical skills. These skills, each of which is associated with a specific project, include:

- Preference and reinforce assessment
- Functional assessment of problem behavior
- Task analysis
- Discrete trial
- Stimulus equivalence
- Conditioned reinforcement
- Literature review

Each semester, students complete assignments associated with the above clinical skills, and each assignment culminates in professional documents to be included in the student's professional portfolio. A faculty member reviews and signs each assignment in the professional portfolio. The faculty member's signature indicates that the student has

achieved the faculty-established standards for the project. Graduates are encouraged to use their professional portfolio when applying for employment.

Please visit Bouvé College Learning Outcomes (<https://nam05.safelinks.protection.outlook.com/?url=https%3A%2F%2Fbouve.northeastern.edu%2Fbchs%2Fabout%2Flearning-outcomes%2F&data=02%7C01%7Ch.daly%40northeastern.edu%7C29ec2ed1b2d5466eed8f08d6a6e60554%7Ca8eec281aaa34daeac9b9a398b921%2Fe%2BrbA%2FnIPIxPWQfF6c%3D&reserved=0/>) for the specific student learning outcomes for this program.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Professional Portfolio

- Preference and reinforce assessment
- Functional assessment of problem behavior
- Task analysis
- Discrete trial
- Stimulus equivalence
- Conditioned reinforcement
- Literature review

### Core Requirements

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

Code	Title	Hours
<b>Basic</b>		
CAEP 6326	Behavioral Concepts and Principles	3
CAEP 6327	Behavior Assessment	3
CAEP 6328	Research and Design Methods	3
CAEP 6329	Service Administration	3
CAEP 6331	Advanced Learning Seminar 1	3
CAEP 6334	Applied Programming Seminar 1	3
CAEP 6336	Systematic Inquiry 1	3
<b>Advanced</b>		
CAEP 6324	Programmed Learning	3
CAEP 6332	Advanced Learning Seminar 2	3
CAEP 6335	Applied Programming Seminar 2	3

### Practicum

Note: The intensive practicum is optional. Consult your faculty advisor.

Code	Title	Hours
CAEP 8417	Intensive Practicum in Applied Behavior Analysis 1	2
CAEP 8418	Intensive Practicum in Applied Behavior Analysis 2	2

### Program Credit/GPA Requirements

30 total semester hours required  
Minimum 3.000 GPA required

### Counseling Psychology, MSCP

The Master of Science in Counseling Psychology (MSCP) program at Northeastern is committed to the development of competent Licensed Mental Health Counselors (LMHC) through the disciplinary studies and

contemporary professional practice of counseling psychology. The program complies with licensing regulations for mental health counselors in the Commonwealth of Massachusetts and is unique in its offer of a choice of specific specializations to gain additional depth in selected areas within the general Master of Science program.

Please visit Bouvé College Learning Outcomes for the specific student learning outcomes for this program.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

A grade of B or higher is required in all course work.

Code	Title	Hours
<b>Seminar</b>		
CAEP 6380	Seminar in Feminist Psychology	3
<b>Required Core</b>		
CAEP 6200	Introduction to Counseling: Theory and Process in an Ecological Context	3
CAEP 6201	Introduction to Assessment	3
CAEP 6203	Understanding Culture and Diversity	3
CAEP 6220	Development Across the Life Span	3
CAEP 6235	Vocational, Education, and Career Development	3
CAEP 6242	Psychopathology: Diagnosis and Treatment Planning	3
CAEP 6250	Individual Interventions	3
CAEP 6260	Community Counseling Psychology	3
CAEP 6282	Ethics and Professional Development	3
CAEP 6287	Group Counseling	3
CAEP 6375	Substance Use and Treatment	3
CAEP 6399	Clinical Skills in Counseling Psychology	3
<b>Research</b>		
CAEP 6202	Research, Evaluation, and Data Analysis	3
<b>Practicum</b>		
CAEP 8401	Practicum in Counseling Psychology	3
<b>Internship</b>		
CAEP 8510	Internship in Counseling Psychology 1	3
CAEP 8511	Internship in Counseling Psychology 2	3
<b>Electives</b>		
<b>Code</b>	<b>Title</b>	<b>Hours</b>
Complete 9 semester hours from the following. Other electives or alternatives may be chosen in consultation with faculty advisor.		
CAEP 6215	Groups: Dynamics and Leadership	9
CAEP 6218	Infant, Child, and Adolescent Development	
CAEP 6222	Human Sexuality	
CAEP 6247	Child and Adolescent Psychopathology	
CAEP 6283	Brief Therapies	
CAEP 6286	Family Counseling Interventions	
CAEP 6290	Reality Therapy	
CAEP 6390	History and Systems of Psychology	
CAEP 6394	Advanced Multicultural Psychology	

CAEP 7720	Advanced Clinical Interventions
CAEP 7758	Doctoral Seminar in Contemporary Theories of Psychotherapy
PHTH 6320	Qualitative Methods in Health and Illness

## Program Credit/GPA Requirements

60 total semester hours required

Minimum 3.000 GPA required

### School Psychology, MS/CAGS

Northeastern University's Master of Science/Certificate of Advanced Graduate Study (CAGS) in School Psychology is approved by the National Association of School Psychologists (NASP) and the Massachusetts Department of Elementary and Secondary Education. The overarching purpose of the program is to develop highly competent school psychologists. Some students also choose to specialize in either early intervention or applied behavior analysis. The early intervention training option is designed to prepare school psychologists to work with infants and toddlers and their families in community and related agencies, on interdisciplinary teams, and on the transition to school. The applied behavior analysis training option is designed to prepare school psychologists to address the learning and behavioral needs of children and adolescents with challenging behaviors in school, home, and community settings, including children with autism spectrum disorders.

Please visit Bouvé College Learning Outcomes (<https://nam05.safelinks.protection.outlook.com/?url=https%3A%2F%2Fbouve.northeastern.edu%2Fbchs%2Fabout%2Flearning-outcomes%2F&data=02%7C01%7Ch.daly%40northeastern.edu%7Cb586f58e7f414e5f23bd08d6a8b7ca62%7Ca8eec281aaa34daeac9b9a398b9215%2BKZy1RfV6o4v%2BwkWyE0yuRS0ZDLMuATVHx%2BMhuZdQ%3D&reserved=0/>) for the specific student learning outcomes for this program.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### MS Requirements

A grade of B or higher is required in all course work.

Code	Title	Hours
<b>Clinical/Applied</b>		
CAEP 6201	Introduction to Assessment	3
CAEP 6347	Behavior Management	3
CAEP 6350	Introduction to Cognitive Assessment	3
CAEP 6400	Prepracticum in School Psychology	1
<b>Foundations</b>		
CAEP 6202	Research, Evaluation, and Data Analysis	3
CAEP 6203	Understanding Culture and Diversity	3
CAEP 6206	Learning Principles	3
CAEP 6218	Infant, Child, and Adolescent Development	3
CAEP 6247	Child and Adolescent Psychopathology	3
CAEP 6365	Seminar in School Psychology	3
CAEP 7750	Biological Bases of Behavior	3

## CAGS Requirements

A grade of B or higher is required in all course work.

Code	Title	Hours
<b>Clinical/Applied</b>		
CAEP 6353	Curriculum-Based Assessment and Instruction	3
CAEP 6354	Social, Emotional, and Behavioral Assessment	3
CAEP 6345	Learning Problems: Educational, Biological, and Ecological Perspectives	3
CAEP 6360	Consultation and Program Evaluation	3
CAEP 6399	Clinical Skills in Counseling Psychology	3
CAEP 6401	Counseling Children and Adolescents in Schools 1	3
CAEP 6402	Counseling Children and Adolescents in Schools 2	3
<b>Practicum</b>		
CAEP 8415	Practicum in School Psychology 1	2
CAEP 8416	Practicum in School Psychology 2	2
<b>Internship</b>		
CAEP 8501	Internship in School Psychology 1	3
CAEP 8502	Internship in School Psychology 2	3

## Optional Concentration

### APPLIED BEHAVIOR ANALYSIS

Code	Title	Hours
CAEP 6327	Behavior Assessment	3
CAEP 6328	Research and Design Methods	3
CAEP 6329	Service Administration	3
CAEP 6336	Systematic Inquiry 1	3
CAEP 8417	Intensive Practicum in Applied Behavior Analysis 1	2
CAEP 8418	Intensive Practicum in Applied Behavior Analysis 2	2

## Optional Specialization

### EARLY INTERVENTION

Code	Title	Hours
CAEP 5150	Early Intervention: Family Systems	3
SLPA 5154	Early Intervention Practicum 1	2
SLPA 5155	Early Intervention Practicum 2	2
SLPA 6335	Early Intervention: Assessment and Intervention	3
CAEP 6202	Research, Evaluation, and Data Analysis	3

## MS/CAGS Program Credit/GPA Requirements

62 total semester hours required  
Minimum 3.000 GPA required

### Applied Behavior Analysis, Graduate Certificate

The goal of the Graduate Certificate in Applied Behavior Analysis is to prepare graduates to assume supervisory behavior analyst roles in schools and service agencies and to serve as independent consultants. The Association for Behavior Analysis International has verified the following courses toward the coursework requirements for eligibility to take the Board Certified Behavior Analyst® or Board Certified Assistant

Behavior Analyst® examination. Applicants will need to meet additional requirements before they can be deemed eligible to take the examination.

This program includes seven core courses in behavior analysis that explore the principles and procedures of applied behavior analysis in-depth and address its philosophical underpinnings. Students may elect to complete their supervised experience hours by taking Intensive Practicum in Applied Behavior Analysis 1 (CAEP 8417) and Intensive Practicum in Applied Behavior Analysis 2 (CAEP 8418), in addition to the seven required courses.

Courses are delivered in an online format. Students attend lectures virtually and view supplementary material on their own schedules, taking advantage of technological advances that promote student learning and increase student-to-instructor and student-to-student communication.

Students take one or two courses each academic term, and courses are offered during the fall, spring, and summer full semesters. Behavioral Concepts and Principles (CAEP 6326) and Service Administration (CAEP 6329) serve as prerequisite courses to the remaining courses in the program.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

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

Code	Title	Hours
<b>Basic Core</b>		
CAEP 6326	Behavioral Concepts and Principles (Behavioral Concepts and Principles)	3
CAEP 6327	Behavior Assessment	3
CAEP 6328	Research and Design Methods	3
CAEP 6329	Service Administration	3
CAEP 6331	Advanced Learning Seminar 1	3
CAEP 6334	Applied Programming Seminar 1	3
CAEP 6336	Systematic Inquiry 1	3

## Intensive Practicum

Note: The intensive practicum is optional. Consult your faculty advisor.

Code	Title	Hours
CAEP 8417	Intensive Practicum in Applied Behavior Analysis 1	2
CAEP 8418	Intensive Practicum in Applied Behavior Analysis 2	2

## Program Credit/GPA Requirements

21 total semester hours required  
Minimum 3.000 GPA required

### Communication Sciences and Disorders

Website (<https://bouve.northeastern.edu/csd/>)

#### Lorraine Book, PhD, CCC-SLP

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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.

## Programs

### Master of Science (MS)

- Speech-Language Pathology (p. 252)

### Graduate Certificate

- Early Intervention (p. 244)

## Speech-Language Pathology, MS

Adhering to the highest professional standards, the speech-language pathology (SLP) graduate program seeks to prepare future speech-language pathologists for the rigors of clinical practice in educational and healthcare settings. Graduates of the program will influence society in profound ways—for example, enabling children with autism to communicate effectively, relieving adolescents' fears of speaking dysfluently in the classroom, and helping stroke survivors resume activities in which they had previously participated. The comprehensive program of study emphasizes teamwork and interdisciplinary approaches to complex service delivery issues. SLP graduate students acquire the knowledge and skills needed for a lifetime of professional achievement and social contribution.

Please visit Bouvé College Learning Outcomes (<https://nam05.safelinks.protection.outlook.com/?url=https%3A%2F%2Fbouve.northeastern.edu%2Fbchs%2Fabout%2Flearning-outcomes%2F&data=02%7C01%7Ci.escobedo%40northeastern.edu%7C34248f06b5934c79986408d6a983e0e1%7Ca8eec281aaa34daeac9b9a398b9215e7%7C0%7C636892781205315774&sd=106FyrwH%2FHhQsh7Y1KtXoCdrWA9zY%3D&reserved=0/>) for the specific student learning outcomes for this program.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

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

Code	Title	Hours
<b>Disorders</b>		
SLPA 5201	Diagnostic Testing in Speech-Language Pathology	2
SLPA 6219	Aural Rehabilitation (or elective)	3-4
SLPA 6303	Stuttering	3
SLPA 6304	Augmentative and Alternative Communication	3
SLPA 6305	Articulation and Phonology	3
SLPA 6307	Voice Disorders	3
SLPA 6308	Dysphagia	3
SLPA 6321	Motor Speech Disorders	3
SLPA 6330	Language Literacy 1	0.5
SLPA 6337	Language Literacy Experiential Program	0.5
SLPA 6340	Language Disorders in Children 1	3
SLPA 6341	Language Disorders in Children 2	3
SLPA 6342	Speech-Language Disorders In Adults 1	3
SLPA 6343	Speech-Language Disorders in Adults 2	3
<b>Science</b>		
SLPA 5109	Neurology of Communication	3
SLPA 6301	Speech Science	3
<b>Research</b>		
SLPA 6211	Research and Evidence-Based Practice	3
SLPA 6420	Practical Statistics for Speech-Language Pathology and Audiology	3
<b>Practicum</b>		
SLPA 6415	Speech-Language Pathology Advanced Clinical Practicum 1	3
SLPA 6416	Speech-Language Pathology Advanced Clinical Practicum 2	2
SLPA 6417	Speech-Language Pathology Advanced Clinical Practicum 3	2
SLPA 6418	Speech-Language Pathology Advanced Clinical Practicum 4	2

### Electives

Code	Title	Hours
Complete 3 semester hours from the following. Other electives may be chosen in consultation with faculty advisor.		3
SLPA 6311	Counseling in SLP	
SLPA 6332	Seminar in Communication Disorders	
SLPA 6773	Topics Seminar	

### Program Credit/GPA Requirements

30 total semester hours required  
Minimum 3.000 GPA required

## Early Intervention, Graduate Certificate

Northeastern University's Certificate Program in Early Intervention is an interdisciplinary, preservice training program that is designed to fulfill requirements for certification as an early intervention specialist, at the advanced provisional level, as set forth by the Massachusetts Department of Public Health (DPH).

The interdisciplinary nature of the program is facilitated by the interaction of graduate students from several disciplines (including school psychology, counseling psychology, and speech-language pathology); undergraduate students from majors such as speech-language pathology and audiology and psychology; and working professionals in the field. Personnel working in the field may use their work sites for field training.

The program is delivered in a hybrid format. Classes meet on campus one day each month, and additional course content is delivered online.

This graduate certificate program can be completed by non-degree-seeking students or integrated with master's or clinical doctoral degree programs. Application of course work from certain degree programs will be approved to apply to requirements of this graduate certificate; students are encouraged to speak with their academic advisors early in their programs to explore these options.

The goals for the early intervention certificate program are:

- To prepare personnel to provide services to infants and toddlers with disabilities and their families, from linguistically and culturally diverse backgrounds in urban environments
- To prepare personnel who have attained all competencies relative to early intervention, specified by the Massachusetts DPH, and that are consistent with best practice and research
- To prepare personnel in an interdisciplinary manner, drawing from Northeastern University's multidisciplinary resources
- To prepare personnel to function effectively across teams (individualized family service plan teams, community teams, interagency teams) and to understand the roles of their interdisciplinary teammates

Upon graduation, students are eligible for employment in an early intervention service delivery setting.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirements

A grade of B or higher is required in all courses.

Code	Title	Hours
<b>Required Core</b>		
CAEP 5150	Early Intervention: Family Systems	3
CAEP 5151	Early Intervention: Infant and Toddler Development, Risk, and Disability	3
SLPA 5152	Early Intervention: Planning and Evaluating Services	3
CAEP 5153	Early Intervention: Assessment and Intervention	3
<b>Practicum</b>		
SLPA 5154	Early Intervention Practicum 1 (Early Intervention Practicum 1)	2

SLPA 5155	Early Intervention Practicum 2 (Early Intervention Practicum 2)	2
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### Program Credit/GPA Requirements

16 total semester hours required  
Minimum 3.000 GPA required

### Health Sciences

Website (<https://bouve.northeastern.edu/health-sciences/>)

**Sharon Harlan, PhD**  
Professor & Interim Chair

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The Department of Health Sciences at the Bouvé College of Health Sciences at Northeastern University provides a unique, transdisciplinary setting that incorporates academics, research, and practice and seeks to prepare students for a wide range of career paths. We offer a bachelor's degree in health sciences and options for combined majors with the D'Amore-McKim School of Business, the College of Social Sciences and Humanities, the College of Science, the College of Engineering, and the Khoury College of Computer Sciences, in addition to minors in exercise science, global health, nutrition, health research methods, and health science. We offer several graduate degrees: Master of Public Health, Master of Science in Exercise Science, and a combined master's in the two fields. We also collaborate with Khoury to offer a Master of Science in Health Informatics, as well as combined graduate degrees with the School of Pharmacy, the Physician Assistant Program, and the School of Law. At the doctoral level, we offer a PhD in Population Health and, in cooperation with Khoury, a PhD in Personal Health Informatics. Finally, we offer a Graduate Certificate in Exercise Science for Clinicians.

Our diverse faculty has expertise in the fields of population health; health disparities; biostatistics; epidemiology; exercise science; medical sociology; public policy; personal health technologies; neurodevelopmental disorders; environmental, occupational, and mental health; among many more. Students have the opportunity to work side-by-side with faculty in conducting cutting-edge research in these fields. We also have research staff highly skilled in providing unique, specialized dietary assessment services.

In line with Northeastern's commitment to interdisciplinary research and urban engagement, we teach and work closely with many other schools, centers, and institutes in the university, including the Institute for Health Equity and Social Justice Research (IHESJR), the Center for Community Health Education Research and Service (CCHERS), the Social Science Environmental Health Research Institute (SSEHRI), and the Center for Health Policy and Healthcare Research (CHPHR), as well as community agencies and neighborhood health centers in the local Boston area and beyond.

### Programs

#### Doctor of Philosophy (PhD)

- Population Health (p. 229)

#### Master of Science (MS)

- Exercise Science with Concentration in Physical Activity and Public Health (p. 256)

## Master of Public Health (MPH)

- Master of Public Health (p. 255)

## Dual Degree

- Law and Urban Public Health, JD/MPH (p. 241)
- Pharmacy and Public Health, PharmD/MPH (p. 258)
- Physician Assistant Studies and Master in Public Health, MS/MPH (p. 259)
- Public Health and Exercise Science with Concentration in Physical Activity and Public Health, MPH/MS (p. 260)
- Public Health and Health Informatics, MPH/MS (p. 243)

## Graduate Certificate

- Exercise Science for Clinicians (p. 262)

## Population Health, PhD

This program seeks to train students to become public health researchers and leaders through simultaneous examination of multiple determinations of health, including social, environmental, nutritional, and behavioral risk factors. Our students investigate the underlying causes of adverse health, including disease, disparities, and disability, through training in core population health disciplines—biostatistics, epidemiology, and health services—together with individual-specific and specialized training in topics related to student research. Importantly, our students are mentored by Northeastern’s distinguished faculty, who individually and together conduct innovative, solution-focused research in critical population health topics.

Our population health doctoral students have an opportunity to learn to conduct research that addresses five key health determinants:

1. Social and community contexts
2. Environment and neighborhoods
3. Health and healthcare delivery
4. Education
5. Economic stability

Our diverse faculty has expertise in numerous population health disciplines, including health services research, health disparities, environmental and social epidemiology, biostatistics, exercise science, medical sociology, public policy, personal health technologies, and mental health. Students have the opportunity to work side by side with faculty in conducting cutting-edge, transdisciplinary research in these fields.

Please visit Bouvé College Learning Outcomes for the specific student learning outcomes for this program.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

Qualifying examination  
Annual review  
Dissertation committee  
Dissertation proposal  
Dissertation defense

## Core Requirements

Code	Title	Hours
<b>Health Services</b>		
PHTH 5232	Evaluating Healthcare Quality	3
or PHTH 5234	Economic Perspectives on Health Policy	
<b>Population Health</b>		
PHTH 6400	Principles of Population Health 1	3
PHTH 6410	Principles of Population Health 2	3
<b>Epidemiology</b>		
PHTH 5202	Introduction to Epidemiology	3
PHTH 6202	Intermediate Epidemiology	3
<b>Research Ethics</b>		
BIOL 6381	Ethics in Biological Research	2
or PHSC 5212	Research Skills and Ethics	
<b>Research and Analysis</b>		
PHTH 5210	Biostatistics in Public Health	3
PHTH 6210	Applied Regression Analysis	3

## Options

Complete one of the following options:

### SOCIAL AND ENVIRONMENTAL DETERMINANTS OF HEALTH OPTION

Code	Title	Hours
PHTH 6224	Social Epidemiology	3
PHTH 6440	Advanced Methods in Biostatistics	3
PHTH 6800	Causal Inference in Public Health Research	3
Electives		2-4

### HEALTH SERVICES AND POLICY OPTION

Code	Title	Hours
ECON 5110	Microeconomic Theory	4
PHTH 5234	Economic Perspectives on Health Policy	3
Electives		3-4

## Electives

Code	Title	Hours
CS 6220	Data Mining Techniques	
CS 7280	Special Topics in Database Management	
ECON 5110	Microeconomic Theory	
ECON 5140	Applied Econometrics	
ECON 7200	Topics in Applied Economics	
EXSC 5200	Cardiopulmonary Physiology	
EXSC 5220	Advanced Exercise Physiology	
EXSC 5230	Physical Activity and Exercise: Effects on Musculoskeletal Health and Disease	
HINF 5200	Theoretical Foundations in Personal Health Informatics	
HRMG 6220	Health Organization Management	
PHSC 6216	Human Physiology and Pathophysiology	
PHTH 5212	Public Health Administration and Policy	
PHTH 5214	Environmental Health	

PHTH 5226	Strategic Management and Leadership in Healthcare
PHTH 5230	Global Health
PHTH 5440	Community-Based Participatory Research: Environmental Health
PHTH 5540	Health Education and Program Planning
PHTH 6200	Principles and History of Urban Health
PHTH 6204	Society, Behavior, and Health
PHTH 6208	Urban Community Health Assessment
PHTH 6320	Qualitative Methods in Health and Illness
PPUA 7247	U.S. Healthcare Reform: Past, Present, and Future
SOCL 7257	Contemporary Issues in Sociology
SOCL 7287	Social Movements in Health
STRT 6220	Strategic Management for Healthcare Organizations

### Dissertation

Code	Title	Hours
Complete the following (repeatable) course twice:		
PHTH 9990	Dissertation	

### Program Credit/GPA Requirements

33 total semester hours required  
 Minimum 3.000 GPA required

## Public Health, MPH

Website (<http://www.northeastern.edu/mph/>)

Through innovation in experiential education, research, and service, the Master of Public Health Program at Northeastern University trains diverse and skilled professionals who promote and protect the health of all communities.

The Northeastern University Master of Public Health Program is accredited by the Council on Education for Public Health (CEPH) (<https://nam05.safelinks.protection.outlook.com/?url=https%3A%2F%2Fceph.org%2F&data=02%7C01%7Ch.daly%40northeastern.edu%7C444b8329a5cc4e32422d08d6a3f8602d%7Ca8eec281aaa34daeac9b9a398b9215e7%7C0%7C0%7C63687668449397%2B3f5nKvOeY0%3D&reserved=0/>). CEPH is an independent agency recognized by the U.S. Department of Education to accredit schools of public health and public health programs outside of schools of public health.

In order to help prepare the next generation of public health leaders and professionals, the MPH offers our diverse graduate students an opportunity to:

- Complete your degree 100 percent online, on-ground, or in a hybrid format (combination of both)
- Participate in learning options that meet the needs of the working professional:
  - On-ground courses are offered in the evening (most classes meet once a week from 5:00 to 7:30 p.m.)
  - Enroll as either a full-time or part-time student

- Take elective courses on a wide range of public health topics, including cross-departmental offerings from Northeastern's other colleges (law, business, social sciences, and more)
- Enjoy a supportive learning environment that includes outstanding student mentoring

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

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

Code	Title	Hours
<b>Required Core</b>		
PHTH 5202	Introduction to Epidemiology	3
PHTH 5210	Biostatistics in Public Health	3
PHTH 5212	Public Health Administration and Policy	3
PHTH 5214	Environmental Health	3
PHTH 5540	Health Education and Program Planning	3
or PPUA 6509	Techniques of Program Evaluation	
PHTH 6204	Society, Behavior, and Health	3
<b>Urban Health</b>		
PHTH 5120	Race, Ethnicity, and Health in the United States	3
PHTH 6200	Principles and History of Urban Health	3
PHTH 6208	Urban Community Health Assessment	3
<b>Practicum</b>		
PHTH 6966	Practicum	3
<b>Capstone</b>		
PHTH 6910	Public Health Capstone	3

### Electives

Code	Title	Hours
Complete 9 semester hours from the following. In consultation with your faculty advisor, you may complete electives from another discipline:		
PHTH 5222	Health Advocacy	
PHTH 5226	Strategic Management and Leadership in Healthcare	
PHTH 5230	Global Health	
PHTH 5232	Evaluating Healthcare Quality	
PHTH 5234	Economic Perspectives on Health Policy	
PHTH 5236	Public Health Nutrition	
PHTH 5300	Project Management in Public Health	
PHTH 5310	Budget Principles in Public Health	
PHTH 5320	Grant Writing in Public Health	
PHTH 5330	Using Publicly Available Data in Public Health	
PHTH 5340	Writing for Peer-Reviewed Journals in Public Health	
PHTH 5350	Using SAS in Public Health Research	
PHTH 5440	Community-Based Participatory Research: Environmental Health	

PHTH 5540	Health Education and Program Planning
PHTH 6202	Intermediate Epidemiology
PHTH 6210	Applied Regression Analysis
PHTH 6224	Social Epidemiology
PHTH 6320	Qualitative Methods in Health and Illness
PHTH 6400	Principles of Population Health 1
PHTH 6410	Principles of Population Health 2
PHTH 6440	Advanced Methods in Biostatistics
PHTH 6450	Systematic Reviews of Scientific Literature
PHTH 6460	Analysis of Messy Data
PHTH 6800	Causal Inference in Public Health Research
PPUA 6509	Techniques of Program Evaluation

### Program Credit/GPA Requirements

42 total semester hours required  
Minimum 3.000 GPA required

### Exercise Science with Concentration in Physical Activity and Public Health, MS

The Department of Health Sciences currently offers a Master of Science in Exercise Science with a public health emphasis. The concentration in physical activity and public health recognizes that inactivity is a major public health problem and represents a significant risk factor for many chronic diseases, including heart disease, stroke, hypertension, metabolic syndrome, obesity, type 2 diabetes, and some types of cancer. Moreover, this concentration integrates key competencies for a degree in exercise science recommended by the American College of Sports Medicine (ACSM), including knowledge of exercise physiology and the assessment and development of physical activity and exercise programs for the general and clinical populations. Graduate students seeking this degree are members of the Bouvé College of Health Sciences—a leading national model for education and research in the health, psychosocial, and biomedical sciences, which supports the university's mission of educating students for a life of fulfillment and accomplishment and creating and translating knowledge to meet global and societal needs through interdisciplinary research, urban engagement, experiential learning, and the integration of classroom learning with real-world experience. Faculty in the department are exploring a range of research topics, including acute/chronic effects of exercise, community-based exercise and nutrition interventions, nutrition epidemiology, health disparities, urban public health, and application of technology for measuring and motivating behavior change.

Two unique features of the program are:

- The program offers three pathways of study based on student interests: research, public health, and practice-based pathways. Students take two electives to enhance their knowledge in their selected pathway. These pathways are designed to train students to pursue a terminal degree in exercise science/opportunities in a research setting, federal/private/nonprofit institutions, and clinical setting.
- We offer students internship, practicum, and research opportunities at both on- and off-campus sites. Experiential education is a key component of the program because application of classroom

knowledge provides valuable preparation for a career in exercise science.

Please visit Bouvé College Learning Outcomes (<https://nam05.safelinks.protection.outlook.com/?url=https%3A%2F%2Fbouve.northeastern.edu%2Fbchs%2Fabout%2Flearning-outcomes%2F&data=02%7C01%7Ch.daly%40northeastern.edu%7Cb586f58e7f414e5f23bd08d6a8b7ca62%7Ca8eec281aaa34daeac9b9a398b921%2BKZy1RfV6o4v%2BwkWyE0yuRS0ZDLMuATVHx%2BMhuZdQ%3D&reserved=0/>) for the specific student learning outcomes for this program.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

A grade of B or higher is required in all course work.

Code	Title	Hours
<b>Exercise Science</b>		
EXSC 5200	Cardiopulmonary Physiology	3
EXSC 5210	Physical Activity and Exercise: Prescription, Measurement, and Testing	3
EXSC 5220	Advanced Exercise Physiology	3
EXSC 5230	Physical Activity and Exercise: Effects on Musculoskeletal Health and Disease	3
EXSC 6202	Electrocardiography, Clinical Assessment, and Prescription	3
<b>Public Health</b>		
PHTH 5540	Health Education and Program Planning	3
PHTH 6208	Urban Community Health Assessment	3
<b>Research</b>		
PHTH 5202	Introduction to Epidemiology	3
PHTH 5210	Biostatistics in Public Health	3
EXSC 6400	Applied Research Methods	3

### Electives

Code	Title	Hours
Complete 6 semester hours from the following: <sup>1</sup>		6
HSCI 5230	Clinical Nutrition Applications in Health and Disease	
EXSC 5000 to EXSC 6402		
PHTH 5000 to PHTH 6800		

### Program Credit/GPA Requirement

36 total semester hours required  
Minimum 3.000 GPA required

<sup>1</sup> Students may choose two courses within one of three areas (public health, practice-based, and research-based) to deepen their knowledge and competency within that area.

### Health Data Analytics, MS

The digitization of healthcare systems in clinical settings, in combination with the explosion of personal data collection devices, provides the opportunity of using data for revolutionizing approaches to care at all levels with an emphasis on precision medicine and person-centered



care. The ability to take advantage of this “Big Data” opportunity, however, requires expertise at the intersection of health informatics, data science, and computational modeling. The Master of Science in Health Data Analytics is designed to prepare students to succeed in this emerging field. This program offers a strong, competency-based curriculum that addresses data analytics ranging from data acquisition from traditional and emerging data streams, data aggregation methods, data mining algorithms, predictive computational modeling, and visualization techniques. Students can expect to amass a broad and deep understanding of the various methods, software tools, and topical expertise needed to discover meaningful patterns in health-related data and effectively communicate their implications to a number of diverse stakeholders. Successful graduates of the Master of Science in Health Data Analytics will be effective practitioners and leaders in the rapidly developing domain of data analytics with a focus on health and healthcare.

The interdisciplinary Master of Science in Health Data Analytics consists of 12 courses, drawn from the Khoury College of Computer Sciences and the Bouvé College of Health Science; a capstone project; and an ongoing series of seminars on topics in health data analytics. Two tracks will be available to matriculating students: standard and research based.

### LEARNING OUTCOMES

- Proficiency in the health and healthcare ecosystem, including stakeholder roles such as payers, providers, and government; social determinants of health; wellness promotion; acute vs. chronic care
- Ability to acquire, store, and validate data; familiarity with common health-related data sources and formats
- Proficiency in analyzing data using statistical, epidemiological, and data-mining methods along with appropriate software tools and programming languages
- Ability to interpret and present analytical results to nontechnical stakeholders using visualization and accessible narrative structures

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirements

Code	Title	Hours
<b>Analytics/Modeling/Statistics</b>		
DA 5020	Collecting, Storing, and Retrieving Data	4
DA 5030	Introduction to Data Mining/Machine Learning	4
HINF 6400	Introduction to Health Data Analytics	3
INSH 5301	Introduction to Computational Statistics	4
INSH 5302	Information Design and Visual Analytics	4
<b>Healthcare</b>		
HINF 5102	Data Management in Healthcare	3
HINF 5105	The American Healthcare System	3
HINF 6500	Predictive Analytics and Modeling	3

#### Thesis/Capstone

Code	Title	Hours
Complete either Thesis or Capstone:		
3		
<i>Thesis</i>		
HINF 6700	Health Informatics Thesis	3

<i>Capstone</i>	
HINF 7701	Health Informatics Capstone Project

### Electives

At least one course must be chosen from the methods list.

Code	Title	Hours
<b>Methods</b>		
Complete 3–6 semester hours from the following:		3-6
PHTH 6202	Intermediate Epidemiology	
PHTH 6210	Applied Regression Analysis	
PHTH 6440	Advanced Methods in Biostatistics	
CS 6350	Empirical Research Methods	
CAEP 7712	Intermediate Statistical Data Analysis Techniques	
CAEP 7716	Advanced Research and Data Analyses 2	

### Other Electives

Complete 0–4 semester hours from the following:		0-4
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 6320	Design of Information-Rich Environments	
HINF 5200	Theoretical Foundations in Personal Health Informatics	
HINF 5300	Personal Health Interface Design and Development	
HINF 6215	Project Management	
HINF 6220	Database Design, Access, Modeling, and Security	
PHTH 5226	Strategic Management and Leadership in Healthcare	
PHTH 5232	Evaluating Healthcare Quality	
PHTH 5234	Economic Perspectives on Health Policy	

### Program Credit/GPA Requirements

37 total semester hours required

Minimum 3.000 GPA required

### Health Informatics, MS

Northeastern’s interdisciplinary Master of Science in Health Informatics was the first MS in the field. The program seeks to prepare students to address the combined clinical, technical, and business needs of health-related professionals. Successful students graduate with the knowledge of how technology, people, health, and the healthcare system interrelate; the ability to use technology and information management to improve healthcare delivery and outcomes; and the skills to communicate effectively among healthcare practitioners, administrators, and information technology professionals.

With approval from the health informatics program director, selected students can substitute one course from the Graduate Certificate in Data Analytics for a technical core requirement in the MS in Health Informatics degree, and up to two more courses from the Graduate Certificate in Data Analytics can be counted as electives for the MS in Health Informatics degree.

Northeastern also offers graduate certificate programs in health informatics. Three certificate programs enable you to choose the one that addresses your specific goals. These programs are listed separately in this catalog:

- Graduate Certificate in Health Informatics Management and Exchange
- Graduate Certificate in Health Informatics Privacy and Security
- Graduate Certificate in Health Informatics Software Engineering

Courses in the certificate program also apply toward master's degree requirements. This gives you the flexibility to complete a certificate and be well on your way to earning a degree if you decide later to continue your education.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

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

Code	Title	Hours
<b>Required Core</b>		
HINF 5101	Introduction to Health Informatics and Health Information Systems	3
HINF 5105	The American Healthcare System	3
HINF 7701	Health Informatics Capstone Project	3
<b>Business Management</b>		
Complete two courses from the following:		6
HINF 6201	Organizational Behavior, Work Flow Design, and Change Management	
HINF 6202	Business of Healthcare Informatics	
HINF 6215	Project Management	
HINF 6335	Management Issues in Healthcare Information Technology	
HINF 6240	Improving the Patient Experience through Informatics	
PHTH 5226	Strategic Management and Leadership in Healthcare	
<b>Health Informatics</b>		
Complete two courses from the following:		6
HINF 5102	Data Management in Healthcare	
HINF 5110	Global Health Information Management	
HINF 5200	Theoretical Foundations in Personal Health Informatics	
HINF 6205	Creation and Application of Medical Knowledge	
HINF 6350	Public Health Surveillance and Informatics	
HINF 6404	Patient Engagement Informatics and Analytics	
HINF 6405	Quantifying the Value of Informatics	
PHTH 5232	Evaluating Healthcare Quality	
<b>Technical</b>		
Complete two courses from the following:		6

HINF 6220	Database Design, Access, Modeling, and Security
HINF 6355	Key Standards in Health Informatics Systems
HINF 6400	Introduction to Health Data Analytics
PHTH 5202	Introduction to Epidemiology
PHTH 5210	Biostatistics in Public Health
PHTH 6210	Applied Regression Analysis
PHTH 6400	Principles of Population Health 1
PHTH 6440	Advanced Methods in Biostatistics
One course from the following may count toward the technical core requirement:	
DA 5020	Collecting, Storing, and Retrieving Data
DA 5030	Introduction to Data Mining/Machine Learning
INSH 5301	Introduction to Computational Statistics
INSH 5302	Information Design and Visual Analytics

### Electives

Code	Title	Hours
Complete two courses from the following. Any course not taken to complete a core requirement may be taken as an elective.		6
HINF 6345	Design for Usability in Healthcare	
DA 5020	Collecting, Storing, and Retrieving Data	
DA 5030	Introduction to Data Mining/Machine Learning	
INSH 5301	Introduction to Computational Statistics	
INSH 5302	Information Design and Visual Analytics	

### Program Credit/GPA Requirements

Minimum 33 total semester hours required

Minimum 3.000 GPA required

## Pharmacy and Public Health, PharmD/MPH

The School of Pharmacy and the Department of Health Sciences offer a combined Doctor of Pharmacy (PharmD) and Master of Public Health (MPH) program.

The combined PharmD/MPH program recognizes and reinforces the importance of public health in pharmacy practice. Central to addressing public health concerns, and in particular those associated with racial and ethnic health disparities, the program is committed to building a strong, diverse, and activist public health workforce. The goal of the program is to graduate professionals who are well educated in the complex issues associated with disparate health status and healthcare access. The combined PharmD/MPH program allows qualified and interested students an opportunity to achieve their goal of obtaining a more robust understanding of public health through an MPH degree while also completing their PharmD.

Refer to the School of Pharmacy PharmD – Direct Entry (p. 281) and Department of Health Sciences Master of Public Health (p. 255) pages of this catalog for program requirements and technical standards. Students must adhere to all PharmD and MPH program

standards, policies, and requirements as listed in the catalog, unless otherwise specified.

The Northeastern University Master of Public Health Program is accredited by the Council on Education for Public Health (CEPH). CEPH is an independent agency recognized by the U.S. Department of Education to accredit schools of public health and public health programs outside of schools of public health.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

#### DOCTOR OF PHARMACY REQUIREMENTS

Code	Title	Hours
<b>Social / Administrative Pharmacy Sciences</b>		
PHMD 2350	Healthcare Systems	3
PHMD 5223	Evidence-Based Medicine	2
PHMD 5250	Pharmacy Care Management	3
PHMD 5330	Jurisprudence	3
<b>Pharmaceutical Sciences</b>		
PHSC 2330	Immunology	3
PHSC 3411	Pharmaceutics 1	4
PHSC 3412	Pharmaceutics 2	4
PHSC 3419	Pharmaceutics Laboratory	1
PHSC 3430	Pharmacokinetics and Biopharmaceutics	3
PHSC 5360	Anti-Infectives	4
PHSC 4501	Pharmacology/Medicinal Chemistry 1	5
PHSC 4502	Pharmacology/Medicinal Chemistry 2	5
<b>Pharmacy Practice</b>		
PHMD 4611	Comprehensive Disease Management 1	6
PHMD 4612	Comprehensive Disease Management 1 Seminar	1
PHMD 4621	Comprehensive Disease Management 2	6
PHMD 4622	Comprehensive Disease Management 2 Seminar	1
PHMD 4623	Comprehensive Disease Management 2 Skills Lab	0.5
PHMD 4631	Comprehensive Disease Management 3	6
PHMD 4632	Comprehensive Disease Management 3 Seminar	1
PHMD 4633	Comprehensive Disease Management 3 Skills Lab	0.5
PHMD 4641	Comprehensive Disease Management 4	6
PHMD 4642	Comprehensive Disease Management 4 Seminar	1
PHMD 4643	Comprehensive Disease Management 4 Skills Lab	0.5
PHMD 1201	Introduction to Pharmacy Practice	2.5
PHMD 1202	Lab for PHMD 1201	0.5
PHMD 2310	Professional Communication in Pharmacy Practice	2
PHMD 2311	Lab for PHMD 2310	0.5
PHMD 5270	Economic Evaluation of Pharmaceuticals and Pharmacy Practice	2

PHMD 5450	Advanced Pharmacy Practice Experience Preparatory Seminar	1
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#### Required Practice Experience

Complete at least 2 semesters of Introductory Pharmacy Practice Experience / Co-op to meet program requirements	
Complete 36 semester hours of advanced pharmacy practice experience (APPE). The first three APPEs may not include PHMD 6453, PHMD 6457, or PHMD 6473.	36
PHMD 6440 to PHMD 6474	

#### MASTER OF PUBLIC HEALTH REQUIREMENTS

Code	Title	Hours
<b>A grade of B- or higher is required in each required MPH course.</b>		
<b>Required Core</b>		
PHTH 5202	Introduction to Epidemiology	3
PHTH 5210	Biostatistics in Public Health	3
PHTH 5212	Public Health Administration and Policy	3
PHTH 5214	Environmental Health	3
PHTH 5540	Health Education and Program Planning	3
PHTH 6204	Society, Behavior, and Health	3
<b>Urban Health</b>		
PHTH 5120	Race, Ethnicity, and Health in the United States	3
PHTH 6200	Principles and History of Urban Health	3
PHTH 6208	Urban Community Health Assessment	3
<b>Practicum</b>		
PHTH 6966	Practicum	3

#### Electives

Code	Title	Hours
Please visit the Electives lists of the Doctor of Pharmacy - Direct Entry or Master of Public Health programs. You may complete electives from another discipline in consultation with your advisor.		9
Doctor of Pharmacy -Direct Entry (p. 281)		
Master of Public Health (p. )		

#### Capstone

Code	Title	Hours
This capstone will satisfy the capstone requirement for both programs.		
PHTH 6910	Public Health Capstone	3

#### Program Credit/GPA Requirements

156 total semester hours required  
Minimum 3.000 GPA required

#### Physician Assistant Studies and Public Health, MS/MPH

The Northeastern University Physician Assistant (PA) Program and Department of Health Sciences offer a combined Master of Science in Physician Assistant Studies (MS)/Master of Public Health (MPH). The combined PA/MPH program allows qualified and interested students an opportunity to achieve their goal of obtaining a more robust

understanding of public health through an MPH degree, while also completing their Master of Science in Physician Assistant Studies.

The Northeastern University Master of Public Health program is accredited by the Council on Education for Public Health (CEPH) (<https://nam05.safelinks.protection.outlook.com/?url=https%3A%2F%2Fceph.org%2F&data=02%7C01%7Ch.daly%40northeastern.edu%7C444b8329a5cc4e32422d08d6a3f8602d%7Ca8eec281aaa34daec9b9a398b9215e7%7C0%7C63687668449376408&amncdata=TTIfa7D71ccR7CFR72mf4rVlIwVlIDh%2B3f5nKvOeY0%3D&reserved=0/>). CEPH is an independent agency recognized by the U.S. Department of Education to accredit schools of public health and public health programs outside of schools of public health. The MPH program has a strong commitment to providing a flexible course of study for working professionals. This flexibility allows for easy incorporation into a dual-degree program.

The combined degree that incorporates both programs is designed to help diversify the public health workforce and improve graduates' ability to approach clinical situations with cultural sensitivity and awareness. Successful graduates of the program benefit from having a greater understanding of public health issues in clinical practice, including the racial and ethnic health disparities prevalent in the U.S. healthcare system, as well as a strong grounding in epidemiology, quantitative and qualitative research methods, and the use of scientific evidence, skills critical to many fields of healthcare practice.

This dual degree takes a total of three years to complete (as opposed to four, if each degree were pursued separately), and a total number of 12 credits are shared between both degrees.

For more information, including the application and admissions process, please visit the PA/MPH website here (<https://bouve.northeastern.edu/health-sciences/programs/pa-mp/>).

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Physician Assistant Requirements

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

Code	Title	Hours
<b>Required Core</b>		
PA 6208	Professional Issues for Physician Assistants	2
PA 6326	Aspects of Primary Care	4
PA 6327	Emergency Medicine and Critical Care	2
PA 6328	Aging and Rehabilitation Medicine	2
<b>Anatomy and Physiology</b>		
PA 6200	Anatomy and Physiology 1	3
PA 6201	Anatomy and Physiology 2	3
<b>Diagnosis and Evaluation</b>		
PA 6203	Physical Diagnosis and Patient Evaluation 1	3
PA 6204	Physical Diagnosis and Patient Evaluation 2	3
PA 6207	Clinical Laboratory and Diagnostic Methods	4
PA 6323	Clinical Neurology	2
<b>Pharmacology</b>		
PA 6205	Pharmacology 1	2
PA 6206	Pharmacology 2	2

### Principles

PA 6311	Principles of Medicine 1	4
PA 6312	Principles of Medicine 2	4
PA 6313	Principles of Medicine 3	4
PA 6320	Principles of Obstetrics and Gynecology	2
PA 6321	Principles of Surgery	2
PA 6322	Principles of Orthopedics	2
PA 6324	Principles of Pediatrics	2
PA 6325	Principles of Psychiatry	2
<b>Clinical</b>		
PA 6400	Applied Study in Medicine	5
PA 6401	Applied Study in Ambulatory Medicine	5
PA 6402	Applied Study in Family Practice	5
PA 6403	Applied Study in Emergency Medicine	5
PA 6404	Applied Study in Obstetrics and Gynecology	5
PA 6405	Applied Study in Pediatrics	5
PA 6406	Applied Study in Surgery	5
PA 6407	Applied Study in Mental Health	5

### Master of Public Health Requirements

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

Code	Title	Hours
<b>Required Core</b>		
PHTH 5202	Introduction to Epidemiology	3
PHTH 5210	Biostatistics in Public Health	3
PHTH 5212	Public Health Administration and Policy	3
PHTH 5214	Environmental Health	3
PHTH 5232	Evaluating Healthcare Quality	3
PHTH 5540	Health Education and Program Planning	3
PHTH 6204	Society, Behavior, and Health	3
<b>Urban Health</b>		
PHTH 5120	Race, Ethnicity, and Health in the United States	3
PHTH 6200	Principles and History of Urban Health	3
PHTH 6208	Urban Community Health Assessment	3
<b>Practicum</b>		
PHTH 6966	Practicum	3
<b>Capstone</b>		
PHTH 6910	Public Health Capstone	3
<b>Elective</b>		
Complete 3 semester hours of approved elective course work.		3

### Program Credit/GPA Requirements

133 total semester hours required  
Minimum 3.000 GPA required

## Public Health and Exercise Science with Concentration in Physical Activity and Public Health, MPH/MS

Website (<https://bouve.northeastern.edu/health-sciences/programs/ms-exercise-science-mp/>)

The Department of Health Sciences at Northeastern University offers a combined Master of Public Health (MPH)/ Master of Science in Exercise Science (EXSC). This dual-degree program allows qualified students to achieve their goal of obtaining a more robust understanding of public health through an MPH degree while also completing their master's in exercise science. Course work consists of advanced physiology, such as musculoskeletal and cardiopulmonary systems, and the assessment and prescription of exercise and physical activity in the context of the social determinants of health. Graduates of the program will benefit from having a greater understanding of public health issues in the fields of exercise and physical activity in order to better design exercise prescription programs in the healthcare industry that aim to improve the health of individuals and communities.

The Northeastern University Master of Public Health program is accredited by the Council on Education for Public Health (CEPH) (<https://nam05.safelinks.protection.outlook.com?url=https%3A%2F%2Fceph.org%2F&data=02%7C01%7Ch.daly%40northeastern.edu%7C444b8329a5cc4e32422d08d6a3f8602d%7Ca8eec281aaa34daec9b9a398b9215e7%7C0%7C636876684493975408&open=1&type=url&context=mailto%3A%2F%2Fceph.org%2F&reserved=0/>). CEPH is an independent agency recognized by the U.S. Department of Education to accredit schools of public health and public health programs outside of schools of public health.

### Program Requirements

#### Public Health Requirements

A grade of B- or higher is required in all course work.

Code	Title	Hours
<b>Public Health</b>		
PHTH 5202	Introduction to Epidemiology	3
PHTH 5210	Biostatistics in Public Health	3
PHTH 5212	Public Health Administration and Policy	3
PHTH 5214	Environmental Health	3
PHTH 5540	Health Education and Program Planning	3
PHTH 6204	Society, Behavior, and Health	3
<b>Urban Health</b>		
PHTH 5120	Race, Ethnicity, and Health in the United States	3
PHTH 6200	Principles and History of Urban Health	3
PHTH 6208	Urban Community Health Assessment	3
<b>Practicum</b>		
PHTH 6966	Practicum	3
<b>Capstone</b>		
PHTH 6910	Public Health Capstone	3

#### Exercise Science Requirements

A grade of B or higher is required in all course work.

Code	Title	Hours
<b>Physiology</b>		
EXSC 5200	Cardiopulmonary Physiology	3
EXSC 5220	Advanced Exercise Physiology	3
EXSC 5230	Physical Activity and Exercise: Effects on Musculoskeletal Health and Disease	3
<b>Assessment and Prescription</b>		
EXSC 5210	Physical Activity and Exercise: Prescription, Measurement, and Testing	3

EXSC 6202	Electrocardiography, Clinical Assessment, and Prescription	3
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Research		
EXSC 6400	Applied Research Methods	3

#### Elective

Code	Title	Hours
Complete one of the following:		
HINF 6240	Improving the Patient Experience through Informatics	3
HSCI 5230	Clinical Nutrition Applications in Health and Disease	
PHTH 5230	Global Health	
PHTH 6320	Qualitative Methods in Health and Illness	

#### Program Credit/GPA Requirement

Minimum 3.000 GPA required

#### Plan of Study

Year 1					
Fall	Hours	Spring	Hours	Summer 1	Hours
EXSC 5210	3	EXSC 5220	3	PHTH 5540	3
PHTH 5210	3	EXSC 6202	3	PHTH 6208	3
PHTH 5212	3	PHTH 5120	3		
PHTH 6204	3	PHTH 5202	3		
		12			6
Year 2					
Fall	Hours	Spring	Hours		
EXSC 5200	3	EXSC 6400	3		
EXSC 5230	3	PHTH 5214	3		
PHTH 6200	3	PHTH 6910	3		
PHTH 6966	3	Approved MPH or EXSC elective	3		
		12			12

Total Hours: 54

#### Public Health and Health Informatics, MPH/MS

Website (<https://bouve.northeastern.edu/health-sciences/programs/ms-hinf-mph/>)

The Master of Public Health (MPH) and Master of Science in Health Informatics (MSHI) combined program allows qualified and interested students to prepare to lead healthcare at the nexus between public health and health informatics. Graduates of this program will be well-educated in the complex issues associated with improvements in information technology, as well as changes to the public health and healthcare delivery systems. Recognizing the increasing overlap between health informatics and public health, this program incorporates course work from both the MPH and MSHI curricula for both degrees, reducing tuition costs and saving one year of study compared to obtaining both degrees individually.

The Northeastern University Master of Public Health program is accredited by the Council on Education for Public Health (CEPH). CEPH is an independent agency recognized by the U.S. Department of Education to accredit schools of public health and public health programs outside of schools of public health.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

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

### Public Health Requirements

Code	Title	Hours
<b>Required Core</b>		
PHTH 5202	Introduction to Epidemiology	3
PHTH 5210	Biostatistics in Public Health	3
PHTH 5212	Public Health Administration and Policy	3
PHTH 5214	Environmental Health	3
PHTH 5540	Health Education and Program Planning	3
or PPUA 6509	Techniques of Program Evaluation	
PHTH 6204	Society, Behavior, and Health	3
<b>Urban Health</b>		
PHTH 5120	Race, Ethnicity, and Health in the United States	3
PHTH 6200	Principles and History of Urban Health	3
PHTH 6208	Urban Community Health Assessment	3

### Health Informatics Requirements

Code	Title	Hours
<b>Required Core</b>		
HINF 5101	Introduction to Health Informatics and Health Information Systems	3
HINF 6220	Database Design, Access, Modeling, and Security	3
HINF 6240	Improving the Patient Experience through Informatics	3
HINF 6355	Key Standards in Health Informatics Systems	3
HINF 6405	Quantifying the Value of Informatics	3

### Capstone and Practicum

Code	Title	Hours
PHTH 6910	Public Health Capstone	3
PHTH 6966	Practicum	3

### Electives

Code	Title	Hours
Complete three of the following, with at least one course completed from each group:		
<b>Group 1</b>		
HINF 6201	Organizational Behavior, Work Flow Design, and Change Management	
HINF 6202	Business of Healthcare Informatics	
HINF 6215	Project Management	
<b>Group 2</b>		

PHTH 5226	Strategic Management and Leadership in Healthcare
PHTH 5232	Evaluating Healthcare Quality
HINF 6404	Patient Engagement Informatics and Analytics

### Program Credit/GPA Requirements

57 total semester hours required

Minimum 3.000 GPA required

### Exercise Science for Clinicians, Graduate Certificate

The Department of Health Sciences offers a Graduate Certificate in Exercise Science for Clinicians. Exercise training has been shown to be of therapeutic benefit to patients who have chronic diseases, including but not limited to cardiovascular disease, pulmonary disease, and metabolic disorders. Supervised exercises are commonly performed in a variety of settings including hospitals, outpatient clinics, physician's offices, university laboratories, or hospital-based research facilities. Exercise physiologists work in the above settings to create, implement, and evaluate exercise programs. Clinicians, such as physicians and nurses, work with exercise physiologists to prescribe individualized exercise to meet the specific clinical needs of their patients. Understanding the benefits of exercise, and how exercise plays a role in health promotion and disease prevention/intervention, is only a small part of traditional training of physicians and nurses. This Graduate Certificate in Exercise Science for Clinicians bridges the knowledge gap between the medical field and the exercise field. Additionally, the program helps clinicians understand the role of exercise as a proven, powerful medicine and a readily available therapy that has demonstrated a high therapeutic effect in a number of chronic disease states, with little to no side effects.

An important feature:

The curriculum includes course work and experiential learning opportunities for students to develop well-rounded knowledge of the role of physical activity and exercise on health and disease prevention/intervention. It covers knowledge of exercise physiology and exercise testing, assessment, and prescription, all of which are major domains of job tasks for a clinical exercise physiologist required by the American College of Sports Medicine (ACSM).

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirements

Code	Title	Hours
<b>Advanced Physiology</b>		
EXSC 5200	Cardiopulmonary Physiology	3
EXSC 5220	Advanced Exercise Physiology	3
<b>Assessment and Prescription</b>		
EXSC 5210	Physical Activity and Exercise: Prescription, Measurement, and Testing	3
EXSC 6202	Electrocardiography, Clinical Assessment, and Prescription	3

#### Internship

Complete the following (repeatable) course twice:		
EXSC 6300	Internship in Exercise Science	6

## Elective

Code	Title	Hours
	Complete 3 semester hours of electives with approval of program director.	3

## Program Credit/GPA Requirements

21 total semester hours required  
Minimum 3.000 GPA required

### Health Informatics Management and Exchange, Graduate Certificate

The certificate program in health informatics management and exchange offers you the opportunity to obtain the knowledge needed to support the collection, management, retrieval, and exchange of electronic health data. It is designed to prepare you for a position as a specialist in data management, interoperability standards, and health database design.

- Eight-month program
- Five courses, 15 semester hours

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

A grade of B– or higher is required in all course work.

Code	Title	Hours
<b>Required Core</b>		
HINF 5101	Introduction to Health Informatics and Health Information Systems	3
HINF 5102	Data Management in Healthcare	3
<b>Management and Exchange</b>		
HINF 6205	Creation and Application of Medical Knowledge	3
HINF 6220	Database Design, Access, Modeling, and Security	3
HINF 6355	Key Standards in Health Informatics Systems	3

## Program Credit/GPA Requirements

15 total semester hours required  
Minimum 3.000 GPA required

### Health Informatics Privacy and Security, Graduate Certificate

The certificate program in health informatics privacy and security combines knowledge of health informatics with a strong foundation in important information security issues. Northeastern's status as a National Security Agency Center of Excellence for Information Security Education and Research ensures the program is both relevant and of high academic quality.

- Eight-month program
- Five courses, 18 semester hours

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

A grade of B– or higher is required in all course work.

Code	Title	Hours
<b>Required Core</b>		
HINF 5101	Introduction to Health Informatics and Health Information Systems	3
HINF 5102	Data Management in Healthcare	3
<b>Privacy and Security</b>		
CY 5130	Computer System Security	4
CY 5150	Network Security Practices	4
CY 5200	Security Risk Management and Assessment	4

## Program Credit/GPA Requirements

18 total semester hours required  
Minimum 3.000 GPA required

### Health Informatics Software Engineering, Graduate Certificate

This certificate program offers software engineers the background in health informatics (as well as interchange and interoperability standards) needed to better understand the context in which they work and perform effectively in a health-related organization. Program design is flexible to allow completion on a rapid schedule or a slower pace that is more compatible with full-time workers.

- Eight-month program
- Five courses, 15 semester hours

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

A grade of B– or higher is required in all course work.

Code	Title	Hours
<b>Required Core</b>		
HINF 5101	Introduction to Health Informatics and Health Information Systems	3
HINF 5102	Data Management in Healthcare	3
<b>Management and Exchange</b>		
HINF 6205	Creation and Application of Medical Knowledge	3
HINF 6345	Design for Usability in Healthcare	3
HINF 6355	Key Standards in Health Informatics Systems	3

## Program Credit/GPA Requirements

15 total semester hours required  
Minimum 3.000 GPA required

### School of Nursing

Website (<https://bouve.northeastern.edu/nursing/>)

**Rhonda M. Board, PhD, RN, CCRN**

Interim Dean and Associate Professor, School of Nursing

Associate Dean, Bouvé College of Health Sciences

### Janet Rico, MBA, NP-BC, PhD

Associate Clinical Professor and Assistant Dean of Graduate Nursing Programs

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This is an exciting time in healthcare, and nursing plays a pivotal role in the transformation of our healthcare system. Northeastern University School of Nursing offers multiple options for graduate study, including master's, Doctor of Nursing Practice, and PhD degree programs, as well as Certificate of Advanced Graduate Study programs, that prepare outstanding clinicians, leaders, scholars, educators, and policymakers. These programs leverage the school's renowned faculty, as well as exceptional clinical practicum sites. Our reputation is why our graduates are sought by top employers. Practicing advanced practice nurses may easily change their specialty area by enrolling in one of our Certificate of Advanced Graduate Study programs in adult primary or acute, pediatric primary or acute, mental health, or anesthesia practice.

The Doctor of Nursing Practice (DNP) program is a practice-oriented degree designed to prepare advanced nurses at the highest level of scholarly practice. Keeping pace with the demands of today's changing healthcare environment requires clinical experts who have the knowledge and skills to be effective change agents. Graduates of our post-master's DNP program assume clinical and leadership positions as advanced nurses in a variety of roles, including clinical experts, nurse executives, community leaders, and professional organization leaders.

The PhD program in nursing prepares research scientists, educators, and leaders who seek to improve health and healthcare across the life span with an emphasis on urban, vulnerable, and underserved populations. Graduates are expected to lead research initiatives that advance nursing science through knowledge development and interdisciplinary scholarly inquiry.

Further information about the degrees and specializations can be found at each program's page of this catalog.

## Programs

### Doctor of Philosophy (PhD)

- Nursing (Post-BSN) (p. 264)
- Nursing—Advanced Entry (Post-MSN) (p. 265)

### Doctor of Nursing Practice (DNP)

- Doctor of Nursing Practice (Post-Master's) (p. 266)
- Nursing Practice with Concentration in Nurse Anesthesia (p. 266)

### Certificate of Advanced Graduate Study (CAGS)

- Adult-Gerontology Nurse Practitioner, Acute Care (p. 267)
- Psychiatric Mental Health Nurse Practitioner (p. 268)
- Neonatal Nurse Practitioner (p. 268)
- Pediatric Nurse Practitioner, Acute Care (p. 268)
- Pediatric Nurse Practitioner, Acute and Primary Care (p. 269)
- Pediatric Nurse Practitioner, Primary Care (p. 269)
- Adult-Gerontology Nurse Practitioner, Primary Care (p. 267)

### Master of Science (MS)

- Nursing—Adult-Gerontology Nurse Practitioner, Acute Care (p. 270)
- Nursing—Psychiatric Mental Health Nurse Practitioner (p. 273)

- Nursing—Neonatal Nurse Practitioner (p. 271)
- Nursing—Pediatric Nurse Practitioner, Acute and Primary Care (p. 272)
- Nursing—Pediatric Nurse Practitioner, Primary Care (p. 272)
- Nursing—Adult-Gerontology Nurse Practitioner, Primary Care (p. 270)
- Nursing—Family Nurse Practitioner, Primary Care (p. 271)
- Nursing—Direct Entry (p. 273)

## Graduate Certificate

- Nursing Informatics (p. 276)

## Nursing, PhD (Post-BSN)

### Overview

#### Research

The (post-BSN) PhD program in nursing prepares research scientists, educators, and leaders who seek to improve health and healthcare across the life span with an emphasis on urban, vulnerable, and underserved populations. Graduates are expected to lead research initiatives that advance nursing science through knowledge development and interdisciplinary scholarly inquiry.

Students will study with nursing faculty whose research addresses questions that extend across a broad health spectrum, including health promotion, risk prevention, and self-management of chronic conditions. Collectively, the faculty have a variety of expertise and interests, such as health issues of women, children, and families; HIV; cancer; mental health; depression; and substance use.

In addition, students will have an opportunity to study with faculty from other Northeastern departments as well as with other Boston-area researchers. This collaboration allows students to work across disciplines and to access populations and sites essential for completing a dissertation. Visit the Northeastern University Faculty Research site (<http://www.northeastern.edu/research/faculty-research/>) for more information.

Please visit Bouvé College Learning Outcomes for the specific student learning outcomes for this program.

### Program Requirements

#### Bachelor's Degree Entrance

A bachelor's degree in nursing is preferred. Complete all courses and requirements listed below unless otherwise indicated.

#### Milestones

Annual reviews  
Comprehensive examination  
Dissertation committee  
Dissertation proposal  
Dissertation defense

### Core Requirements

A grade of B or higher is required in all course work.

Code	Title	Hours
<b>Required Core</b>		
NRSNG 7104	Foundations in Nursing Research	3
NRSNG 7700	The Science of Nursing	3



NRSG 7705	Theoretical and Conceptual Foundations in Nursing Science	3
NRSG 7715	Measurement in Clinical Research	3
NRSG 7750	Healthcare of Urban Populations	3

**Statistics**

PHTH 5210	Biostatistics in Public Health	3
NRSG 5121	Epidemiology and Population Health	3
PHTH 6210	Applied Regression Analysis	3

**Research**

NRSG 7709	Qualitative Research Methods	3
NRSG 7712	Quantitative Research Methods	3
NRSG 7755	Intervention Research: Development, Implementation, and Evaluation	3
NRSG 7770	Research Colloquium	1

Complete the following (repeatable) course twice: 6

NRSG 9984 Research

**Cognate Courses**<sup>1</sup>

Complete two cognate courses in consultation with your faculty advisor. 6

**Electives**

Code	Title	Hours
Complete two elective courses in consultation with your faculty advisor.		6

**Dissertation**

Code	Title	Hours
NRSG 9845	Dissertation Seminar 1	3
NRSG 9846	Dissertation Seminar 2	3
Complete the following (repeatable) course twice:		2
NRSG 9990	Dissertation	

**Program Credit/GPA Requirements**

60 total semester hours required

Minimum 3.000 GPA required

<sup>1</sup> Cognates are graduate-level courses that are taken outside of nursing. These courses should provide depth and breadth to the student's dissertation research.

<sup>2</sup> Electives may be taken in nursing or in an area related to the student's dissertation research, including appropriate methodology and statistics courses.

**Nursing, PhD—Advanced Entry (Post-MSN)**

The advanced entry (Post-MSN) PhD program in nursing prepares research scientists, educators, and leaders who seek to improve health and healthcare across the life span with an emphasis on urban, vulnerable, and underserved populations. Graduates are expected to lead research initiatives that advance nursing science through knowledge development and interdisciplinary scholarly inquiry.

Students will study with nursing faculty whose research addresses questions that extend across a broad health spectrum, including health promotion, risk prevention, and self-management of chronic conditions. Collectively, the faculty have a variety of expertise and interests, such as health issues of women, children, and families; HIV; cancer; mental health; depression; and substance use.

In addition, students will have an opportunity to study with faculty from other Northeastern departments, as well as with other Boston-area researchers. This collaboration allows students to work across disciplines and to access populations and sites essential for completing a dissertation. Visit the Northeastern University Faculty Research site (<http://www.northeastern.edu/research/faculty-research/>) for more information.

Please visit Bouvé College Learning Outcomes for the specific student learning outcomes for this program.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Milestones**

Annual reviews  
Comprehensive examination  
Dissertation proposal  
Dissertation defense

**Core Requirements**

A grade of B or higher is required in all course work.

Code	Title	Hours
<b>Required Core</b>		
NRSG 7700	The Science of Nursing	3
NRSG 7705	Theoretical and Conceptual Foundations in Nursing Science	3
NRSG 7750	Healthcare of Urban Populations	3
<b>Statistics</b>		
PHTH 5210	Biostatistics in Public Health	3
PHTH 6210	Applied Regression Analysis	3
<b>Cognate Courses</b> <sup>1</sup>		
Complete two cognate courses in consultation with your faculty advisor.		6
<b>Research</b>		
NRSG 7709	Qualitative Research Methods	3
NRSG 7712	Quantitative Research Methods	3
NRSG 7715	Measurement in Clinical Research	3
NRSG 7755	Intervention Research: Development, Implementation, and Evaluation	3
NRSG 7770	Research Colloquium	1
Complete the following (repeatable) course twice:		6
NRSG 9984	Research	

**Dissertation Courses**

Code	Title	Hours
NRSG 9845	Dissertation Seminar 1	3
NRSG 9846	Dissertation Seminar 2	3
Complete the following (repeatable) course twice:		2
NRSG 9990	Dissertation	

**Program Credit/GPA Requirements**

48 total semester hours required

Minimum 3.000 GPA required

<sup>1</sup> Cognates are graduate-level courses that are taken outside of nursing and should provide depth and breadth to the student's area of interest.

## Nursing Practice, DNP (Post-Master's)

The Doctor of Nursing Practice (DNP) is a practice-oriented degree designed to prepare advanced nurses at the highest level of scholarly practice. Keeping pace with the demands of today's changing healthcare environment requires clinical experts who have the knowledge and skills to be effective change agents. Graduates of our post-master's DNP program assume clinical and leadership positions as advanced nurses in a variety of roles including clinical experts, nurse executives, community leaders, and professional organization leaders.

The Northeastern University post-master's DNP program includes advanced course work in leadership, practice inquiry, population health, informatics, and health policy. Our goal is to prepare the next generation of nurse leaders with a greater breadth of expertise so they can collaborate more effectively with interprofessional partners and provide leadership to enhance quality and safety. The DNP program curriculum is delivered online in an executive model hybrid format.

If you are a registered nurse with at least two years of active advanced nursing experience, you may enter the DNP program after completing a master's degree in nursing or, in some cases, a related health field. A DNP Scholarly Project and 1,000 scholarly practice hours are required for program completion. A gap analysis upon admission will determine how many, if any, practice hours from a previously completed Master of Science in Nursing practicum qualify toward this practice hour requirement. An ePortfolio is used to document all scholarly practice hours and DNP program achievements.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

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

Code	Title	Hours
<b>Required Core</b>		
NRSG 6300	Healthcare Finance and Marketing	3
NRSG 6306	Health Informatics	3
NRSG 7100	Leadership in Advanced Practice Nursing	3
NRSG 7924	Applied Epidemiology for Advanced Nursing	3
NRSG 7925	Health Policy and Advocacy	3
<b>Project</b>		
NRSG 7920	The Steps to Practice Inquiry: Analyze, Evaluate, Synthesize, and Apply the Evidence	3
NRSG 7921	DNP Scholarly Project 1: Design and Ethical Consideration of Practice Application	3
NRSG 7922	DNP Scholarly Project 2: Applying Practice Knowledge—Implementation/Outcomes	3
NRSG 7923	DNP Scholarly Project 3: Dissemination of Practice Inquiry	3

## Elective

Code	Title	Hours
	Complete 3 semester hours, selected in consultation with faculty program advisor.	3

### Program Credit/GPA Requirements

30 total semester hours required  
Minimum 3.000 GPA required

## Nursing Practice with Concentration in Nurse Anesthesia, DNP

The Doctor of Nursing Practice with Concentration in Nurse Anesthesia is a practice-oriented degree designed to prepare nurse anesthetists at the highest level of clinical scholarly practice. Keeping pace with the demands of today's changing healthcare environment requires clinical experts who have the knowledge and skills to be effective change agents. The program prepares graduates to question practice, search for and critically appraise the best evidence to guide practice, and implement and evaluate the application of best evidence in practice.

A successful graduate from the program will gain the requisite skill set and leadership expertise to be a critical member of the healthcare team and provide anesthetics to patients throughout the life cycle in diverse settings such as small local hospitals, regional centers, and rural or urban settings for all types of surgery or procedures.

Please visit Bouvé College Learning Outcomes (<https://nam05.safelinks.protection.outlook.com/?url=https%3A%2F%2Fbouve.northeastern.edu%2Fbchs%2Fabout%2Flearning-outcomes%2F&data=02%7C01%7Ch.daly%40northeastern.edu%7C29ec2ed1b2d5466eed8f08d6a6e60554%7Ca8eec281aaa34daec9b9a398b921%2Fe%2BrbA%2FnIPxPWQfF6c%3D&reserved=0/>) for the specific student learning outcomes for this program.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

A grade of B or higher is required in all course work.

### Core Requirements

Code	Title	Hours
<b>Required Core</b>		
NRSG 5117	Advanced Pharmacology	2
NRSG 5121	Epidemiology and Population Health	3
NRSG 5126	Pathophysiology for Advanced Practice	3
NRSG 6115	Health Assessment	3
NRSG 6300	Healthcare Finance and Marketing	3
NRSG 6302	Health Policy and Law	3
NRSG 6306	Health Informatics	3
NRSG 7100	Leadership in Advanced Practice Nursing	3
<b>Didactic</b>		
NRSG 7500	Role/Practice Issues in Nurse Anesthesia	3
NRSG 7503	Pharmacotherapeutics in Anesthesia and Critical Care Nursing	3
NRSG 7506	Applied Chemistry, Physics, and Cardiopulmonary Physiology of Anesthesia	3

NRSG 7509	Advanced Concepts in Nurse Anesthesia Practice	3
NRSG 7511	Applied Gross Anatomy and Physiology of Anesthesia	3
NRSG 7520	Conceptual Basis of Nurse Anesthesia Practice 1	3
NRSG 7523	Conceptual Basis of Nurse Anesthesia Practice 2	3
NRSG 7526	Conceptual Basis of Nurse Anesthesia Practice 3	3
<b>Practicum</b>		
NRSG 7530	Nurse Anesthesia Practicum 1	2
NRSG 7533	Nurse Anesthesia Practicum 2	4
NRSG 7536	Nurse Anesthesia Practicum 3	4
<b>Research</b>		
NRSG 7105	Translating Research Evidence into Practice	3
NRSG 7920	The Steps to Practice Inquiry: Analyze, Evaluate, Synthesize, and Apply the Evidence	3
<b>Project</b>		
NRSG 7921	DNP Scholarly Project 1: Design and Ethical Consideration of Practice Application	3
NRSG 7922	DNP Scholarly Project 2: Applying Practice Knowledge—Implementation/Outcomes	3
NRSG 7923	DNP Scholarly Project 3: Dissemination of Practice Inquiry	3
<b>Clinical</b>		
NRSG 7540	Advanced Clinical Experiences in Nurse Anesthesia 1	1
NRSG 7543	Advanced Clinical Experiences in Nurse Anesthesia 2	2
NRSG 7546	Advanced Clinical Experiences in Nurse Anesthesia 3	2

### Program Credit/GPA Requirements

77 total semester hours required  
Minimum 3.000 GPA required

#### Nursing—Adult-Gerontology Nurse Practitioner, Acute Care, CAGS

The adult-gerontology acute-care nurse practitioner program is designed to prepare nurses for advanced-practice roles as clinical experts, managers, educators, and consultants. The program offers advanced study with a major focus on clinical experience. Nurses who possess a Master of Science are eligible for the Certificate of Advanced Graduate Study (CAGS) in this specialization.

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/bchs/about/learning-outcomes/>) for the specific student learning outcomes for this program.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

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

Code	Title	Hours
<b>Theory</b>		
NRSG 6220	Nursing Management: Acute Episodic Illness	3
NRSG 6221	Nursing Management: Critical and Chronic Illness	3
NRSG 6241	Acute-Care Concepts in Nursing Practice	3
<b>Practicum</b>		
NRSG 6420	Adult-Gerontology Acute-Care Nursing Practicum 1	2
NRSG 6421	Adult-Gerontology Acute-Care Nursing Practicum 2	4
NRSG 6422	Adult-Gerontology Acute-Care Nursing Practicum 3	4

### Electives

Code	Title	Hours
Complete 5 semester hours in the following subject area:		5
NRSG		

### Program Credit/GPA Requirements

24 total semester hours required  
Minimum 3.000 GPA required

#### Nursing—Adult-Gerontology Nurse Practitioner, Primary Care, CAGS

This specialization offers nurse practitioners (NPs) with certification in a different specialty the opportunity to prepare for practice providing high-quality adult primary care services as an adult-gerontology nurse practitioner. Adult-gerontology NPs provide services to individuals across most of the life span in clinics, private practices, home care, long-term care, and day programs. Upon completion of the primary care program, graduates are eligible to sit for the adult-gerontology certification exam.

### Program Requirements

#### Core Requirements

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

Code	Title	Hours
<b>Required Core</b>		
NRSG 6249	Health Promotion of Adult/Older Adult	3
NRSG 6253	Primary Care of Adult/Older Adult Health Problems	4
NRSG 6254	Primary Care of Adult/Older Adult Complex Patients	4
<b>Clinical</b>		
NRSG 5117	Advanced Pharmacology	2
NRSG 5126	Pathophysiology for Advanced Practice	3
NRSG 6115	Health Assessment	3
NRSG 6222	Pharmacology of Adults and Older Adults	2
<b>Practicum</b>		

NRSG 6449	Health Promotion of Adult/Older Adult Practicum	1
NRSG 6450	Adult/Older Adult Practicum 1	4
NRSG 6451	Adult/Older Adult Practicum 2	4

### Program Credit/GPA Requirements

30 total semester hours required  
Minimum 3.000 GPA required

### Psychiatric Mental Health Nurse Practitioner, CAGS

The School of Nursing offers specialized and flexible program options in psychiatric mental health nursing for nurse practitioners (NPs) with certification in another specialty. Classes are offered during the late afternoon and early evening hours to accommodate the multiple responsibilities of adult learners. This is a 24-semester-hour program of study. Upon completion of the psychiatric mental health advanced practice Certificate of Advanced Graduate Study (CAGS) program, graduates are eligible to sit for available national certification exams in their area of practice.

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/bchs/about/learning-outcomes/>) for the specific student learning outcomes for this program.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

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

Code	Title	Hours
<b>Required Core</b>		
NRSG 6281	Dimensions of Clinical Practice	3
NRSG 6282	Clinical Psychopharmacology	3
NRSG 6283	Psychobiological Bases of Mental Disorders	3
NRSG 6286	Contemporary Psychotherapies—Theory and Practice	3
<b>Practicum</b>		
NRSG 6480	Psychiatric Practicum across the Life Span 1	5
NRSG 6481	Psychiatric Practicum across the Life Span 2	5

### Elective

Code	Title	Hours
Complete 2 semester hours in the following subject area:		2
NRSG		

### Program Credit/GPA Requirements

24 total semester hours required  
Minimum 3.000 GPA required

### Nursing—Neonatal Nurse Practitioner, CAGS

The School of Nursing offers a certificate of advanced study for experienced nurses who have a master's degree in nursing and want to specialize in neonatal critical care. Applicants are required to have at

least two years of level 3 or greater of neonatal intensive care unit (NICU) experience before entering the program; most applicants have greater relevant experience. One year of full-time study offers the student an opportunity to increase skills and experience and enables the student to sit for the neonatal nurse practitioner certification exam offered by the National Certification Corporation for the obstetric, gynecologic, and neonatal nursing specialties.

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/bchs/about/learning-outcomes/>) for the specific student learning outcomes for this program.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Prerequisites

Code	Title	Hours
NRSG 5117	Advanced Pharmacology	2
NRSG 5126	Pathophysiology for Advanced Practice	3

### Core Requirements

A grade of B or higher is required in all course work.

Code	Title	Hours
<b>Clinical</b>		
NRSG 6116	Advanced Health Assessment of the Neonate and Infant	3
NRSG 6230	Nursing Management: Critically Ill Neonatal 1	3
NRSG 6231	Nursing Management: Critically Ill Neonatal 2	3
NRSG 6232	Neonatal Pharmacology	2
<b>Practicum</b>		
NRSG 6430	Neonatal Clinical Practicum 1	4
NRSG 6431	Neonatal Clinical Practicum 2	4
NRSG 6432	Neonatal Clinical Practicum 3	2

### Elective

Code	Title	Hours
Select courses in consultation with faculty advisor.		3
NRSG		

### Program Credit/GPA Requirements

24 total semester hours required  
Minimum 3.000 GPA required

### Nursing—Pediatric Nurse Practitioner, Acute Care, CAGS

The pediatric acute-care Certificate of Advanced Graduate Study (CAGS) is available for pediatric or family nurse practitioners who wish to be prepared for practice in the pediatric acute-care role. Applicants must have a minimum of one year of work experience in an acute-care setting working with the pediatric population. The program requires 24 credits of study.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

A grade of B or higher is required in all course work.

Code	Title	Hours
<b>Required Core</b>		
NRSG 6116	Advanced Health Assessment of the Neonate and Infant	3
NRSG 6262	Pediatric Pharmacology	2
NRSG 6265	Care of Child/Adolescent Health Problems	4
NRSG 6267	Care of the Critically Ill Child	4
<b>Practicum</b>		
NRSG 6461	Child/Adolescent Health Problems Practicum	4
NRSG 6463	Care of the Critically Ill Child Practicum	4

## Elective

Code	Title	Hours
Complete 3 semester hours from the following subject area:		
NRSG		3

## Program Credit/GPA Requirements

24 total semester hours required  
Minimum 3.000 GPA required

### Nursing—Pediatric Nurse Practitioner, Acute and Primary Care, CAGS

This specialization is designed to prepare nurse practitioners (NPs) prepared in different specialties with the skills needed to care for children who are at risk across the continuum of care. For nearly two decades, 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. Students may study either full-time or part-time.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

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

Code	Title	Hours
<b>Required Core</b>		
NRSG 5117	Advanced Pharmacology	2
NRSG 6116	Advanced Health Assessment of the Neonate and Infant	3
NRSG 6264	Care of Well Child/Adolescent Health Promotion	4
NRSG 6265	Care of Child/Adolescent Health Problems	4
<b>Practicum</b>		
NRSG 6460	Care of Well Child/Adolescent Health Promotion Practicum	4
NRSG 6461	Child/Adolescent Health Problems Practicum	4
NRSG 6463	Care of the Critically Ill Child Practicum	4

<b>Clinical</b>		
NRSG 5126	Pathophysiology for Advanced Practice	3
NRSG 6115	Health Assessment	3
NRSG 6262	Pediatric Pharmacology	2
NRSG 6267	Care of the Critically Ill Child	4
NRSG 6275	Urban Families at Risk: A Primary Care Approach	4

## Program Credit/GPA Requirements

41 total semester hours required  
Minimum 3.000 GPA required

### Nursing—Pediatric Nurse Practitioner, Primary Care, CAGS

This program is designed to prepare nurse practitioners (NPs) certified in a different specialty to provide high-quality primary care to children in a variety of settings. For nearly two decades, the School of Nursing's pediatric nurse practitioner (PNP) program has prepared primary care PNPs to provide community-based, culturally sensitive care.

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/bchs/about/learning-outcomes/>) for the specific student learning outcomes for this program.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

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

Code	Title	Hours
<b>Prerequisite Courses or Equivalent</b>		
NRSG 5117	Advanced Pharmacology	2
NRSG 5126	Pathophysiology for Advanced Practice	3
NRSG 6115	Health Assessment	3
<b>Required Courses</b>		
NRSG 6262	Pediatric Pharmacology	2
NRSG 6264	Care of Well Child/Adolescent Health Promotion	4
NRSG 6265	Care of Child/Adolescent Health Problems	4
NRSG 6275	Urban Families at Risk: A Primary Care Approach	4
NRSG 6460	Care of Well Child/Adolescent Health Promotion Practicum	4
NRSG 6461	Child/Adolescent Health Problems Practicum	4

## Elective

Code	Title	Hours
Complete 2 semester hours from the following subject area:		
	Graduate NRSG course	2

## Program Credit/GPA Requirements

24 total semester hours required  
(Prerequisite courses or equivalent are an additional 8 hours)  
Minimum 3.000 GPA required

## Nursing—Adult-Gerontology Nurse Practitioner, Acute Care, MS

The adult-gerontology acute-care program seeks to prepare nurses for advanced-practice roles as clinical experts, educators, and consultants. The program provides advanced study with a major focus on clinical experience and culminates with the Master of Science with a specialization in Nursing. Students may pursue either full-time or part-time study. Nurses who possess an MS are eligible for the Certificate of Advanced Graduate Study (CAGS) in this specialization.

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/bchs/about/learning-outcomes/>) for the specific student learning outcomes for this program.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

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

Code	Title	Hours
<b>Professional</b>		
NRSNG 5118	Healthcare System and Professional Role Development	3
NRSNG 5121	Epidemiology and Population Health	3
<b>Clinical</b>		
NRSNG 5117	Advanced Pharmacology	2
NRSNG 5126	Pathophysiology for Advanced Practice	3
NRSNG 6115	Health Assessment	3
NRSNG 6325	Pharmacotherapeutics in Anesthesia and Critical Care Nursing	2
or NRSNG 6222	Pharmacology of Adults and Older Adults	
<b>Theory</b>		
NRSNG 6220	Nursing Management: Acute Episodic Illness	3
NRSNG 6221	Nursing Management: Critical and Chronic Illness	3
NRSNG 6241	Acute-Care Concepts in Nursing Practice	3
<b>Practicum</b>		
NRSNG 6420	Adult-Gerontology Acute-Care Nursing Practicum 1	2
NRSNG 6421	Adult-Gerontology Acute-Care Nursing Practicum 2	4
NRSNG 6422	Adult-Gerontology Acute-Care Nursing Practicum 3	4
<b>Research</b>		
NRSNG 7105	Translating Research Evidence into Practice	3
NRSNG 7110	Evidence-Based Practice Research Application	2

### Elective

Code	Title	Hours
Complete 3 semester hours in the following subject area:		3
NRSNG		

### Program Credit/GPA Requirements

43 total semester hours required  
Minimum 3.000 GPA required

## Nursing—Adult-Gerontology Nurse Practitioner, Primary Care, MS

This specialization offers registered nurses with a bachelor's degree the opportunity to prepare for a career providing high-quality adult primary care services as an adult-gerontologic nurse practitioner (NP). Adult-gerontology NPs provide services to individuals across most of the life span in clinics, private practices, home care, long-term care, and day programs. Upon completion of the primary care program, graduates are eligible to sit for the adult-gerontology certification exam.

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/bchs/about/learning-outcomes/>) for the specific student learning outcomes for this program.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

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

Code	Title	Hours
<b>Professional</b>		
NRSNG 5118	Healthcare System and Professional Role Development	3
NRSNG 5121	Epidemiology and Population Health	3
<b>Required Core</b>		
NRSNG 6249	Health Promotion of Adult/Older Adult	3
NRSNG 6253	Primary Care of Adult/Older Adult Health Problems	4
NRSNG 6254	Primary Care of Adult/Older Adult Complex Patients	4
<b>Clinical</b>		
NRSNG 5117	Advanced Pharmacology	2
NRSNG 5126	Pathophysiology for Advanced Practice	3
NRSNG 6115	Health Assessment	3
NRSNG 6222	Pharmacology of Adults and Older Adults	2
<b>Practicum</b>		
NRSNG 6449	Health Promotion of Adult/Older Adult Practicum	1
NRSNG 6450	Adult/Older Adult Practicum 1	4
NRSNG 6451	Adult/Older Adult Practicum 2	4
<b>Research</b>		
NRSNG 7105	Translating Research Evidence into Practice	3
NRSNG 7110	Evidence-Based Practice Research Application	2

### Elective

Code	Title	Hours
Complete 2 semester hours in the following subject area:		2
NRSNG		

### Program Credit/GPA Requirements

43 total semester hours required  
 Minimum 3.000 GPA required

(60 clinical hours/1 semester credit)  
 Minimum 3.000 GPA required

### Nursing—Family Nurse Practitioner, Primary Care, MS

The family nurse practitioner program is a specialty track focusing on the primary healthcare of individuals and families. The program is offered in a hybrid format with the majority of the classes delivered online, coupled with live presentation sessions. Students are required to be on campus twice per semester.

Upon completion of the primary care program, graduates are eligible to sit for all national certification exams in their area of practice.

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/bchs/about/learning-outcomes/>) for the specific student learning outcomes for this program.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirements

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

Code	Title	Hours
<b>Professional</b>		
NRSG 5117	Advanced Pharmacology	2
NRSG 5118	Healthcare System and Professional Role Development	3
NRSG 5121	Epidemiology and Population Health	3
NRSG 5126	Pathophysiology for Advanced Practice	3
NRSG 6115	Health Assessment	3
<b>Family</b>		
NRSG 6390	Family Care of the Adult/Older Adult Patient	4
NRSG 6392	Family Theory	2
NRSG 6393	Family Care of the Pediatric and Adolescent Patient	4
NRSG 6395	Healthcare of Women in Family Practice	2
<b>Clinical</b>		
NRSG 6222	Pharmacology of Adults and Older Adults	2
NRSG 6262	Pediatric Pharmacology	2
<b>Practicum</b>		
NRSG 6391	Practicum for NRSG 6390	4
NRSG 6394	Practicum for NRSG 6393	4
NRSG 6396	Practicum for NRSG 6395	4
<b>Research</b>		
NRSG 7105	Translating Research Evidence into Practice	3
NRSG 7110	Evidence-Based Practice Research Application	2

### Program Credit/GPA Requirements

47 total semester hours required  
 720 clinical hours plus 40 research practicum hours

### Nursing—Neonatal Nurse Practitioner, MS

Applicants are required to have at least two years of level 3 or greater of neonatal intensive care unit (NICU) experience before entering this program; most applicants have greater relevant experience. The neonatal nurse practitioner (NNP) program builds on the applicant’s significant base of nursing knowledge and focuses on advanced nursing knowledge and clinical practice. In this program, students:

- Learn advanced diagnostic reasoning
- Carry out independent management of patients and their families
- Develop the expertise necessary to care for high-risk neonates and their families
- Become proficient at delivery room management of high-risk neonates

Successful graduates are prepared to make independent decisions in level 2 and level 3 NICUs, drawing on their experience and diagnostic abilities to affect lives every day.

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/bchs/about/learning-outcomes/>) for the specific student learning outcomes for this program.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirements

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

Code	Title	Hours
<b>Required Core</b>		
NRSG 5117	Advanced Pharmacology	2
NRSG 5118	Healthcare System and Professional Role Development	3
NRSG 5121	Epidemiology and Population Health	3
NRSG 5126	Pathophysiology for Advanced Practice	3
<b>Clinical</b>		
NRSG 6116	Advanced Health Assessment of the Neonate and Infant	3
NRSG 6230	Nursing Management: Critically Ill Neonatal 1	3
NRSG 6231	Nursing Management: Critically Ill Neonatal 2	3
NRSG 6232	Neonatal Pharmacology	2
<b>Practicum</b>		
NRSG 6430	Neonatal Clinical Practicum 1	4
NRSG 6431	Neonatal Clinical Practicum 2	4
NRSG 6432	Neonatal Clinical Practicum 3	2
<b>Research</b>		
NRSG 7105	Translating Research Evidence into Practice	3
NRSG 7110	Evidence-Based Practice Research Application	2

**Elective**

Code	Title	Hours
Complete 4 semester hours from the following subject area:		4
NRSNG		

**Program Credit/GPA Requirements**

41 total semester hours required

Minimum 3.000 GPA required

**Nursing—Pediatric Nurse Practitioner, Acute and Primary Care, MS**

This specialization is designed to prepare nurses with the specialized skills needed to care for children who are at risk across the continuum of care. For nearly two decades, the School of Nursing's pediatric nurse practitioner (PNP) program has prepared primary care PNPs to provide community-based, culturally-sensitive care. More recently, building on its foundation in evidence-based, interdisciplinary, urban healthcare, the School of Nursing expanded the PNP program into acute care. Students may study either full-time or part-time.

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/bchs/about/learning-outcomes/>) for the specific student learning outcomes for this program.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Core Requirements**

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

Code	Title	Hours
<b>Professional Core Courses</b>		
NRSNG 5118	Healthcare System and Professional Role Development	3
NRSNG 5121	Epidemiology and Population Health	3
<b>Research Core Courses</b>		
NRSNG 7105	Translating Research Evidence into Practice	3
NRSNG 7110	Evidence-Based Practice Research Application	2
<b>Clinical Core Courses</b>		
NRSNG 5117	Advanced Pharmacology	2
NRSNG 5126	Pathophysiology for Advanced Practice	3
NRSNG 6115	Health Assessment	3
NRSNG 6116	Advanced Health Assessment of the Neonate and Infant	3
NRSNG 6262	Pediatric Pharmacology	2
<b>Clinical Theory Courses</b>		
NRSNG 6275	Urban Families at Risk: A Primary Care Approach	4
NRSNG 6264	Care of Well Child/Adolescent Health Promotion	4
NRSNG 6265	Care of Child/Adolescent Health Problems	4
NRSNG 6267	Care of the Critically Ill Child	4
<b>Clinical Practicum Courses</b>		

NRSNG 6460	Care of Well Child/Adolescent Health Promotion Practicum	4
NRSNG 6461	Child/Adolescent Health Problems Practicum	4
NRSNG 6463	Care of the Critically Ill Child Practicum	4

**Program Credit/GPA Requirements**

52 total semester hours required

Minimum 3.000 GPA required

**Nursing—Pediatric Nurse Practitioner, Primary Care, MS**

This specialization is designed to prepare nurses with the specialized skills needed to provide high-quality primary care to children in a variety of settings. For nearly two decades, the School of Nursing's pediatric nurse practitioner (PNP) program has prepared primary care PNPs to provide community-based, culturally-sensitive care.

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/bchs/about/learning-outcomes/>) for the specific student learning outcomes for this program.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Core Requirements**

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

Code	Title	Hours
<b>Professional Core Courses</b>		
NRSNG 5118	Healthcare System and Professional Role Development	3
NRSNG 5121	Epidemiology and Population Health	3
<b>Clinical Theory Courses</b>		
NRSNG 6264	Care of Well Child/Adolescent Health Promotion	4
NRSNG 6265	Care of Child/Adolescent Health Problems	4
NRSNG 6275	Urban Families at Risk: A Primary Care Approach	4
<b>Clinical Core Courses</b>		
NRSNG 5117	Advanced Pharmacology	2
NRSNG 5126	Pathophysiology for Advanced Practice	3
NRSNG 6115	Health Assessment	3
NRSNG 6262	Pediatric Pharmacology	2
<b>Clinical Practicum Courses</b>		
NRSNG 6460	Care of Well Child/Adolescent Health Promotion Practicum	4
NRSNG 6461	Child/Adolescent Health Problems Practicum	4
<b>Research Core Courses</b>		
NRSNG 7105	Translating Research Evidence into Practice	3
NRSNG 7110	Evidence-Based Practice Research Application	2

**Program Credit/GPA Requirements**

41 total semester hours required



Minimum 3.000 GPA required

### Nursing—Psychiatric Mental Health Nurse Practitioner, MS

The School of Nursing offers specialized and flexible program options in psychiatric mental health nursing. Part-time and full-time programs are available. Classes are offered during the late afternoon and early evening hours to accommodate the multiple responsibilities of adult learners.

- For nurses who have a baccalaureate degree in nursing, the Master of Science (MS) option is a 43-semester-hour program.
- For nurses with master's preparation in other nursing specialties, the Certificate of Advanced Graduate Study (CAGS) option is a 24-semester-hour program.
- For those who wish to pursue a career in nursing and possess a baccalaureate degree or higher in a related (non-nursing) field, a direct-entry program is available.

Upon completion of the psychiatric mental health advanced-practice nursing graduate program curriculum, graduates are eligible to sit for available national certification exams in their area of practice.

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/bchs/about/learning-outcomes/>) for the specific student learning outcomes for this program.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

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

Code	Title	Hours
<b>Required Core</b>		
NRSG 6281	Dimensions of Clinical Practice	3
NRSG 6282	Clinical Psychopharmacology	3
NRSG 6283	Psychobiological Bases of Mental Disorders	3
NRSG 6286	Contemporary Psychotherapies—Theory and Practice	3
<b>Professional</b>		
NRSG 5118	Healthcare System and Professional Role Development	3
NRSG 5121	Epidemiology and Population Health	3
<b>Clinical</b>		
NRSG 5117	Advanced Pharmacology	2
NRSG 5126	Pathophysiology for Advanced Practice	3
NRSG 6115	Health Assessment	3
<b>Practicum</b>		
NRSG 6480	Psychiatric Practicum across the Life Span 1	5
NRSG 6481	Psychiatric Practicum across the Life Span 2	5
<b>Research</b>		
NRSG 7105	Translating Research Evidence into Practice	3
NRSG 7110	Evidence-Based Practice Research Application	2

### Elective

Code	Title	Hours
Complete 2 semester hours in the following subject area:		2
NRSG		

### Program Credit/GPA Requirements

43 total semester hours required  
Minimum 3.000 GPA required

### Nursing—Direct Entry, MS

#### Part I: Prelicensure

The direct-entry nursing student enters the accelerated master's program as a graduate student. The first 16 months (four semesters) of the program consist of intensive, sequential classes and clinical with combined undergraduate- and graduate-level courses. Students are then prepared to take the National Council Licensure Exam (NCLEX-RN) upon completion of 64 program semester hours to earn a RN license. Students earn a Bachelor of Science in Nursing (BSN) after this part of the program. Financial aid will be granted on an undergraduate basis during the prelicensure phase of the program.

#### Academic Standards for Nursing Majors

- Students must successfully complete all courses, as stipulated by their curriculum plan, with a grade of C or better, in order to progress into the next professional course.
- Students who either fail or withdraw from a professional course will need to successfully remediate that course before continuing in their approved curriculum plan.
- Students who incur an incomplete grade in a prerequisite course must obtain approval from their academic advisor, upon consultation with the department faculty and, when appropriate, the School of Nursing Academic Standing Committee, prior to progression into the subsequent course(s).

#### ACADEMIC DISMISSAL FROM MAJOR

Students in the Bouvé College of Health Sciences will be dismissed from their major effective the following academic semester for any of the reasons noted below:

- Students who do not meet the required minimum grade in two professional courses, including labs and clinical, will be dismissed from the program. Only one professional course can be remediated.
- Remediation of a failed professional course is a requirement for progression in the program. Students who do not meet the minimum grade in the same course twice will be dismissed from the program. If a student fails a second professional course, dismissal for failure of two professional courses will take effect.

#### Academic Appeals

Students who believe that they were erroneously, capriciously, or otherwise unfairly treated in an academic or cooperative education decision may petition to appeal the decision. Refer to the Bouvé College of Health Sciences Academic Affairs Appeals Process and the Northeastern University Appeals Policies and Procedures

#### Program Policies & Standards

Students are expected to adhere to the policies and standards of their program major to progress through their curriculum as planned. Students seeking any exceptions to the Program Policies & Standards

specified for their program major will present their petitions before the School of Nursing Academic Standing Committee.

Students are required to attend all scheduled nursing classes, clinical experiences, and clinical labs on campus and in clinical agencies. If the student fails to meet attendance requirements, the student will fail the associated class, clinical and/or lab.

### CLINICAL REQUIREMENTS

Clinical settings require a criminal background check. Additionally, international students require curricular practical training (CPT) clearance to meet federal requirements for all clinical and co-op experiences.

All students must receive a health clearance from University Health and Counseling Services (UHCS). Health clearance is based on specific documentation of immunity from infectious disease and a physical examination. (This may be done by the student's own healthcare provider). In addition, nursing students need a clinical clearance in order to participate in clinical courses. Clinical clearance, managed by the School of Nursing's Clinical Placement Office, includes verification of certification in cardiopulmonary resuscitation (CPR); recent negative tuberculosis screening (PPD); positive titres for MMR, varicella, and hepatitis B; vaccines including TDAP and influenza; and additional health screenings as may be required by the program. It is the responsibility of the student to stay current and to provide documentation required for clinical clearance throughout the entire nursing program.

Six weeks prior to the start of a clinical course, students must show the following to be eligible for clinical placement:

- Evidence of immunizations and health clearance by University Health and Counseling Services,
- Documentation of CPR certification
- Completion of a Criminal Offender Record Information (CORI) background check

*Students will not be allowed to start the clinical course, and may be dropped from the clinical course, if these processes are not satisfactorily completed.*

Students should refer to Requirements for Clinical, Internship, and Practicum Courses (p. 231) in this catalog (applicable to both undergraduate students and graduate students at the college) for additional details.

### Clinical Warning

A nursing student may be placed on clinical warning, or fail the clinical course, at any time during the semester for the following reasons:

- Failing to meet the clinical objectives at a satisfactory level.
- Failing to demonstrate safe practice. Students may be removed from the clinical area, before completion of the clinical rotation, if the instructor determines that the student is unsafe. This will result in the student failing the clinical course.
- Failing to meet the attendance requirement.

### Conditions

- Students on clinical warning must develop an academic plan with the clinical instructor to address clinical performance.
- Students will be expected to improve clinical performance by adhering to the plan.
- Failure to adhere to the terms of the plan will result in the student failing the course and being placed on academic probation. All conditions of academic probation will then apply.

### Notification

- The clinical instructor will issue the student a Clinical Warning via the Faculty and Advisor Communication Tool (FACT) identifying the problem.
- The student and the instructor should then develop a plan together to address the deficiency.
- Copies of the warning will be forwarded to the Program Director and/or the Assistant Dean for Undergraduate programs if needed.
- This is an administrative warning and will not be posted on the transcript.
- Satisfactory completion of the clinical experience component of the course will result in removal of the warning from the student's file.

### Bloodborne Pathogen Exposure and Injury

Any students who sustain any kind of injury and/or exposure related to blood borne, respiratory or other pathogens or hazardous materials while on a clinical rotation must immediately follow the procedures below. Students are provided access to post-exposure counseling through the university's partner, OEHN (Occupational Environmental Health Network).

### PROCEDURES

Students must follow the Affiliate site's protocol for exposure reporting, testing, counseling and follow up. If there is no affiliate site protocol, students should notify their program, as well as the Office of Risk Services ([risk@northeastern.edu](mailto:risk@northeastern.edu)).

Within 24 hours of the incident, students must also inform their program's Director of Clinical Education (or unit designee responsible for clinical placements) and/or Medical Director and submit, in writing, a description of the incident and injury or exposure.

The program's Director of Clinical Education (or unit designee responsible for clinical placements) will notify the following individuals that an incident has occurred (PHI only necessary upon request):

- The Associate Dean of Clinical, Rehabilitation and New Initiatives
- The unit head
- The Dean
- The Office of Risk Services ([risk@northeastern.edu](mailto:risk@northeastern.edu))

Students on or near the NU Boston campus are encouraged to schedule an appointment with UHCS to discuss the exposure, treatment, potential risks and side effects of any medications. Students in clinical programs outside the Boston area should contact the Occupational & Environmental Health Network (OEHN) at 1-866-360-8100. OEHN is open 24 hours a day, 7 days a week 365 days a year. OEHN will collect appropriate information and engage the doctor on call, who can help to direct appropriate care depending on exposure and circumstances.

Students should rely on their health insurance for necessary treatment. Out of pocket costs may be submitted to the Office of Risk Services for reimbursement consideration.

Students should contact their Clinical Education Program Director and/or the Office of Risk Services with any further questions related to exposure-related treatment.

### Technical Standards for Admission, Academic Progression, and Graduation

The primary mission of the School of Nursing is to educate our students to provide evidence-based, culturally and linguistically competent, ethical healthcare that is high quality, safe, and accessible to diverse local, national and global communities. Our programs prepare students to become leaders as nurse clinicians, educators, scholars, and researchers.

The School of Nursing is also committed to achieving the goals of the university to become an outstanding national research, practice-oriented, student-centered, urban institution.

The goal of the School of Nursing is to prepare students to think critically and to practice nursing competently and compassionately in rapidly changing practice environments. All efforts are designed to build nursing knowledge, enhance nursing practice and patient safety, foster professional integrity, and ultimately improve the health outcomes of patients, families, and communities across the continuum of care.

In addition to classroom learning, students' clinical education experiences occur in settings, like hospitals, in which patient safety is the priority. For this reason, students who, upon enrollment in any of the nursing programs, seek accommodations from the Disability Resource Center (DRC) at NU must also request an assessment of accommodations that would be needed for clinical education.

Certain functional abilities are essential for the delivery of safe, effective nursing care during clinical education activities. Therefore, the School of Nursing has determined that certain technical standards are requisite for admission, progression, and graduation from the nursing programs. An individual must be able to independently, with or without reasonable accommodation, meet the following technical standards:

1. General abilities (p. 275)
2. Observation (p. 275)
3. Communication (p. 275)
4. Motor (p. 275)
5. Intellectual, conceptual, and quantitative abilities (p. 275)
6. Essential behavioral and social attributes (p. 275)
7. Ability to manage stressful situations (p. 275)

Individuals unable to meet these technical standards, with or without reasonable accommodation, will not be able to complete the program.

### GENERAL ABILITIES

The student is expected to possess functional use of the senses of vision, touch, hearing, and smell so that data received by the senses may be integrated, analyzed, and synthesized in a consistent and accurate manner. A student must be able to respond promptly to urgent situations that may occur during clinical training activities and must not hinder the ability of other members of the health care team to provide prompt treatment and care to patients.

### OBSERVATIONAL ABILITY

The student must have sufficient capacity to make accurate visual observations and interpret them in the context of laboratory studies, medication administration, and patient care activities. In addition, the student must be able to document these observations and maintain accurate records.

### COMMUNICATION ABILITY

The student must communicate both verbally and non-verbally in order to elicit information and to convey that information to others. Each student must have the ability to read and write accurately and comprehensively in English. The student must be able to thoroughly comprehend and fluently speak the English language so as to facilitate communication with patients, families, professionals in health care settings, instructors, and other students. The student must also be able to present information in a professional, logical manner and to provide counseling and instruction in order to effectively care for patients and their families.

### MOTOR ABILITY

The student must be able to perform gross and fine motor movements with sufficient coordination needed to perform complete physical examinations utilizing the techniques of inspection, palpation, percussion, auscultation, and other diagnostic maneuvers. A student must develop the skills needed to perform or assist with procedures, treatments, administration of medication, and the management and operation of diagnostic and therapeutic medical equipment. The student possess the physical and mental stamina to meet the demands associated with extended periods of sitting, standing, moving, and physical exertion required for satisfactory and safe performance in the clinical and classroom settings.

### INTELLECTUAL, CONCEPTUAL, AND QUANTITATIVE ABILITIES

The student must be able to develop and refine critical thinking skills that are essential to nursing practice. Critical thinking involves the abilities to measure, calculate, reason, analyze, and synthesize objective and subjective data, and to make decisions, often in a time-urgent environment, that reflect consistent and thoughtful deliberation and sound clinical judgment.

### BEHAVIORAL AND SOCIAL ATTRIBUTES

Compassion, integrity, motivation, effective interpersonal skills, and concern for others are personal attributes required of those in the nursing programs. The student must be able to work under supervision of a clinical instructor or preceptor; this is essential to ensure patient safety. The student must exercise good judgment and promptly complete all responsibilities in the classroom and clinical settings. The ability to establish culturally competent relationships with individuals, families, and groups and to respond effectively to patients who have different intellectual capacities is critical to nursing practice.

### EXAMINATIONS DISABILITY AND SPECIAL NEEDS

Students with special needs are encouraged to contact the Disability Resource Center (DRC) in 20 Dodge Hall to register and request services.

Students must notify the instructor at the beginning of the semester if they plan to use DRC services throughout the course. The staff in that office is available for assistance.

### ABILITY TO MANAGE STRESSFUL SITUATIONS

The student must be able to adapt to and function effectively in stressful situations in both the classroom and clinical settings, including emergency situations. These stressors include personal, patient care/family, faculty/peer, and or program related issues.

### State Board Nursing Examination

In Massachusetts, and several other states, the registering board requires that graduates taking the National Council Licensing Examination (NCLEX-RN) meet standards of "good moral character" (GMC). Students may review the GMC requirement specified at Massachusetts General Laws Chapter 112, sections 74, 74A, and 76; Licensure Policy No. 00-01 under "Rules & Regulations" on the Massachusetts BORN website.

### RN Work Experience

Once a student graduates with a BSN, they participate in an online professional seminar for two semesters. In addition, students seek full-time RN experience required for progression into the NP Master's clinical practicums. One-to-two years of RN work experience is required, depending on the track. Students may begin core courses, such as epidemiology, during the required one to two years of RN experience, with approval from the specialty track director. Finding RN employment is the responsibility of the student, as it is professional nursing experience. Northeastern will help support the student in preparation for the job search. A leave of absence (LOA) may be granted on an individual basis

to gain more nursing experience before returning to the master's portion of the program.

## Part II: Return to Master's Specialty Tracks

In the master's specialty track, students are required to take professional and research core classes, clinical core, and specialty clinical courses. Full- or part-time academic study is available to students. Most students return to the master's segment of the program, taking course work as a part-time student while continuing to work and increase the amount of RN professional experience. Completion of the MSN can take four to six semesters, depending on the student's pace and specialty track. Upon completion of the required specialty area credits, the student receives a Master of Science degree and is eligible to take the national certification exam in their area of advanced specialty nursing practice. Financial aid is awarded on a graduate basis during this portion of the program.

Please visit Bouvé College Learning Outcomes for the specific student learning outcomes for this program.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

A grade of B or better in the **BSN clinical courses** is highly recommended for progression into the MSN portion of the program. Progression is at the graduate specialty director's discretion.

A grade of B or better is required in **graduate-level courses: Advanced Pharmacology (NRSNG 5117) and Pathophysiology for Advanced Practice (NRSNG 5126)**.

Code	Title	Hours
<b>Semester 1</b>		
NRSNG 2220 and NRSNG 2221	Health Assessment and Fundamental Nursing Skills and Lab for NRSNG 2220	4
NRSNG 3302 and NRSNG 3303	Nursing with Women and Families and Clinical for NRSNG 3302	5
NRSNG 5117	Advanced Pharmacology	2
NRSNG 5126	Pathophysiology for Advanced Practice	3
<b>Semester 2</b>		
NRSNG 2210	Influences on Health and Illness: A Nursing Perspective	3
NRSNG 3323 and NRSNG 3324	Intermediate Interventions and Assessment and Lab for NRSNG 3323	2
NRSNG 3320 and NRSNG 3321	Nursing Care of Adults 1 and Clinical for NRSNG 3320	6
NRSNG 3400 and NRSNG 3401	Nursing and the Promotion of Mental Health and Clinical for NRSNG 3400	5
<b>Semester 3</b>		
NRSNG 3420 and NRSNG 3421	Nursing Care of Adults 2 and Clinical for NRSNG 3420	6
NRSNG 4502 and NRSNG 4503	Nursing Care of the Child and Clinical for NRSNG 4502	6
HLTH 5450	Healthcare Research	4
<b>Semester 4</b>		
NRSNG 2150	Ethical Healthcare: Genetics and Genomics	4

NRSNG 4604 and NRSNG 4605	Public Health Community Nursing and Clinical for NRSNG 4604	5
NRSNG 4610	Managing and Leading in Healthcare	4
NRSNG 4995 and NRSNG 4996	Comprehensive Nursing Practicum and Clinical for NRSNG 4995	5

## Program Credit / GPA Requirements

64 total semester hours required

Minimum 3.000 GPA required

## Nursing Informatics, Graduate Certificate

Globally connected networks, big data, and innovative decision analytics are rapidly shaping the future of healthcare systems and patient care delivery. This graduate certificate blends nursing science with knowledge and skills in information science, business management, and healthcare to prepare the student to:

- Utilize nursing informatics concepts to support decision making, work flows, and improve healthcare outcomes
- Accelerate the transformation of data into information and knowledge
- Design, implement, and evaluate health information systems
- Employ evidence-based strategies to promote data integrity and security
- Apply business, economic, and entrepreneurial principles to advance strategic business goals
- Become an innovative informatics healthcare leader to participate in efforts to improve human health

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Grade of B or higher is required in all courses.

### Core Requirements

Code	Title	Hours
HINF 6202	Business of Healthcare Informatics	3
NRSNG 6306	Health Informatics	3
NRSNG 6307	Operational Informatics in Healthcare Organizations	3

### Elective

Code	Title	Hours
Complete one of the following:		
HINF 6201	Organizational Behavior, Work Flow Design, and Change Management	3
HINF 6240	Improving the Patient Experience through Informatics	
HINF 6404	Patient Engagement Informatics and Analytics	
HINF 6405	Quantifying the Value of Informatics	

## Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

## School of Pharmacy

Website (<http://www.northeastern.edu/bouve/pharmacy/>)

**John R. Reynolds, PharmD**  
Professor and Dean

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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 seek to prepare students with knowledge, skills, and values for careers in pharmacy practice and the pharmaceutical sciences. Our programs promote intellectual growth, professionalism, and lifelong learning. Through the generation and dissemination of new knowledge and through scholarship and community service, the school contributes to improved individual and population health.

### Programs

#### Doctor of Philosophy (PhD)

- Biomedical Sciences (p. 277)
- Biomedical Sciences—Advanced Entry (p. 278)
- Medicinal Chemistry (p. 278)
- Medicinal Chemistry—Advanced Entry (p. 279)
- Pharmaceutical Sciences (p. 279)
- Pharmaceutical Sciences—Advanced Entry (p. 280)
- Pharmacology (p. 280)
- Pharmacology—Advanced Entry (p. 281)

#### Doctor of Pharmacy (PharmD)

- Doctor of Pharmacy (p. 281)
- Doctor of Pharmacy—Direct Entry (p. 281)

#### Master of Science (MS)

- Biomedical Sciences (p. 285)
- Medicinal Chemistry (p. 286)
- Pharmaceutical Sciences (p. 286)
- Pharmacology (p. 287)

#### Dual Degree

- Pharmacy and Public Health, PharmD/MPH (p. 258)

## Biomedical Sciences, PhD

The department offers a PhD program in biomedical science. Increasingly, scientific work is becoming interdisciplinary. In response to this trend, we allow the student to focus on more than one area in biomedical science. The concept is appropriate for both those entering the field, as well as those currently employed in the field, including research technicians,

clinical laboratory workers, science teachers, and science administrators. For those currently employed, the flexibility of our program can enhance their performance in a present position or open up new employment opportunities.

Please visit Bouvé College Learning Outcomes for the specific student learning outcomes for this program.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Milestones

Qualifying examination  
Annual review  
Dissertation committee  
Dissertation proposal  
Dissertation defense

### Core Requirements

A grade of C– or higher is required in each course.

Code	Title	Hours
<b>Seminar</b>		
Complete the following (repeatable) course twice:		2
PHSC 6300	Pharmaceutical Science Seminar	
<b>Colloquium</b>		
PHSC 6810	Pharmaceutical Science Colloquium	1
<b>Required Core</b>		
Complete 18-20 semester hours from the following:		
PHSC 5100	Concepts in Pharmaceutical Science	2
PHSC 5102	Concepts in Pharmaceutical Science 2	2
PHSC 5212	Research Skills and Ethics	2
PHSC 5300	Pharmaceutical Biochemistry	2-4
	or PHSC 7010	Pharmaceutical Sciences Laboratory
PHSC 5310	Cellular Physiology	2
PHSC 6213	Ethical Problems in Health Sciences Research	2
PHSC 6214	Experimental Design and Biostatistics	2
PHSC 6216	Human Physiology and Pathophysiology	2
PHSC 7020	Scientific Writing: Thesis Proposal	2

#### Electives

Code	Title	Hours
Complete 17-19 semester hours in the following subject areas: <sup>1</sup>		17-19
BIOL, BIOT, CHEM, NNMD, PHSC, PMCL, PMST		

### Research and Dissertation

Code	Title	Hours
<b>Qualifying Exam</b>		
PHSC 8940	Doctoral Training and Research	1
<b>Proposal Preparation</b>		
PHSC 9681	Doctoral Proposal	2
<b>Dissertation</b>		
Complete the following (repeatable) course twice:		2
PHSC 9990	Dissertation	

## Program Credit/GPA Requirements

45 total semester hours required  
Minimum 3.000 GPA required

<sup>1</sup> Students who opt to complete 4-credit PHSC 7010 in the Core Requirements may complete the degree with 17 elective credits; all other students must complete 19 elective credits.

### Biomedical Sciences, PhD—Advanced Entry

Advanced entry into the PhD in Biomedical Sciences requires a master's degree in pharmaceutical sciences or a related area. Completion of the PhD program requires 12 additional credits, focusing on various advanced research courses and successful defense of the dissertation.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

Annual review  
Qualifying examination  
Dissertation committee  
Dissertation proposal  
Dissertation defense

## Core Requirements

A grade of C– or higher is required in each course.

Code	Title	Hours
<b>Seminar</b>		
Complete the following (repeatable) course twice:		2
PHSC 6300	Pharmaceutical Science Seminar	
<b>Colloquium</b>		
PHSC 6810	Pharmaceutical Science Colloquium	1

## Research and Dissertation

Code	Title	Hours
<b>Qualifying Examination</b>		
PHSC 8940	Doctoral Training and Research	1
<b>Proposal Preparation</b>		
PHSC 9681	Doctoral Proposal	2
<b>Dissertation</b>		
Complete the following (repeatable) course twice:		6
PHSC 9990	Dissertation	

## Program Credit/GPA Requirements

12 total semester hours required  
Minimum 3.000 GPA required

### Medicinal Chemistry, PhD

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. Specializations are available in synthetic, biochemical/pharmacological, and biophysical medicinal chemistry. 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.

Please visit Bouvé College Learning Outcomes for the specific student learning outcomes for this program.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

Qualifying examination  
Annual review  
Dissertation committee  
Dissertation proposal  
Dissertation defense

## Core Requirements

A grade of C– or higher is required in each course.

Code	Title	Hours
<b>Seminar</b>		
Complete the following (repeatable) course twice:		2
PHSC 6300	Pharmaceutical Science Seminar	
<b>Colloquium</b>		
PHSC 6810	Pharmaceutical Science Colloquium	1
<b>Required Core</b>		
PHSC 5100	Concepts in Pharmaceutical Science	2
PHSC 5102	Concepts in Pharmaceutical Science 2	2
PHSC 5212	Research Skills and Ethics	2
PHSC 6213	Ethical Problems in Health Sciences Research	2
PHSC 7020	Scientific Writing: Thesis Proposal	2
<b>Chemistry</b>		
CHEM 5626	Organic Synthesis 1	3
CHEM 5628	Principles of Spectroscopy of Organic Compounds	3
CHEM 5672	Organic Synthesis 2	3
CHEM 5676	Biorganic Chemistry	3
PHSC 5400	Principles of Drug Design	3
PHSC 6222	The Chemistry and Biology of Drugs of Abuse	2
PHSC 6224	Behavioral Pharmacology and Drug Discovery	2
PHSC 6290	Biophysical Methods in Drug Discovery	2

## Electives

Code	Title	Hours
Complete 6 semester hours in the following subject areas:		6
BIOL, BIOT, CHEM, NNMD, PHSC, PMCL, PMST		

## Research and Dissertation

Code	Title	Hours
<b>Research</b>		
PHSC 8940	Doctoral Training and Research	1
<b>Proposal Preparation</b>		
PHSC 9681	Doctoral Proposal	2
<b>Dissertation</b>		

Complete the following (repeatable) course twice:

PHSC 9990	Dissertation	2
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## Program Credit/GPA Requirements

45 total semester hours required  
Minimum 3.000 GPA required

### Medicinal Chemistry, PhD—Advanced Entry

Advanced entry into the PhD in Medicinal Chemistry requires a master's degree in pharmaceutical sciences or a related area. Completion of the PhD program requires 12 additional credits, focusing on various advanced research courses and successful defense of the dissertation.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

Annual review  
Qualifying examination  
Dissertation committee  
Dissertation proposal  
Dissertation defense

### Core Requirements

A grade of C– or higher is required in each course.

Code	Title	Hours
<b>Seminar</b>		
Complete the following (repeatable) course twice: 2		
PHSC 6300	Pharmaceutical Science Seminar	
<b>Colloquium</b>		
PHSC 6810	Pharmaceutical Science Colloquium	1

## Research and Dissertation

Code	Title	Hours
<b>Qualifying Examination</b>		
PHSC 8940	Doctoral Training and Research	1
<b>Proposal Preparation</b>		
PHSC 9681	Doctoral Proposal	2
<b>Dissertation</b>		
Complete the following (repeatable) course twice: 6		
PHSC 9990	Dissertation	

## Program Credit/GPA Requirements

12 total semester hours required  
Minimum 3.000 GPA required

### Pharmaceutical Sciences, PhD

## 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 degree 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.

Please visit Bouvé College Learning Outcomes for the specific student learning outcomes for this program.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

Qualifying examination  
Annual review  
Dissertation committee  
Dissertation proposal  
Dissertation defense

### Core Requirements

A grade of C– or higher is required in each course.

Code	Title	Hours
<b>Seminar</b>		
Complete the following (repeatable) course twice: 2		
PHSC 6300	Pharmaceutical Science Seminar	
<b>Colloquium</b>		
PHSC 6810	Pharmaceutical Science Colloquium	1
<b>Required Core</b>		
Complete 18-20 semester hours from the following:		
PHSC 5100	Concepts in Pharmaceutical Science	2
PHSC 5102	Concepts in Pharmaceutical Science 2	2
PHSC 5212	Research Skills and Ethics	2
PHSC 5300	Pharmaceutical Biochemistry	2-4
or PHSC 7010	Pharmaceutical Sciences Laboratory	
PHSC 5310	Cellular Physiology	2
PHSC 6213	Ethical Problems in Health Sciences Research	2
PHSC 6214	Experimental Design and Biostatistics	2
PHSC 6216	Human Physiology and Pathophysiology	2
PHSC 7020	Scientific Writing: Thesis Proposal	2

**Pharmaceutics**

PMST 6250	Advanced Physical Pharmacy	2
PMST 6252	Pharmacokinetics and Drug Metabolism	3
PMST 6254	Advanced Drug Delivery System	3

**Electives**

Code	Title	Hours
Complete 9-11 semester hours from the following subject areas: <sup>1</sup>		9-11
	BIOL, BIOT, CHEM, NNMD, PHSC, PMCL, PMST	

**Research and Dissertation**

Code	Title	Hours
<b>Qualifying Examination</b>		
PHSC 8940	Doctoral Training and Research	1
<b>Proposal Preparation</b>		
PHSC 9681	Doctoral Proposal	2
<b>Dissertation</b>		
Complete the following (repeatable) course twice:		2
PHSC 9990	Dissertation	

**Program Credit/GPA Requirements**

45 total semester hours required  
Minimum 3.000 GPA required

<sup>1</sup> Students who opt to complete 4-credit PHSC 7010 in the Core Requirements may complete the degree with 9 elective credits; all other students must complete 11 elective credits.

**Pharmaceutical Sciences, PhD—Advanced Entry**

Advance entry into the PhD program in pharmaceutical sciences requires a master's degree in pharmaceutical sciences or related area. Completion of the PhD program requires 12 additional credits focusing on various advanced research courses.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Milestones**

Annual review  
Qualifying examination  
Dissertation committee  
Dissertation proposal  
Dissertation defense

**Core Requirements**

A grade of C– or higher is required in each course.

Code	Title	Hours
<b>Seminar</b>		
Complete the following (repeatable) course twice:		2
PHSC 6300	Pharmaceutical Science Seminar	
<b>Colloquium</b>		
PHSC 6810	Pharmaceutical Science Colloquium	1

**Research and Dissertation**

Code	Title	Hours
<b>Qualifying Examination</b>		
PHSC 8940	Doctoral Training and Research	1
<b>Proposal Preparation</b>		
PHSC 9681	Doctoral Proposal	2
<b>Dissertation</b>		
Complete the following (repeatable) course twice:		6
PHSC 9990	Dissertation	

**Program Credit/GPA Requirements**

12 total semester hours required  
Minimum 3.000 GPA required

**Pharmacology, PhD**

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.

Please visit Bouvé College Learning Outcomes for the specific student learning outcomes for this program.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Milestones**

Qualifying examination  
Annual review  
Dissertation committee  
Dissertation proposal  
Dissertation defense

**Core Requirements**

A grade of C– or higher is required in each course.

Code	Title	Hours
<b>Seminar</b>		
Complete the following (repeatable) course twice:		2
PHSC 6300	Pharmaceutical Science Seminar	
<b>Colloquium</b>		
PHSC 6810	Pharmaceutical Science Colloquium	1
<b>Required Core</b>		
Complete 18-20 semester hours from the following:		
PHSC 5100	Concepts in Pharmaceutical Science	2
PHSC 5102	Concepts in Pharmaceutical Science 2	2
PHSC 5212	Research Skills and Ethics	2
PHSC 5300	Pharmaceutical Biochemistry	2-4
or PHSC 7010	Pharmaceutical Sciences Laboratory	
PHSC 5310	Cellular Physiology	2
PHSC 6213	Ethical Problems in Health Sciences Research	2
PHSC 6214	Experimental Design and Biostatistics	2



PHSC 6216	Human Physiology and Pathophysiology	2
PHSC 7020	Scientific Writing: Thesis Proposal	2
<b>Pharmacology</b>		
PMCL 6260	Pharmacology 1	2
PMCL 6261	Pharmacology 2	2
PMCL 6262	Receptor Pharmacology	2

## Electives

Code	Title	Hours
Complete 11-13 semester hours from the following subject areas: BIOL, BIOT, CHEM, NNMD, PHSC, PMCL, PMST <sup>1</sup>		11-13

## Research and Dissertation

Code	Title	Hours
<b>Research</b>		
PHSC 8940	Doctoral Training and Research	1
<b>Proposal Preparation</b>		
PHSC 9681	Doctoral Proposal	2
<b>Dissertation</b>		
Complete the following (repeatable) course twice:		2
PHSC 9990	Dissertation	

## Program Credit/GPA Requirements

45 total semester hours required  
Minimum 3.000 GPA required

<sup>1</sup> Students who opt to complete 4-credit PHSC 7010 in the Core Requirements may complete the degree with 11 elective credits; all other students must complete 13 elective credits.

## Pharmacology, PhD—Advanced Entry

Advanced entry into the PhD in Pharmacology requires a master's degree in pharmaceutical sciences or a related area. Completion of the PhD program requires 12 additional credits, focusing on various advanced research courses and successful defense of the dissertation.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

Annual review  
Qualifying examination  
Dissertation committee  
Dissertation proposal  
Dissertation defense

## Core Requirements

A grade of C– or higher is required in each course.

Code	Title	Hours
<b>Seminar</b>		
Complete the following (repeatable) course twice:		2
PHSC 6300	Pharmaceutical Science Seminar	
<b>Colloquium</b>		
PHSC 6810	Pharmaceutical Science Colloquium	1

## Research and Dissertation

Code	Title	Hours
<b>Qualifying Examination</b>		
PHSC 8940	Doctoral Training and Research	1
<b>Proposal Preparation</b>		
PHSC 9681	Doctoral Proposal	2
<b>Dissertation</b>		
Complete the following (repeatable) course twice:		6
PHSC 9990	Dissertation	

## Program Credit/GPA Requirements

12 total semester hours required  
Minimum 3.000 GPA required

## Pharmacy, PharmD

Program requirements that follow relate to the final year of the six-year Doctor of Pharmacy (PharmD) program only. For information regarding years one through five of this program, please see the *Undergraduate Catalog* Doctor of Pharmacy (Pharmacy, PharmD) webpage.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
Complete 36 semester hours in the following range:		36
PHMD 6440 to PHMD 6474		

## Program Credit/GPA Requirements

36 total semester hours required  
Minimum 3.000 GPA required

## Pharmacy, PharmD—Direct Entry

The School of Pharmacy offers the Doctor of Pharmacy degree (PharmD). The direct-entry admission pathway for this program requires that students complete a BS or BA from an accredited institution with a preferred prerequisite grade-point average (GPA) of 3.000. The following prerequisite courses and credits are required:

Requirements	Credits
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 electives	4

Direct entry into the first professional year of the PharmD program offers students a four-year graduate course of study that fully integrates campus-based learning with experiential learning, including the university's signature cooperative education (co-op) program, to provide students with the knowledge, skills, and abilities necessary to succeed in the pharmacy profession. Our students promote and ensure the safe and effective use of drugs and provide medication therapy management services. In addition to preparing and dispensing prescribed medications, our students provide information to patients about medications and their uses; advise physicians, other prescribers, and other healthcare practitioners on medication selection, dosages, interactions, and adverse effects; and monitor patient responses to drug therapy.

Our students are well equipped to provide patient care services in a variety of settings. Most of our graduates work in community pharmacies or in healthcare facilities such as hospitals and ambulatory clinics. Additional practice opportunities exist in health maintenance organizations, private practice groups, long-term-care facilities, home healthcare, the Public Health Service, the armed services, and law enforcement agencies such as the Federal Drug Administration (FDA) or Drug Enforcement Administration (DEA). Graduates may also find employment in drug development, marketing and research within the pharmaceutical industry, colleges of pharmacy, and professional association management. In addition, many of our graduates go on to pharmacy practice residencies, fellowships, and leading graduate programs.

Doctor of Pharmacy students are admitted with the expectation that by working with faculty, staff, and each other, they will develop the knowledge, skills, and attitudes necessary for academic and professional success. Students follow academic progression plans for their respective years of graduation. Any deviation from the prescribed curriculum will require faculty/staff permission and an approved plan of study from the School of Pharmacy Academic Standing Committee.

The curriculum includes both Introductory Pharmacy Practice Experiences (IPPEs, fulfilled with cooperative education) and Advanced Pharmacy Practice Experiences (APPEs). These pharmacy practice experiences are provided primarily under the direct supervision of qualified pharmacist preceptors and occasionally with other qualified healthcare professionals. The school is affiliated with many world-class practice sites throughout the United States, providing students with access to experienced clinicians and scholars. Although every effort is made to accommodate individual circumstances and requests, students should be prepared to travel outside the Boston area to complete some of their pharmacy practice experiences. Availability of a car may be required, as some sites are not accessible by public transportation. All expenses associated with pharmacy practice experiences, including travel and housing, are the responsibility of the student.

IPPEs are competitive placements that are based on job availability in a geographic region. The placements are facilitated by School of Pharmacy cooperative education coordinators. Students are required to earn satisfactory (S) grades on one IPPE in a community setting and on one IPPE in an institutional/hospital practice setting.

APPE placements are provided based on site/preceptor availability and the final approval of the School of Pharmacy Office of Experiential Education (OEE). Students may be able to petition the OEE for out-of-system APPEs; however, availability for such requests is limited.

To be eligible for a PharmD, a student must successfully complete all courses in the curriculum, including the IPPEs/co-op and APPEs; meet the academic progression standards of the program; meet the technical standards of the program; and satisfy all other requirements

as stated. The pharmacy program is fully accredited by the Accreditation Council for Pharmacy Education (ACPE) ([info@acpe-accredit.org](mailto:info@acpe-accredit.org)) and adheres to the standards established by ACPE.

Pharmacy graduates must meet specific requirements to qualify for professional licensure in the state where they plan to practice as a registered pharmacist. These requirements include graduating from an accredited school of pharmacy, passing national and state board examinations, and completing internship hours. The internship is a period of practical experience conducted under the supervision of a registered pharmacist. Massachusetts requires 1,500 internship hours, all of which are satisfied through completion of IPPEs (co-op) and APPEs.

Professional and/or legal exigencies arise from time to time, which may necessitate changes in a pharmacy course, progression, and/or graduation requirements. Students should review their status with academic advisors on a timely basis and refer to current publications for updated information.

### Requirements for the PharmD Pharmacy Practice Experiences (PPEs)

Requirements for the successful completion of the PharmD PPEs include:

1. Evidence of health clearance from University Health and Counseling Services before placements at any PPE site.
2. Satisfactory completion of any additional site-specific requirements including, but not limited to, criminal record information (CORI), urine drug screens, and verification of immunization status. All fees associated with these requirements are the responsibility of the student.

#### Management of Positive Urine Drug Screens

If the student learns the urine drug screen (test #1) is positive, the student will notify the OEE ([pharmacyoe@northeastern.edu](mailto:pharmacyoe@northeastern.edu)) and immediately complete a second urine screen (test #2). A professional concern form will be completed based on test #1 results.

If urine screen test #2 is negative (-), the student will be allowed to continue the PPEs. However, the student will be asked to complete a random urine screen (test #3) at a time determined by the OEE. If this urine screen (test #3) is positive (+), the student will be administratively removed from the active PPEs and graduation may be delayed. A second professional concern form will be completed, based on test #3 results. The return to PPEs will occur once a repeat urine test is negative. That repeat negative test will be followed up by a random urine screen at a time determined by the OEE.

If the urine screen (test #2) is positive (+), the student will be administratively removed from the PPEs and graduation may be delayed. The return to PPEs will occur once a repeat urine screen is negative. That negative screen will be followed up by a random urine screen at a time determined by the OEE. A second professional concern form will be completed based on a positive test #3 result.

3. Adherence to the school's code of professional conduct and university's code of conduct policies while off-campus.
4. Maintenance of an active pharmacy intern license in every state where the student completes an experience.
5. Compliance with site-specific requirements (via site descriptions) and completion of site requests within specified deadlines. Undergraduate students who fail to complete these requirements as

directed will likely incur grade penalties and may experience a delay of graduation or dismissal from the pharmacy program.

### PROGRAM POLICIES

Students are expected to adhere to the policies and standards of their program major as stated to progress through their curriculum as planned. Students seeking any exceptions to the program policies and standards specified for their program major must present a petition before the School of Pharmacy Academic Standing Committee.

Given programmatic requirements, coupled with concerns over the loss of therapeutic knowledge, requests for a general leave of absence:

- Must comply with all stated Northeastern University general policies, regardless of the academic year.
- May be made at any time period during the P1 or P2 years.
- During the P3 academic year, any request for a general leave must be made no later than February 1 of the given academic year. Requests after this date will not be permitted.
- During the P4 academic year, requests for a general leave cannot be made at any time.

### TECHNICAL STANDARDS FOR THE DOCTOR OF PHARMACY PROGRAM

The PharmD program at Northeastern University is a rigorous and challenging academic program that requires students to possess specific characteristics and abilities within the cognitive, affective, and psychomotor domains, referred to here as technical standards. To successfully progress in and ultimately complete the didactic, laboratory, and experiential components of the PharmD program, students must meet the standards described below.

#### **Intellectual Abilities**

Students must have well-developed problem-solving and critical-thinking skills. Cognitive function must be appropriate to integrate, evaluate, and apply information gained through measurement, analysis, calculation, and reasoning. Students must have the capacity to learn efficiently in classroom, laboratory, small group and experiential settings, and through independent study. Students are required to demonstrate the ability to integrate course content knowledge with clinical practice applications to optimize medication therapy management.

#### **Communication Skills**

Students must be able to communicate effectively with colleagues, professors, patients, families, and healthcare providers. This includes efficiently comprehending, speaking, reading, and writing in English. Students must be able to process and use appropriate nonverbal cues and be proficient in the use of electronic communication media.

#### **Behavioral and Social Attributes**

Students must demonstrate professionalism, maturity, integrity, honesty, compassion, and respect when relating to others. Students must have sufficient mental and emotional health to complete work and responsibilities using good judgment. Students must be able to tolerate and adapt to stressful workloads and situations and modify behavior based on constructive criticism. Students must be able to function in accordance with the legal, ethical, and professional standards of practice.

#### **Observation and Motor Skills**

Students must have functional use of visual, auditory, and tactile senses. Students must be able to observe and perform experiments, physical assessments, patient interviews, and medication order processing. Students must be able to distinguish physical characteristics of medications by inspection. Students must have coordination of gross and fine muscular movements sufficient to perform pharmacy-related

tasks including compounding and dispensing medications, administering medications, and using computers and other technology necessary for learning and professional practice

### ACADEMIC DISMISSAL FROM MAJOR

PharmD students in the Bouvé College of Health Sciences will be dismissed from their major effective the following academic semester for any of the reasons noted below:

- Failure to earn a grade of C or better in three professional courses, regardless of remediation. Within the PharmD program, each specific professional course (with separate registration number) will be counted as a separate failure even if content is related.
- Failure to earn the minimum required grade in the same course twice.
- Failure to maintain a GPA of 3.000 after one semester of probation.
- The expected graduation date may not change more than twice.

The PharmD program monitors and promotes the development of professional behaviors in its students in order to ensure appropriate professionalism in the classroom, local and global communities, and clinical settings. Breach of adherence to these standards may result in dismissal from the program.

### ACADEMIC APPEALS

Students who believe that they were erroneously, capriciously, or otherwise unfairly treated in an academic or cooperative education decision may petition to appeal the decision. Refer to the Bouvé College of Health Sciences Academic Affairs Appeals Process (p. 234) and the Northeastern University Appeals Policies and Procedures (p. 34).

### PROGRAM STUDENT LEARNING OUTCOMES

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/bchs/about/learning-outcomes/>) for the specific student learning outcomes for this program.

## Program Requirements Pharmacy Major (PharmD) Grade and Progression Requirement

To progress into the subsequent semester of professional courses, students must receive a grade of C or better in all PHMD and PHSC courses, as well as in any course completed to fulfill the professional elective requirement.

For pharmacy students, an unsatisfactory grade (U) in a co-op will be counted as a professional course deficiency.

Students who incur an incomplete grade in a prerequisite course may not progress into the subsequent courses(s). Any exceptions will be determined by protocols established by the program, after consultation with the student's academic advisor.

## Core Requirements

Code	Title	Hours
<b>SEMESTER 1</b>		
PHMD 1201 and PHMD 1202	Introduction to Pharmacy Practice and Lab for PHMD 1201	3
PHMD 2350	Healthcare Systems	3
PHSC 4501	Pharmacology/Medicinal Chemistry 1	5
PHSC 3411	Pharmaceutics 1	4
<b>SEMESTER 2</b>		
Co-op /Introductory Pharmacy Practice Experience		
<b>SEMESTER 3</b>		

PHMD 2310 and PHMD 2311	Professional Communication in Pharmacy Practice and Lab for PHMD 2310	2.5
PHMD 5250	Pharmacy Care Management	3
PHSC 4502	Pharmacology/Medicinal Chemistry 2	5
PHSC 3412	Pharmaceutics 2	4
PHSC 3419	Pharmaceutics Laboratory	1

**SEMESTER 4**

Co-op /Introductory Pharmacy Practice Experience

**SEMESTER 5**

PHSC 3430	Pharmacokinetics and Biopharmaceutics	3
PHSC 2330	Immunology	3
PHMD 4611	Comprehensive Disease Management 1	6
PHMD 4612	Comprehensive Disease Management 1 Seminar	1
PHMD 3450	Research Methodology and Biostatistics	3

**SEMESTER 6, 7, or 8**

PHMD 5600	Pharmacy Capstone	4
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**SEMESTER 6**

PHMD 5330	Jurisprudence	3
PHSC 5360	Anti-Infectives	4
PHMD 4621	Comprehensive Disease Management 2	6
PHMD 4622	Comprehensive Disease Management 2 Seminar	1
PHMD 4623	Comprehensive Disease Management 2 Skills Lab	0.5

**SEMESTER 7**

PHMD 5223	Evidence-Based Medicine	2
PHMD 4631	Comprehensive Disease Management 3	6
PHMD 4632	Comprehensive Disease Management 3 Seminar	1
PHMD 4633	Comprehensive Disease Management 3 Skills Lab	0.5

**SEMESTER 8**

PHMD 4641	Comprehensive Disease Management 4	6
PHMD 4642	Comprehensive Disease Management 4 Seminar	1
PHMD 4643	Comprehensive Disease Management 4 Skills Lab	0.5
PHMD 5270	Economic Evaluation of Pharmaceuticals and Pharmacy Practice	2
PHMD 5450	Advanced Pharmacy Practice Experience Preparatory Seminar	1

**SEMESTERS 9, 10, 11**

Complete 36 credit hours of Advanced Pharmacy Practice Experience from courses PHMD 6440–6474		36
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**Elective Requirements**

Code	Title	Hours
<b>Open Electives</b>		
A minimum of 6 semester hours of open electives is required. Additional electives may be required to fulfill the total semester hours for your program.		6

**Professional Elective**

<i>Complete at least 2 semester hours from the following:</i>		2
CAEP 3480	Counseling Theories and Practice	
CAEP 5200	Motivational Interviewing in a Healthcare Setting	
CAEP 6203	Understanding Culture and Diversity	
CAEP 6220	Development Across the Life Span	
HINF 5101	Introduction to Health Informatics and Health Information Systems	
HINF 5407	Business Application of Decision Support in Healthcare	
HINF 6205	Creation and Application of Medical Knowledge	
HINF 6404	Patient Engagement Informatics and Analytics	
HLTH 1010	From the Community to the Intensive Care Unit: Approaching Interdisciplinary Research in the Elderly	
HLTH 1510	Introduction to Healthcare Ethics	
HLTH 2100	Interprofessional Ethics for Individual and Population Health	
HLTH 2302	Alternative Medicine	
HLTH 5002	Mindfulness: Theory and Practice	
HLTH 5135	Developing an Interdisciplinary Approach to Health Management for Older Adults	
HLTH 5280	The (in)Visibility of (dis)Ability in Society	
HLTH 5730	Global Perspectives in Disability and Health	
HSCI 1105	Human Nutrition	
HSCI 2350	Advanced Nutrition in Health and Disease	
HSCI 2500	Public Health Nutrition in the Community	
HSCI 5230	Clinical Nutrition Applications in Health and Disease	
NRS 1205	Wellness	
PHMD 3600	Leadership and Advocacy in Health Professions	
PHMD 4350	Exploring Academic Careers	
PHMD 4581	Cancer Chemotherapy	
PHMD 4585	Research Methods in Health Systems	
PHMD 4700	Principles in General Medicine	
PHMD 4890	Contemporary Issues in Geriatric Pharmacy	
PHMD 4991	Research	
PHMD 4992	Directed Study	
PHMD 5575	Pharmaceutical Industry	
PHMD 5675	Ambulatory Care Pharmacy Practice in Urban Health	
PHMD 5900	Self-Care and Nonprescription Medications: A Team-Based Approach	
PHSC 4991	Research	
PHSC 4992	Directed Study	
PHSC 5100	Concepts in Pharmaceutical Science	

PHSC 5400	Principles of Drug Design
PHSC 5500	Repurposing Drugs for Cancer Immunotherapies
PHSC 5555	Pharmaceutical Toxicology
PHSC 6218	Biomedical Chemical Analysis
PHSC 6222	The Chemistry and Biology of Drugs of Abuse
PHSC 6224	Behavioral Pharmacology and Drug Discovery
PHSC 6290	Biophysical Methods in Drug Discovery
PHTH 1270	Introduction to Global Health
PHTH 5222	Health Advocacy
PHTH 5226	Strategic Management and Leadership in Healthcare
PHTH 5230	Global Health
PHTH 5232	Evaluating Healthcare Quality
PHTH 5234	Economic Perspectives on Health Policy
PHTH 5236	Public Health Nutrition
PHTH 5300	Project Management in Public Health
PHTH 5310	Budget Principles in Public Health
PHTH 5320	Grant Writing in Public Health
PHTH 6320	Qualitative Methods in Health and Illness
PMST 6250	Advanced Physical Pharmacy
PMST 6252	Pharmacokinetics and Drug Metabolism
SLPA 1101	Introduction to Communication Disorders
SLPA 1555	Communication Disorders in Movies

PHMD 4611	6	PHMD 5330	3
PHMD 4612	1	PHSC 5360	4
		Elective or capstone	4
0		16	
		18.5	

**Year 3**

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHMD 4631	6	PHMD 4641	6	PHMD APPE	6
PHMD 4632	1	PHMD 4642	1	PHMD APPE	6
PHMD 4633	0.5	PHMD 4643	0.5		
PHMD 5223	2	PHMD 5270	2		
Electives and/or capstone	3-8	PHMD 5450	1		
		Electives and/or capstone	3-4		
		Professional elective	2		
12.5-17.5		15.5-16.5		12	

**Year 4**

Fall	Hours	Spring	Hours
PHMD APPE	6	PHMD APPE	6
PHMD APPE	6	PHMD APPE	6
12		12	

Total Hours: 129-135

**Biomedical Sciences, MS**

The department offers MS programs in biomedical science. Increasingly, scientific work is becoming interdisciplinary. In response to this trend, we allow the student to focus on more than one area in biomedical science. The concept is appropriate for both those entering (as well as those currently employed in) the field, including research technicians, clinical laboratory workers, science teachers, and science administrators. For those currently employed, the flexibility of our program can enhance their performance in a present position or open up new employment opportunities. Graduates of the program will be well prepared to enter related PhD programs at the university.

Please visit Bouvé College Learning Outcomes for the specific student learning outcomes for this program.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Core Requirements**

A grade of C- or higher is required in each course.

Code	Title	Hours
<b>Required Core</b>		
Complete 14–16 semester hours from the following:		
PHSC 5100	Concepts in Pharmaceutical Science	2
PHSC 5102	Concepts in Pharmaceutical Science 2	2
PHSC 5212	Research Skills and Ethics	2
PHSC 5300	Pharmaceutical Biochemistry	2-4

**Program Credit/GPA Requirements**

129 total semester hours required  
Minimum 3.000 GPA required

**Plan of Study**

**Sample Plan of Study**

**Year 1**

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHMD 1201 and PHMD 1202	3	PHMD 6964 Co-op/IPPE		PHMD 5250	3
PHMD 2350	3			PHMD 2310 and PHMD 2311	2.5
PHSC 3411	4			PHSC 3412	4
PHSC 4501	5			PHSC 3419	1
				PHSC 4502	5
15		0		15.5	

**Year 2**

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHMD 6964 Co-op/IPPE	0	PHSC 2330	3	PHMD 4621	6
		PHSC 3430	3	PHMD 4622	1
		PHMD 3450	3	PHMD 4623	0.5

or PHSC 7010	Pharmaceutical Sciences Laboratory	
PHSC 5310	Cellular Physiology	2
PHSC 6214	Experimental Design and Biostatistics	2
PHSC 6216	Human Physiology and Pathophysiology	2

## Electives

Code	Title	Hours
Complete 17-19 semester hours in the following subject areas: <sup>1</sup>		17-19
PHSC, PMCL, PMST, BIOL, CHEM, NNMD, BIOT		

## Program Credit/GPA Requirements

33 total semester hours required  
Minimum 3.000 GPA required

<sup>1</sup> Students who opt to complete 4-credit PHSC 7010 in the Core Requirements may complete the degree with 17 elective credits; all other students must complete 19 elective credits.

## Medicinal Chemistry, MS

This Master of Science 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.

Please visit Bouvé College Learning Outcomes for the specific student learning outcomes for this program.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

A grade of C- or higher is required in each course.

Code	Title	Hours
<b>Required Core</b>		
PHSC 5100	Concepts in Pharmaceutical Science	2
PHSC 5102	Concepts in Pharmaceutical Science 2	2
PHSC 5212	Research Skills and Ethics	2
<b>Chemistry</b>		
CHEM 5626	Organic Synthesis 1	3
CHEM 5628	Principles of Spectroscopy of Organic Compounds	3
CHEM 5672	Organic Synthesis 2	3
CHEM 5676	Bioorganic Chemistry	3
PHSC 5400	Principles of Drug Design	3
PHSC 6222	The Chemistry and Biology of Drugs of Abuse	2

PHSC 6224	Behavioral Pharmacology and Drug Discovery	2
PHSC 6290	Biophysical Methods in Drug Discovery	2

## Electives

Code	Title	Hours
Complete 6 semester hours in the following subject areas:		6
BIOL, BIOT, CHEM, NNMD, PHSC, PMCL, PMST		

## Program Credit/GPA Requirements

33 total semester hours required  
Minimum 3.000 GPA required

## Pharmaceutical Sciences, MS

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 pharmaceuticals 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 Master of Science in Pharmaceutical Sciences (interdisciplinary concentration).

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' pharmaceuticals faculty and students are developing the pathways that bring small-molecule drugs and biological therapies directly to the target cells.

Our comprehensive program in pharmaceuticals 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
- Biopharmaceuticals 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.

Please visit Bouvé College Learning Outcomes for the specific student learning outcomes for this program.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

A grade of C– or higher is required in each course.

Code	Title	Hours
<b>Required Core</b>		
Complete 14–16 semester hours from the following:		
PHSC 5100	Concepts in Pharmaceutical Science	2
PHSC 5102	Concepts in Pharmaceutical Science 2	2
PHSC 5212	Research Skills and Ethics	2
PHSC 5300 or PHSC 7010	Pharmaceutical Biochemistry Pharmaceutical Sciences Laboratory	2-4
PHSC 5310	Cellular Physiology	2
PHSC 6214	Experimental Design and Biostatistics	2
PHSC 6216	Human Physiology and Pathophysiology	2
<b>Pharmaceutics</b>		
PMST 6250	Advanced Physical Pharmacy	2
PMST 6252	Pharmacokinetics and Drug Metabolism	3
PMST 6254	Advanced Drug Delivery System	3

### Electives

Code	Title	Hours
Complete 9-11 semester hours from the following subject area <sup>1</sup>		9-11
BIOL, BIOT, CHEM, NNMD, PHSC, PMCL, PMST		

### Program Credit/GPA Requirements

33 total semester hours required  
Minimum 3.000 GPA required

<sup>1</sup> Students who opt to complete 4-credit PHSC 7010 in the Core Requirements may complete the degree with 9 elective credits; all other students must complete 11 elective credits.

## Pharmacology, MS

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.

Please visit Bouvé College Learning Outcomes for the specific student learning outcomes for this program.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

A grade of C– or higher is required in each course.

Code	Title	Hours
<b>Required Core</b>		
Complete 14–16 semester hours from the following:		
PHSC 5100	Concepts in Pharmaceutical Science	2
PHSC 5102	Concepts in Pharmaceutical Science 2	2
PHSC 5212	Research Skills and Ethics	2
PHSC 5300 or PHSC 7010	Pharmaceutical Biochemistry Pharmaceutical Sciences Laboratory	2-4
PHSC 5310	Cellular Physiology	2
PHSC 6214	Experimental Design and Biostatistics	2
PHSC 6216	Human Physiology and Pathophysiology	2
<b>Pharmacology</b>		
PMCL 6260	Pharmacology 1	2
PMCL 6261	Pharmacology 2	2
PMCL 6262	Receptor Pharmacology	2
<b>Electives</b>		
Complete 11–13 semester hours from the following subject areas: <sup>1</sup>		11-13
BIOL, BIOT, CHEM, NNMD, PHSC, PMCL, PMST		

### Program Credit/GPA Requirements

33 total semester hours required  
Minimum 3.000 GPA required

<sup>1</sup> Students who opt to complete 4-credit PHSC 7010 in the Core Requirements may complete the degree with 11 elective credits; all other students must complete 13 elective credits.

## Pharmacy and Public Health, PharmD/MPH

The School of Pharmacy and the Department of Health Sciences offer a combined Doctor of Pharmacy (PharmD) and Master of Public Health (MPH) program.

The combined PharmD/MPH program recognizes and reinforces the importance of public health in pharmacy practice. Central to addressing public health concerns, and in particular those associated with racial and ethnic health disparities, the program is committed to building a strong, diverse, and activist public health workforce. The goal of the program is to graduate professionals who are well educated in the complex issues associated with disparate health status and healthcare access. The combined PharmD/MPH program allows qualified and interested students an opportunity to achieve their goal of obtaining a

more robust understanding of public health through an MPH degree while also completing their PharmD.

Refer to the School of Pharmacy PharmD – Direct Entry (p. 281) and Department of Health Sciences Master of Public Health (p. 255) pages of this catalog for program requirements and technical standards. Students must adhere to all PharmD and MPH program standards, policies, and requirements as listed in the catalog, unless otherwise specified.

The Northeastern University Master of Public Health Program is accredited by the Council on Education for Public Health (CEPH). CEPH is an independent agency recognized by the U.S. Department of Education to accredit schools of public health and public health programs outside of schools of public health.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

#### DOCTOR OF PHARMACY REQUIREMENTS

Code	Title	Hours
<b>Social / Administrative Pharmacy Sciences</b>		
PHMD 2350	Healthcare Systems	3
PHMD 5223	Evidence-Based Medicine	2
PHMD 5250	Pharmacy Care Management	3
PHMD 5330	Jurisprudence	3
<b>Pharmaceutical Sciences</b>		
PHSC 2330	Immunology	3
PHSC 3411	Pharmaceutics 1	4
PHSC 3412	Pharmaceutics 2	4
PHSC 3419	Pharmaceutics Laboratory	1
PHSC 3430	Pharmacokinetics and Biopharmaceutics	3
PHSC 5360	Anti-Infectives	4
PHSC 4501	Pharmacology/Medicinal Chemistry 1	5
PHSC 4502	Pharmacology/Medicinal Chemistry 2	5
<b>Pharmacy Practice</b>		
PHMD 4611	Comprehensive Disease Management 1	6
PHMD 4612	Comprehensive Disease Management 1 Seminar	1
PHMD 4621	Comprehensive Disease Management 2	6
PHMD 4622	Comprehensive Disease Management 2 Seminar	1
PHMD 4623	Comprehensive Disease Management 2 Skills Lab	0.5
PHMD 4631	Comprehensive Disease Management 3	6
PHMD 4632	Comprehensive Disease Management 3 Seminar	1
PHMD 4633	Comprehensive Disease Management 3 Skills Lab	0.5
PHMD 4641	Comprehensive Disease Management 4	6
PHMD 4642	Comprehensive Disease Management 4 Seminar	1
PHMD 4643	Comprehensive Disease Management 4 Skills Lab	0.5
PHMD 1201	Introduction to Pharmacy Practice	2.5
PHMD 1202	Lab for PHMD 1201	0.5

PHMD 2310	Professional Communication in Pharmacy Practice	2
PHMD 2311	Lab for PHMD 2310	0.5
PHMD 5270	Economic Evaluation of Pharmaceuticals and Pharmacy Practice	2
PHMD 5450	Advanced Pharmacy Practice Experience Preparatory Seminar	1

#### Required Practice Experience

Complete at least 2 semesters of Introductory Pharmacy Practice Experience / Co-op to meet program requirements	
Complete 36 semester hours of advanced pharmacy practice experience (APPE). The first three APPEs may not include PHMD 6453, PHMD 6457, or PHMD 6473.	36
PHMD 6440 to PHMD 6474	

### MASTER OF PUBLIC HEALTH REQUIREMENTS

Code	Title	Hours
<b>A grade of B– or higher is required in each required MPH course.</b>		

Required Core		
PHTH 5202	Introduction to Epidemiology	3
PHTH 5210	Biostatistics in Public Health	3
PHTH 5212	Public Health Administration and Policy	3
PHTH 5214	Environmental Health	3
PHTH 5540	Health Education and Program Planning	3
PHTH 6204	Society, Behavior, and Health	3
<b>Urban Health</b>		
PHTH 5120	Race, Ethnicity, and Health in the United States	3
PHTH 6200	Principles and History of Urban Health	3
PHTH 6208	Urban Community Health Assessment	3
<b>Practicum</b>		
PHTH 6966	Practicum	3

### Electives

Code	Title	Hours
Please visit the Electives lists of the Doctor of Pharmacy - Direct Entry or Master of Public Health programs. You may complete electives from another discipline in consultation with your advisor.		9
Doctor of Pharmacy -Direct Entry (p. 281)		
Master of Public Health (p. )		

### Capstone

Code	Title	Hours
This capstone will satisfy the capstone requirement for both programs.		
PHTH 6910	Public Health Capstone	3

### Program Credit/GPA Requirements

156 total semester hours required  
Minimum 3.000 GPA required



## Physical Therapy, Movement, and Rehabilitation Sciences

Website (<https://bouve.northeastern.edu/physical-therapy/>)

### Kristin Curry Greenwood, PT, DPT, EdD, MS

Associate Clinical Professor and Chair

### Eric Folmar, PT, DPT, OCS

Assistant Clinical Professor and Associate Chair

301 Robinson Hall

617.373.3908

617.373.3161 (fax)

[physicaltherapy@northeastern.edu](mailto:physicaltherapy@northeastern.edu)

The cornerstone of the Department of Physical Therapy, Movement, and Rehabilitation Sciences is experiential learning aligned with the mission of Bouvé College and Health Sciences and Northeastern University's 2025 Academic Plan. The programs within the department enhance and extend students' learning of human movement and rehabilitation through experiential education, interdisciplinary collaborations, interprofessional education, research opportunities, and a variety of global educational experiences. The department is led by a collaborative interdisciplinary body of faculty with research, scholarship, clinical, and teaching expertise across a diverse spectrum.

The Department of Physical Therapy, Movement, and Rehabilitation Sciences' research mission is to build the evidence for best practices to maintain and improve the health and well-being of local, national, and global community members. Students have the opportunity to work with faculty to conduct ongoing research in one of the nine Department of Physical Therapy, Movement, and Rehabilitation Sciences' labs and centers, including Neuromotor Systems Laboratory, Laboratory for Locomotion Research, ReGameVR Laboratory, Movement Neuroscience Laboratory, Musculoskeletal Epidemiology and Biomechanics Laboratory, Neuroscience Wet Lab, Occupational Biomechanics Laboratory, Teaching and Learning Innovation Lab, and the Center for Cognitive and Brain Health Program.

The Department of Physical Therapy, Movement, and Rehabilitation Sciences graduates are innovative, global leaders who excel in clinical practice, research, worker wellness, ergonomics, human movement, and community service.

## Programs

### Doctor of Philosophy (PhD)

- Human Movement and Rehabilitation Sciences (p. 291)

### Doctor of Physical Therapy (DPT)

- Physical Therapy—Postbaccalaureate Entry (p. 289)
- Transitional Doctor of Physical Therapy (p. 315)

### Graduate Certificate

- Advanced Study in Orthopedics (p. 359)
- Occupational Ergonomics and Health (p. 292)

## Physical Therapy, DPT— Postbaccalaureate Entry

### Kristin Curry Greenwood, PT, DPT, EdD, MS

Associate Clinical Professor and Interim Chair

Sonya Larrieux, PT, MA, PhD, C/NDT

Director, DPT Graduate Affairs

### Diane Fitzpatrick, PT, DPT, MS, CEEAA

Associate Director, Student Affairs

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Our Postbaccalaureate Doctor of Physical Therapy (DPT) (<http://www.northeastern.edu/bouve/pt/programs/pbdpt.html>) program is designed for individuals who hold a minimum of a baccalaureate degree in any major other than physical therapy and have satisfied the prerequisite requirements. Over the course of three years, this rigorous curriculum provides didactic and experiential learning experiences, the cornerstone of our program. These experiences include cooperative education, simulated patient interactions, human cadaver lab, engagement with consumer clients, service-learning, clinical research, and clinical education experiences.

The Doctor of Physical Therapy program recognizes that becoming a physical therapist is a developmental process that allows students the opportunity to take risks, reflect, learn from mistakes, and continue to grow to promote lifelong learning. We are committed to a process of actively engaged learning that occurs in the classroom, the research laboratory, the community, and clinical settings regionally and internationally. We strive to provide challenging and leading-edge academic content in an environment supportive of professional development. Our educational philosophy is based upon a strong foundation of biological, psychological, social, and clinical sciences; experiential learning; evidence-based practice; cultural agility and humanistic values; and ethical and professional expectations. This is supported by a commitment of promoting and improving the health of clients and society locally, nationally, and globally. Academic content is student-centered and delivered using both traditional and innovative teaching methods including, but not limited to, lectures, small group projects and discussions, multimedia presentations, expert panel discussions, human cadaver lab, problem-based approaches, case studies, faculty-led research, patient simulation, interprofessional education opportunities, virtual and online learning activities, and self-reflection. Experiential learning, a cornerstone of our curriculum, is embedded in academic course requirements including clinical education, cooperative education, service-learning, and capstone research projects. These experiences are intentional and align with the Northeastern University Academic 2025 Plan.

We offer a sports performance concentration that is designed to prepare the physical therapy student to confidently pursue a sports physical therapy position working with athletes of all ages in a variety of settings. Students take additional course work, focused on research and clinical rotations that expand upon the entry-level physical therapy curriculum. Our Sports Clinical Residency program is for licensed practicing physical therapists.

### Progression in the DPT program

To progress in the program, students must maintain acceptable standards of scholarship and academic performance as stated in the academic requirements section of this catalog. Students must develop appropriate motor skills, professional behaviors, and emotional maturity as outlined in the essential functions. The program in physical therapy is accredited by the Commission on Accreditation in Physical Therapy Education of the American Physical Therapy Association.

Graduates of the Doctor of Physical Therapy program are eligible to sit for the Physical Therapy Licensure Examination.

## Emphasis on Experiential Learning

### COOPERATIVE EDUCATION

Our DPT program provides students with six months of full-time experiential learning in addition to the required clinical affiliations necessary for licensure. Through cooperative education, the hallmark of Northeastern University, students are able to integrate semesters of academic study with semesters of cooperative education experiences in hospitals and clinics throughout the country and around the globe. Students may be employed as physical therapy co-ops or perform other health-related duties.

### CLINICAL EDUCATION

The curriculum also includes three rotations for a total of 36 weeks of clinical education under the direct supervision of a licensed physical therapist. We are affiliated with world-class medical centers and clinical sites throughout the United States, providing students with access to master clinicians and clinical scholars. Every effort is made to accommodate individual circumstances, but students should be prepared to travel out of state for two of the three clinical placements. Availability of a car may be required, as most sites are not accessible by public transportation. All expenses associated with clinical education, including travel and housing, are the responsibility of the student.

### GLOBAL OUTREACH

Students may participate in short cultural immersion experiences abroad whereby they engage in community service projects under the direction of a physical therapy faculty member or on physical therapy academic exchanges with partner academic institutions.

### SERVICE-LEARNING

During the curriculum, students participate in service-learning opportunities in the local community in which they learn and apply skills and knowledge related to program objectives. These opportunities start during the first academic year and continue throughout the program in a variety of settings.

### STUDENT RESEARCH

The Department of Physical Therapy, Movement, and Rehabilitation Sciences' research mission is to build the evidence for best practices to maintain and improve the health and well-being of local, national, and global community members. Students have the opportunity to work with faculty to conduct ongoing research in world-renowned medical centers and in one of the nine Department of Physical Therapy, Movement, and Rehabilitation Sciences' labs and centers, including Neuromotor Systems Lab, Laboratory for Locomotion Research, The ReGameVR Laboratory, Movement Neuroscience Laboratory, Musculoskeletal Epidemiology and Biomechanics Laboratory, Occupational Biomechanics and Ergonomics Laboratory, Teaching and Learning Innovation Lab, Neuroscience Wet Lab, and the Center for Cognitive and Brain Health Program.

Please visit Bouvé College Learning Outcomes for the specific student learning outcomes for this program.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

A grade of C or higher is required in all courses.

Code	Title	Hours
<b>Foundations</b>		
PT 5101 and PT 5102	Foundations of Physical Therapy and Lab for PT 5101	4
PT 6350 and PT 6351	Foundations of PT Examination and Therapeutic Activities and Lab for PT 6350	5
<b>Core</b>		
PT 5160	Psychosocial Aspects of Healthcare	3
PT 6243 and PT 6244	Health Education, Promotion, and Wellness and Recitation for PT 6243	3
PT 6251	Diagnostic Imaging	3
<b>Medicine and Management</b>		
PT 5140	Pathology	4
PT 5500	Pharmacology for Physical Therapy	2
PT 5503 and PT 5504	Cardiovascular and Pulmonary Management and Lab for PT 5503	5
PT 6219	Physical Therapy Administration	4
PT 6520 and PT 6521	Prosthetic Management and Lab for PT 6520	2
PT 6550	Pediatric Aspects of Life Span Management	3
PT 6555	Geriatric Aspects of Life Span Management	2
<b>Anatomy and Physiology</b>		
PT 5505 and PT 5506	Musculoskeletal Management 1 and Lab for PT 5505	5
PT 5515 and PT 5516	Integumentary Systems and Advanced Modalities and Lab for PT 5515	3
PT 6223 and PT 6224	Musculoskeletal Management 2 and Lab for PT 6223	5
PT 6330 and PT 6331	Functional Anatomy 1 and Lab for PT 6330	3
PT 6340 and PT 6341	Functional Anatomy 2 and Lab for PT 6340	5
PT 6505 and PT 6506	Musculoskeletal Management 3 and Lab for PT 6505	4
<b>Neurology</b>		
PT 5138 and PT 5139	Neuroscience and Lab for PT 5138	5
PT 5150 and PT 5151	Motor Control, Development, and Learning and Lab for PT 5150	5
PT 5209 and PT 5210	Neurological Rehabilitation 1 and Lab for PT 5209	5
PT 6221 and PT 6222	Neurological Rehabilitation 2 and Lab for PT 6221	5
<b>Seminar and Advanced Topics</b>		
PT 5161	Psychosocial Aspects of Healthcare Seminar	1
PT 5226	Physical Therapy Professional Seminar 2	2
PT 6600	Special Topics	2
<b>Clinical</b>		

PT 5540	Clinical Integration 1: Evidence and Practice	2
PT 6250	Clinical Integration 2: Evidence and Practice	2
PT 6441	Clinical Education 1	6
PT 6442	Clinical Education 2	6
PT 6448	Clinical Education 3	8
<b>Research</b>		
PT 6510	Evidence-Based Practice and Research Design	3
PT 6511	Research Methods and Statistics in PT	2
PT 6512	DPT Capstone 1	1
PT 6513	DPT Capstone 2	2
<b>Co-op</b>		
PT 5111	Professional Development for Bouvé Graduate Co-op	1
PT 6964	Co-op Work Experience (taken two semesters)	0

### Program Credit/GPA Requirements

123 total semester hours required  
 Minimum 3.000 GPA required

### Plan of Study

#### Human Movement and Rehabilitation Sciences, PhD

The Department of Physical Therapy, Movement, and Rehabilitation Sciences offers a PhD program in human movement and rehabilitation sciences. The PhD program seeks to prepare graduates to conduct independent (original) basic, translational, and applied research with the goal of creating new knowledge about neuromotor mechanisms and methods of restoring and maximizing human functional capacity and well-being across the life span. The program emphasizes core competencies in motor control and motor learning, movement measurement and analysis, knowledge translation theory, and the use of traditional and emerging technologies. The program is based on the integration of core skills and concepts across the multiple disciplines that are associated with human movement and rehabilitation sciences, coupled with the acquisition of research methodology, analyses, and skills, as well as specialization within specific areas of human movement and rehabilitation research.

The program showcases the unique faculty and research laboratories in human movement and rehabilitation sciences, as well as highly ranked programs in Bouvé College of Health Sciences, the College of Science, and the College of Engineering. Northeastern is dedicated to advancing the field of human movement and rehabilitation sciences and translating research from bench to clinic. Students benefit from our new research laboratories utilizing state-of-the-art movement and rehabilitation methods including virtual reality, ultrasound, neuroscience, neurophysiology, robotics, and movement measurement technologies.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

- Annual review
- Qualifying exam
- Dissertation committee

- Dissertation proposal
- Dissertation defense

### Core Requirements

Code	Title	Hours
<b>Seminar</b>		
PT 7030	Interdisciplinary Seminar in Rehabilitation Science	1
<b>Foundations</b>		
PHTH 5210	Biostatistics in Public Health	3
<b>Rehabilitation Science and Human Movement</b>		
PT 7001	Core Concepts in Rehabilitation Science and Research	3
PT 7010	Measurement and Analysis of Human Movement and Bioinstrumentation	4
PT 7020	Technologies in Movement and Rehabilitation Science	4

### Electives

Code	Title	Hours
Complete 17 semester hours from the list below chosen in consultation with a faculty advisor.		
BIOE 5320	Advanced Biomedical Measurements and Instrumentation	
BIOE 5810	Design of Biomedical Instrumentation	
BIOE 5235	Biomedical Imaging	
BIOE 7300	Special Topics in Biomechanics	
BIOL 5601	Multidisciplinary Approaches in Motor Control	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7200	Linear Systems Analysis	
EXSC 5210	Physical Activity and Exercise: Prescription, Measurement, and Testing	
HLTH 5450	Healthcare Research	
ME 5250	Robot Mechanics and Control	
ME 5659	Control Systems Engineering	
ME 5665	Musculoskeletal Biomechanics	
ME 7247	Advanced Control Engineering	
PHTH 6210	Applied Regression Analysis	
PHTH 6440	Advanced Methods in Biostatistics	
PT 5133	Kinesiology	
PT 5138	Neuroscience	
PT 5150	Motor Control, Development, and Learning	
PT 5209	Neurological Rehabilitation 1	
PT 5600	Ergonomics and the Work Environment	
PT 6221	Neurological Rehabilitation 2	

### Dissertation

Code	Title	Hours
Complete the following (repeatable) course twice:		
PT 9990	Dissertation	

### Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

## Occupational Ergonomics and Health, Graduate Certificate

The Occupational Ergonomics and Health graduate certificate focuses on approaches that promote worker well-being and prevent work-related musculoskeletal disorders (MSDs) and injuries. What makes this certificate unique is the emphasis on not just physical ergonomic factors, like the design of tools and equipment, but also the importance of organizational ergonomic factors, like policies, communication, and teamwork. This is important because the management of workplace ergonomics and health programs requires a multidisciplinary set of skills based on understanding interactions in the work environment, including the physical and organizational factors.

The workplace of the 21<sup>st</sup> century demands an interprofessional approach that reaches across organizational boundaries, making health and safety a uniform and consistent value within the organization to effectively impact worker health. Students add to their professional experience by specializing in workplace approaches that integrate health and safety programs.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

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

Code	Title	Hours
PT 5600	Ergonomics and the Work Environment	3
PT 5610	Workplace Wellness and Health Promotion	3
PHTH 5202	Introduction to Epidemiology	3
PHTH 5210	Biostatistics in Public Health	3

### Elective

Code	Title	Hours
Complete 3 semester hours from the following:		
HINF 6201	Organizational Behavior, Work Flow Design, and Change Management	3
PHTH 5214	Environmental Health	

### Program Credit/GPA Requirements

15 total semester hours required

Minimum 3.000 GPA required

## Physician Assistant

Website (<https://bouve.northeastern.edu/physician-assistant/>)

### Robert Baginski, MD

Associate Clinical Professor and Program Director

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paprogram@northeastern.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.

### Programs

#### Master of Science (MS)

- Physician Assistant Studies (p. 292)

#### Dual Degree

- Physician Assistant Studies and Health Informatics, MS/MS (p. 242)
- Physician Assistant Studies and Public Health, MS/MPH (p. 259)

#### Graduate Certificate

- Physician Assistant and Nurse Practitioner Leadership and Management (p. 295)

## Physician Assistant Studies, MS

Physician assistants (PAs) are healthcare providers who practice medicine with physician supervision. They are highly sought after members of the healthcare team who provide diagnostic and therapeutic patient care. The physician assistant studies (MS) program is a full-time, two-year graduate program that provides an opportunity to earn a Master of Science in Physician Assistant Studies.

Please visit Bouvé College Learning Outcomes for the specific student learning outcomes for this program.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

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

Code	Title	Hours
<b>Required Core</b>		
PA 6208	Professional Issues for Physician Assistants	2
PA 6326	Aspects of Primary Care	4
PA 6327	Emergency Medicine and Critical Care	2
PA 6328	Aging and Rehabilitation Medicine	2
PA 6329	Healthcare Delivery	2
PA 6330	Research Design	2
<b>Anatomy and Physiology</b>		
PA 6200	Anatomy and Physiology 1	3
PA 6201	Anatomy and Physiology 2	3

**Diagnosis and Evaluation**

PA 6203	Physical Diagnosis and Patient Evaluation 1	3
PA 6204	Physical Diagnosis and Patient Evaluation 2	3

**Pharmacology**

PA 6205	Pharmacology 1	2
PA 6206	Pharmacology 2	2
PA 6207	Clinical Laboratory and Diagnostic Methods	4

**Principles**

PA 6311	Principles of Medicine 1	4
PA 6312	Principles of Medicine 2	4
PA 6313	Principles of Medicine 3	4
PA 6320	Principles of Obstetrics and Gynecology	2
PA 6321	Principles of Surgery	2
PA 6322	Principles of Orthopedics	2
PA 6323	Clinical Neurology	2
PA 6324	Principles of Pediatrics	2
PA 6325	Principles of Psychiatry	2

**Clinical**

PA 6400	Applied Study in Medicine	5
PA 6401	Applied Study in Ambulatory Medicine	5
PA 6402	Applied Study in Family Practice	5
PA 6403	Applied Study in Emergency Medicine	5
PA 6404	Applied Study in Obstetrics and Gynecology	5
PA 6405	Applied Study in Pediatrics	5
PA 6406	Applied Study in Surgery	5
PA 6407	Applied Study in Mental Health	5
PA 6408	Applied Study Elective	5

**Program Credit/GPA Requirements**

103 total semester hours required

Minimum 3.000 GPA required

**Physician Assistant Studies and Health Informatics, MS/MS**

The Northeastern University health informatics and physician assistant combined program allows qualified and interested students to achieve their goal of obtaining a more robust understanding of healthcare technology while also completing robust clinical training in the physician assistant program. This prepares a select group of exceptionally qualified clinicians to become leaders in healthcare technology application and development and fosters interdisciplinary collaboration in order to address problems in the healthcare and health information environments both locally and across the globe. The joint program is designed to provide students a greater understanding of technological issues in clinical practice, quantitative methods, and the use of scientific evidence and cutting-edge technology to optimize clinical workflows and improve patient outcomes.

This dual degree takes 34 months to complete (as opposed to 48, if each degree were pursued separately), and a total number of 8 credits are shared between both degrees.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Physician Assistant Requirements**

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

Code	Title	Hours
<b>Required Core</b>		
PA 6208	Professional Issues for Physician Assistants	2
PA 6326	Aspects of Primary Care	4
PA 6327	Emergency Medicine and Critical Care	2
PA 6328	Aging and Rehabilitation Medicine	2
PA 6329	Healthcare Delivery	2
<b>Anatomy &amp; Physiology</b>		
PA 6200	Anatomy and Physiology 1	3
PA 6201	Anatomy and Physiology 2	3
<b>Diagnosis &amp; Evaluation</b>		
PA 6203	Physical Diagnosis and Patient Evaluation 1	3
PA 6204	Physical Diagnosis and Patient Evaluation 2	3
<b>Pharmacology</b>		
PA 6205	Pharmacology 1	2
PA 6206	Pharmacology 2	2
PA 6207	Clinical Laboratory and Diagnostic Methods	4
<b>Principles</b>		
PA 6311	Principles of Medicine 1	4
PA 6312	Principles of Medicine 2	4
PA 6313	Principles of Medicine 3	4
PA 6320	Principles of Obstetrics and Gynecology	2
PA 6321	Principles of Surgery	2
PA 6322	Principles of Orthopedics	2
PA 6323	Clinical Neurology	2
PA 6324	Principles of Pediatrics	2
PA 6325	Principles of Psychiatry	2
<b>Clinical</b>		
PA 6400	Applied Study in Medicine	5
PA 6401	Applied Study in Ambulatory Medicine	5
PA 6402	Applied Study in Family Practice	5
PA 6403	Applied Study in Emergency Medicine	5
PA 6404	Applied Study in Obstetrics and Gynecology	5
PA 6405	Applied Study in Pediatrics	5
PA 6406	Applied Study in Surgery	5
PA 6407	Applied Study in Mental Health	5
PA 6408	Applied Study Elective	5

**Health Informatics Requirements**

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

Code	Title	Hours
<b>Required Core</b>		
HINF 7701	Health Informatics Capstone Project	3

**Business Management**

Complete two courses from the following:	6
HINF 6201	Organizational Behavior, Work Flow Design, and Change Management
HINF 6202	Business of Healthcare Informatics
HINF 6215	Project Management
HINF 6240	Improving the Patient Experience through Informatics
HINF 6335	Management Issues in Healthcare Information Technology
PHTH 5226	Strategic Management and Leadership in Healthcare

**Health Informatics**

Complete two courses from the following:	6
HINF 5102	Data Management in Healthcare
HINF 5110	Global Health Information Management
HINF 5200	Theoretical Foundations in Personal Health Informatics
HINF 6205	Creation and Application of Medical Knowledge
HINF 6350	Public Health Surveillance and Informatics
HINF 6404	Patient Engagement Informatics and Analytics
HINF 6405	Quantifying the Value of Informatics
PHTH 5232	Evaluating Healthcare Quality

**Technical**

PHTH 5202	Introduction to Epidemiology	3
PHTH 5210	Biostatistics in Public Health	3

**Electives**

Complete two courses from the following:	6
HINF 6345	Design for Usability in Healthcare
DA 5020	Collecting, Storing, and Retrieving Data
DA 5030	Introduction to Data Mining/Machine Learning
INSH 5301	Introduction to Computational Statistics
INSH 5302	Information Design and Visual Analytics

**Program Credit/GPA Requirements**

128 total semester hours required  
Minimum 3.000 GPA required

**Physician Assistant Studies and Public Health, MS/MPH**

The Northeastern University Physician Assistant (PA) Program and Department of Health Sciences offer a combined Master of Science in Physician Assistant Studies (MS)/Master of Public Health (MPH). The combined PA/MPH program allows qualified and interested students an opportunity to achieve their goal of obtaining a more robust understanding of public health through an MPH degree, while also completing their Master of Science in Physician Assistant Studies.

The Northeastern University Master of Public Health program is accredited by the Council on Education for Public Health (CEPH) (<https://nam05.safelinks.protection.outlook.com/?url=https%3A%2F%2Fceph.org%2F&data=02%7C01%7Ch.daly>

%40northeastern.edu%7C444b8329a5cc4e32422d08d6a3f8602d%7Ca8eec281aaa34daeac9b9a398b9215e7%7C0%7C636876684493976408&%2B3f5nKvOeY0%3D&reserved=0/). CEPH is an independent agency recognized by the U.S. Department of Education to accredit schools of public health and public health programs outside of schools of public health. The MPH program has a strong commitment to providing a flexible course of study for working professionals. This flexibility allows for easy incorporation into a dual-degree program.

The combined degree that incorporates both programs is designed to help diversify the public health workforce and improve graduates' ability to approach clinical situations with cultural sensitivity and awareness. Successful graduates of the program benefit from having a greater understanding of public health issues in clinical practice, including the racial and ethnic health disparities prevalent in the U.S. healthcare system, as well as a strong grounding in epidemiology, quantitative and qualitative research methods, and the use of scientific evidence, skills critical to many fields of healthcare practice.

This dual degree takes a total of three years to complete (as opposed to four, if each degree were pursued separately), and a total number of 12 credits are shared between both degrees.

For more information, including the application and admissions process, please visit the PA/MPH website here (<https://bouve.northeastern.edu/health-sciences/programs/pa-mph/>).

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Physician Assistant Requirements**

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

Code	Title	Hours
<b>Required Core</b>		
PA 6208	Professional Issues for Physician Assistants	2
PA 6326	Aspects of Primary Care	4
PA 6327	Emergency Medicine and Critical Care	2
PA 6328	Aging and Rehabilitation Medicine	2
<b>Anatomy and Physiology</b>		
PA 6200	Anatomy and Physiology 1	3
PA 6201	Anatomy and Physiology 2	3
<b>Diagnosis and Evaluation</b>		
PA 6203	Physical Diagnosis and Patient Evaluation 1	3
PA 6204	Physical Diagnosis and Patient Evaluation 2	3
PA 6207	Clinical Laboratory and Diagnostic Methods	4
PA 6323	Clinical Neurology	2
<b>Pharmacology</b>		
PA 6205	Pharmacology 1	2
PA 6206	Pharmacology 2	2
<b>Principles</b>		
PA 6311	Principles of Medicine 1	4
PA 6312	Principles of Medicine 2	4
PA 6313	Principles of Medicine 3	4
PA 6320	Principles of Obstetrics and Gynecology	2

PA 6321	Principles of Surgery	2
PA 6322	Principles of Orthopedics	2
PA 6324	Principles of Pediatrics	2
PA 6325	Principles of Psychiatry	2
<b>Clinical</b>		
PA 6400	Applied Study in Medicine	5
PA 6401	Applied Study in Ambulatory Medicine	5
PA 6402	Applied Study in Family Practice	5
PA 6403	Applied Study in Emergency Medicine	5
PA 6404	Applied Study in Obstetrics and Gynecology	5
PA 6405	Applied Study in Pediatrics	5
PA 6406	Applied Study in Surgery	5
PA 6407	Applied Study in Mental Health	5

**Master of Public Health Requirements**

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

Code	Title	Hours
<b>Required Core</b>		
PHTH 5202	Introduction to Epidemiology	3
PHTH 5210	Biostatistics in Public Health	3
PHTH 5212	Public Health Administration and Policy	3
PHTH 5214	Environmental Health	3
PHTH 5232	Evaluating Healthcare Quality	3
PHTH 5540	Health Education and Program Planning	3
PHTH 6204	Society, Behavior, and Health	3
<b>Urban Health</b>		
PHTH 5120	Race, Ethnicity, and Health in the United States	3
PHTH 6200	Principles and History of Urban Health	3
PHTH 6208	Urban Community Health Assessment	3
<b>Practicum</b>		
PHTH 6966	Practicum	3
<b>Capstone</b>		
PHTH 6910	Public Health Capstone	3
<b>Elective</b>		
Complete 3 semester hours of approved elective course work.		3

**Program Credit/GPA Requirements**

133 total semester hours required  
 Minimum 3.000 GPA required

**Physician Assistant and Nurse Practitioner Leadership and Management, Graduate Certificate**

The Northeastern University Physician Assistant (PA) Program and the American Academy of Physician Assistants' Center for Healthcare Leadership and Management jointly sponsor the Graduate Certificate in PA and NP Leadership and Management. The certificate seeks to prepare qualified and interested students to achieve their goal of obtaining a robust understanding of the theory, techniques, and implementation of leadership and management skills essential in the practice and administration of medicine in today's healthcare environment. The curriculum is designed to support physician assistants, nurse practitioners, and those managing PAs and NPs with the necessary

skills and competencies to expand their roles in the clinical arena and/or increase their familiarity with and training in leadership/management in order to advance their careers in healthcare administration.

The certificate can be completed in one year and requires a total of 12 credits.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Core Requirements**

Code	Title	Hours
PA 5100	Principles of Leadership in Healthcare	3
PA 5101	Advocacy in Leadership	3
PA 5102	Medical Billing and Reimbursement for Advanced Practice Providers	3
PA 5103	Metrics: Measuring, Comparing, and Privileging Your PA and NP Workforce	3

**Program Credit/GPA Requirements**

12 total semester hours required  
 Minimum 3.000 GPA required

**James R. Hackney, JD**, Dean

**Martha F. Davis, MA, JD**, Associate Dean for Experiential Education

**Kristin Madison, JD, PhD**, Associate Dean for Academic Affairs

**John Reilly, MS**, Associate Dean for Finance and Administration

**Margaret Y.K. Woo, JD, LLM**, Associate Dean for Research and Interdisciplinary Education

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Today's legal environment demands that attorneys be nimble, entrepreneurial, and savvy; in all of these regards, graduates of the School of Law excel. Our curriculum, taught by nationally recognized faculty, provides students with a superior understanding of how the law applies in real settings, a strong ethical framework, and the experience to strategically pursue their professional objectives. Our co-op program sets us apart from all other law schools—our JD students complete many hours of full-time work in law offices, judges' chambers, corporations, nonprofits, and government. As a result of their co-op experiences, Northeastern law students are not just sitting in classes hearing about the rapid changes in the legal world—they live them.

Our community also provides a refreshing refutation of the law school stereotype as a place of ruthless competition and blind ambition. Instead, we cultivate an atmosphere that is collaborative, collegial, and supportive. Our students' eagerness to work in teams, help one another, and share their experiences reflects that ethos. Our faculty and staff are exceptionally supportive of students—not only because our small community encourages extensive student-faculty interaction but also because they share their students' passion for justice.

Students may choose from a number of programs, including the JD, LLM, and other full-time and part-time programs for lawyers as well as nonlawyers. Our suite of LLM opportunities are offered for both those who hold a U.S. law degree and those who hold a first professional law degree from a law school outside of the United States.

## Programs

### Master of Legal Studies (MLS)

- Legal Studies—Online (p. 296)

### Master of Science

- Media Advocacy (p. 61)

### Graduate Certificate

- Business Law (p. 298)
- Health Law (p. 299)
- Healthcare Compliance (p. 300)
- Human Resources Law (p. 300)
- Intellectual Property Law (p. 301)

### Legal Studies, MLS—Online

The Master of Legal Studies program is designed for professionals who want a deeper understanding of law and legal concepts. Such

professionals may be found in nonprofit organizations, foundations, financial services firms, pharmaceutical companies, insurance firms, compliance departments, or a host of other commercial and noncommercial settings. Examples of the professionals who would be interested in this degree are human resource professionals, claims representatives for insurance companies, professionals in healthcare organizations, bank loan officers, real estate brokers, risk managers, government affairs officers, management consultants advising organizations, development officers working on planned giving, and software entrepreneurs. They desire to know more about the law and to be able to deal more effectively with the lawyers with whom they interact during their professional lives. The degree includes concentrations in human resources law, business law, intellectual property law, and health law.

## Program Plan

Students take one 3-semester-hour course per term. A term is approximately eight weeks; there are two terms (A and B) in each of three semesters (fall, spring, and summer). The course work is spread over 10 terms or five semesters. Every student in their first semester takes two required foundation courses. Students then take four out of five core courses, plus three or four elective courses from any of four concentrations. Students choosing not to concentrate may take courses from any concentration.

## Program Features

### TOTAL DEGREE CREDIT REQUIRED

The program requires 30 semester hours.

### COURSE ORGANIZATION

The program comprises 10 courses:

- Each course is eight weeks
- Two courses are taken per semester
- Each course is 3 semester hours
- Course types:
  - Two foundation courses
  - Four or five core courses
  - Three or four elective courses

### CONCENTRATIONS

The program includes four concentrations plus a general track. The concentrations are:

- Business Law
- Health Law
- Human Resources Law
- Intellectual Property Law

### ACADEMIC STRUCTURE

- Six eight-week sessions per calendar year.
  - Spring A
  - Spring B
  - Summer A
  - Summer B
  - Fall A
  - Fall B



- Two eight-week courses (3 semester hours each) back-to-back in each 16-week semester
- Total of 10 courses needed to graduate

### TIME TO DEGREE COMPLETION

Normal completion time is five semesters of part-time study, with students taking one course at a time.

### 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
- Transcripts from all previous higher educational institutions attended.
- Professional resumé

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Foundation Courses

Code	Title	Hours
LS 6101	Introduction to Legal Studies 1: Law and Legal Reasoning	3
LS 6102	Introduction to Legal Studies 2	3

#### Core Courses

Code	Title	Hours
Complete at least four of the following:		12-15
LS 6110	Law of Information and Records	
LS 6120	Law and Strategy	
LS 6130	Negotiation and Advocacy	
LS 6140	Data Regulation and Compliance	
LS 6150	Law and Organizational Management	

#### Electives

Code	Title	Hours
Students who prefer not to pursue a concentration may take 9-12 hours of electives in any specialty area.		9-12

#### Concentration Options

A concentration is not required, students may complete electives in lieu of a concentration.

##### *Concentration in Business Law*

Code	Title	Hours
LS 6160	Regulation and Global Business Strategies	3
LS 6170	Financial Transactions	3
LS 6230	Intellectual Property Survey	3
or LS 6210	Special Topics in Employee Rights and Employer Obligations	

##### *Concentration Health Law*

Code	Title	Hours
LS 6180	Health Law Survey	3
LS 6181	Healthcare Regulation and Compliance	3
LS 6182	Patient Records, Privacy, and Security	3

##### *Concentration in Human Resources Law*

Code	Title	Hours
LS 6210	Special Topics in Employee Rights and Employer Obligations	3
LS 6211	Antidiscrimination Law	3
LS 6212	Wages and Benefits	3

##### *Concentration in Intellectual Property Law*

Code	Title	Hours
LS 6230	Intellectual Property Survey	3
LS 6231	Identifying and Securing Intellectual Property Rights	3
LS 6232	Intellectual Property and Media	3

### Program Credit/GPA Requirements

30 total semester hours required  
Minimum 3.000 GPA required

### Media Advocacy, MS

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

### Program Requirements

#### Core Requirements

Code	Title	Hours
JRNL 5400	Media and Advocacy in Theory and Practice	4
JRNL 5480		
LW 6400	Law, Policy and Legal Argument	4
LW 7667	Law and Ethics of Advocacy	3

#### Electives

Code	Title	Hours
Complete 18 semester hours from the following:		18
<b>Advocating for Change</b>		
Complete 9–12 semester hours from the following:		
JRNL 6202	Perspective on Journalism Ethics	
LW 6120	Law and Strategy	
LW 6180	Health Law Survey	
LW 6211	Antidiscrimination Law	

LW 6231	Identifying and Securing Intellectual Property Rights
LW 7329	Environmental Law
LW 7335	Health Law
LW 7369	Intellectual Property
LW 7428	State and Local Government
LW 7463	Nonprofit Organizations
LW 7488	Sexuality, Gender and the Law
LW 7512	Problems in Public Health Law
LW 7525	Law and Economic Development
LW 7582	Elder Law
LW 7588	Reproductive Rights and Health
LW 7597	Civil Rights and Restorative Justice Clinic
LW 7600	Current Issues in Health Law and Policy
LW 7635	Lab Seminar in Applied Design and Legal Empowerment
LW 7651	Human Rights in the United States

**Techniques of Advocacy**

Complete 9–12 semester hours from the following:

ARTD 5001	Art, Context, Action 1
ARTD 5002	Art, Context, Action 2
ARTD 5582	Collaborative Video and Community Engagement
ARTG 5100	Information Design Studio 1: Principles
ARTG 5110	Information Design History
ARTG 5310	Visual Cognition
ARTG 5330	Visualization Technologies 1: Fundamentals
ARTG 5600	Experience Design Studio 1: Principles
ARTG 5610	Design Systems
ARTG 5620	Notational Systems for Experience
ARTG 6310	Design for Behavior and Experience
ARTG 6320	Design of Information-Rich Environments
JRNL 5310	Photojournalism
JRNL 6340	Fundamentals of Digital Journalism
LW 6120	Law and Strategy
LW 6180	Health Law Survey
LW 6231	Identifying and Securing Intellectual Property Rights
LW 7597	Civil Rights and Restorative Justice Clinic
LW 7635	Lab Seminar in Applied Design and Legal Empowerment

### Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

### Plan of Study

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

##### Year 1

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
JRNL 5400	4	Media Advocacy and Communication Research	4	Vacation	0	Vacation	0
LW 6400	4	Elective 2	3-4				
Elective 1	3-4	Elective 3	3-4				
		11-12		10-12		0	0

##### Year 2

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

Total Hours: 33-39

### Business Law, Graduate Certificate

The Graduate Certificate in Business Law is designed to provide professionals in large and small enterprises with an ability to recognize, navigate, and leverage the laws that regulate business organizations and transactions.

### Program Plan

Students take one 3-credit course per term. Each term is approximately eight weeks, and there are two terms (A and B) in each of three semesters (fall, spring, and summer). The course work may be spread over two or three semesters. Every student begins the program by taking a required foundation course (Introduction to Legal Studies II). Students then take three additional courses related to business law.

### Program Features

#### TOTAL CERTIFICATE CREDIT REQUIREMENT

The program requires 12 semester hours.

#### COURSE ORGANIZATION

The program comprises four courses:

- Each course is eight weeks
- One or two courses are taken each semester
- Each course is 3 semester hours
- Course type:
  - One foundation course
  - Three certificate-specific courses

#### ACADEMIC STRUCTURE

- Six eight-week sessions per calendar year.
  - Fall A
  - Fall B

- Spring A
- Spring B
- Summer A
- Summer B

One or two eight-week courses (3 semester hours each) taken in one to three semesters.

Total of four courses needed to complete certificate.

**TIME TO CERTIFICATE COMPLETION**

Normal completion time is two to three semesters (depending upon course sequencing) of part-time study, with students taking one course at a time.

**ADMISSIONS CYCLES**

- Fall B
- Spring B
- Summer B

**ADMISSIONS REQUIREMENTS**

- Bachelor’s degree from regionally accredited institution
- Online application
- Application fee—none
- Personal statement with designated questions to be answered
- One letter of recommendation
- TOEFL for international students
- Transcripts from all previous higher educational institutions attended
- Professional resumé

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Requirements**

Code	Title	Hours
LS 6102	Introduction to Legal Studies 2	3
LS 6170	Financial Transactions	3
LS 6160	Regulation and Global Business Strategies	3
Complete one of the following:		3
LS 6230	Intellectual Property Survey	
LS 6210	Special Topics in Employee Rights and Employer Obligations	

**Program Credit/GPA Requirements**

12 total semester hours required  
 Minimum 3.000 GPA required

**Health Law, Graduate Certificate**

The Graduate Certificate in Health Law is designed to provide professionals who work in healthcare with the skills needed to recognize,

navigate, and leverage the many legal issues that arise within this heavily regulated industry.

**Program Plan**

Students take one 3-credit course per term. Each term is approximately eight weeks, and there are two terms (A and B) in each of three semesters (fall, spring, and summer). The course work may be spread over two or three semesters. Every student begins the program by taking a required foundation course (Introduction to Legal Studies 2 (LS 6102). Students then take three additional required courses, each that focuses specifically on health law.

**Program Features**

**TOTAL CERTIFICATE CREDIT REQUIREMENT**

The program requires 12 semester hours.

**COURSE ORGANIZATION**

The program comprises four courses:

- Each course is eight weeks
- One or two courses are taken each semester
- Each course is 3 semester hours
- Course type:
  - One foundation course
  - Three certificate-specific courses

**ACADEMIC STRUCTURE**

- Six eight-week sessions per calendar year.
  - Fall A
  - Fall B
  - Spring A
  - Spring B
  - Summer A
  - Summer B

One or two eight-week courses (3 semester hours each) taken in one to three semesters.

Total of four courses needed to complete certificate.

**TIME TO CERTIFICATE COMPLETION**

Normal completion time is two to three semesters (depending upon course sequencing) of part-time study, with students taking one course at a time.

**ADMISSIONS CYCLES**

- Fall B
- Spring B
- Summer B

**ADMISSIONS REQUIREMENTS**

- Bachelor’s degree from regionally accredited institution
- Online application
- Application fee—none
- Personal statement with designated questions to be answered
- One letter of recommendation
- TOEFL for international students
- Transcripts from all previous higher educational institutions attended
- Professional resumé

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Requirements

Code	Title	Hours
LS 6102	Introduction to Legal Studies 2	3
LS 6180	Health Law Survey	3
LS 6181	Healthcare Regulation and Compliance	3
LS 6182	Patient Records, Privacy, and Security	3

### Program Credit/GPA Requirements

12 total semester hours required  
Minimum 3.000 GPA required

### Healthcare Compliance, Graduate Certificate

The Graduate Certificate in Healthcare Compliance is designed to give law students, MBA students, and working professionals tools they need to successfully navigate the world of healthcare compliance. This 15-credit, one-year program jointly offered by the School of Law and the D'Amore-McKim School of Business gives students the opportunity to learn about the laws that govern the healthcare system while developing the business knowledge and skills critical to healthcare compliance.

Students may fulfill most of the requirements for this program by taking online courses; all LS courses are taught in an online format. Students will also interact with instructors on Northeastern's Boston campus during an on-the-ground 1-credit introductory course and a 1-credit capstone course.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Requirements

Code	Title	Hours
<b>Required Courses</b>		
LS 6190	Introduction to Healthcare Compliance	1
LS 6184	Healthcare Compliance 1	2
LS 6192	Healthcare Compliance 2	2
LS 6182	Patient Records, Privacy, and Security	3
LS 6193	Healthcare Compliance Capstone	1
Complete one of the following:		3
LS 6180	Health Law Survey	
HINF 5105	The American Healthcare System (MBA students should take this course)	
LAW 7335	Health Law (Law students should take this course)	
<b>Elective</b>		
Complete one of the following:		3
FINA 6200	Value Creation through Financial Decision Making	
HRMG 6220	Health Organization Management	
LAW 7344	Accounting/Finance for Lawyers	
LAW 7494	Bioethics and the Law	
LAW 7600	Current Issues in Health Law and Policy	
LAW 7619	Healthcare Fraud and Abuse Law	

LS 6110 Law of Information and Records

LS 6120 Law and Strategy

LS 6140 Data Regulation and Compliance

PHTH 5232 Evaluating Healthcare Quality

SCHM 6223 Managing Healthcare Supply Chain Operations

STRT 6220 Strategic Management for Healthcare Organizations

### Program Credit/GPA Requirements

15 total semester hours required  
Minimum 3.000 GPA required

### Human Resources Law, Graduate Certificate

The Graduate Certificate in Human Resources Law is designed to provide professionals who work in human resources with the skills needed to recognize, navigate, and leverage the many legal issues that arise within this heavily regulated field.

### Program Plan

Students take one 3-credit course per term. Each term is approximately eight weeks, and there are two terms (A and B) in each of three semesters (fall, spring, and summer). The course work may be spread over two or three semesters. Every student begins the program by taking a required foundation course (Introduction to Legal Studies 2 (LS 6102)). Students then take three additional required courses, each that focuses specifically on health law.

### Program Features

#### TOTAL CERTIFICATE CREDIT REQUIREMENT

The program requires 12 semester hours.

#### COURSE ORGANIZATION

The program comprises four courses:

- Each course is eight weeks
- One or two courses are taken each semester
- Each course is 3 semester hours
- Course type:
  - One foundation course
  - Three certificate-specific courses

#### ACADEMIC STRUCTURE

- Six eight-week sessions per calendar year.
  - Fall A
  - Fall B
  - Spring A
  - Spring B
  - Summer A
  - Summer B

One or two eight-week courses (3 semester hours each) taken in one to three semesters.

Total of four courses needed to complete certificate.

**TIME TO CERTIFICATE COMPLETION**

Normal completion time is two to three semesters (depending upon course sequencing) of part-time study, with students taking one course at a time.

**ADMISSIONS CYCLES**

- Fall B
- Spring B
- Summer B

**ADMISSIONS REQUIREMENTS**

- Bachelor’s degree from regionally accredited institution
- Online application
- Application fee—none
- Personal statement with designated questions to be answered
- One letter of recommendation
- TOEFL for international students
- Transcripts from all previous higher educational institutions attended
- Professional resumé

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Requirements**

Code	Title	Hours
LS 6102	Introduction to Legal Studies 2	3
LS 6210	Special Topics in Employee Rights and Employer Obligations	3
LS 6211	Antidiscrimination Law	3
LS 6212	Wages and Benefits	3

**Program Credit/GPA Requirements**

12 total semester hours required  
 Minimum 3.000 GPA required

**Intellectual Property Law, Graduate Certificate**

The Graduate Certificate in Intellectual Property Law is designed to provide professionals who work in intellectual property, technology transfer, licensing, or related areas, as well as inventors and entrepreneurs, with the skills they need to recognize and protect intellectual property rights.

**Program Plan**

Students take one 3-credit course per term. Each term is approximately eight weeks, and there are two terms (A and B) in each of three semesters (fall, spring, and summer). The course work may be spread over two or three semesters. Every student begins the program by taking a required foundation course (Introduction to Legal Studies 2 (LS 6102). Students

then take three additional required courses, each that focuses specifically on intellectual property law.

**Program Features**

**TOTAL CERTIFICATE CREDIT REQUIREMENT**

The program requires 12 semester hours.

**COURSE ORGANIZATION**

The program comprises four courses:

- Each course is eight weeks
- One or two courses are taken each semester
- Each course is 3 semester hours
- Course type:
  - One foundation course
  - Three certificate-specific courses

**ACADEMIC STRUCTURE**

- Six eight-week sessions per calendar year.
  - Fall A
  - Fall B
  - Spring A
  - Spring B
  - Summer A
  - Summer B

One or two eight-week courses (3 semester hours each) taken in one to three semesters

Total of four courses needed to complete certificate

**TIME TO CERTIFICATE COMPLETION**

Normal completion time is two to three semesters (depending upon course sequencing) of part-time study, with students taking one course at a time.

**ADMISSIONS CYCLES**

- Fall B
- Spring B
- Summer B

**ADMISSIONS REQUIREMENTS**

- Bachelor’s degree from regionally accredited institution
- Online application
- Application fee—none
- Personal statement with designated questions to be answered
- One letter of recommendation
- TOEFL for international students
- Transcripts from all previous higher educational institutions attended

- Professional resumé

### **Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

### **Requirements**

<b>Code</b>	<b>Title</b>	<b>Hours</b>
LS 6102	Introduction to Legal Studies 2	3
LS 6230	Intellectual Property Survey	3
LS 6231	Identifying and Securing Intellectual Property Rights	3
LS 6232	Intellectual Property and Media	3

### **Program Credit/GPA Requirements**

12 total semester hours required

Minimum 3.000 GPA required

# College of Professional Studies

Website (<https://cps.northeastern.edu>)

**Mary Loeffelholz, PhD**, Dean of the College of Professional Studies and Vice President of Professional Education

**David Fields, PhD**, Senior Associate Dean of Graduate Academic and Faculty Affairs

**Lydia Young, PhD**, Associate Dean of Academic and Faculty Affairs; Director of Graduate School of Education

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## Academic Policies and Procedures

- Master's Degree Admission Requirements (p. 303)
- Transfer Credit Policies (p. 303)
- Special Student Status (p. 304)
- Personal Professional Enrichment (PPE) (p. 304)
- New Student Orientation (On-Ground and Online) (p. 304)
- Academic Resources (p. 304)
- Attendance Requirements (p. 304)
- Attendance Verification (p. 305)
- Reentry to Program (p. 305)
- Readmission to Program (p. 306)
- Full-Time Status (p. 306)
- Active-Duty Military Personnel (p. 307)
- Registration and Taking Courses (p. 307)
- Student Evaluation of Courses (EvaluationKit) (p. 308)
- Academic Progression Standards (p. 308)
- Reinstatement after Academic Dismissal (p. 309)
- Completing Degree Requirements (p. 309)
- Degrees, Majors, and Concentrations (p. 309)
- Seeking more than One Certificate or Degree (p. 309)
- Graduation Requirements (p. 310)
- Global Partnership Programs (p. 310)
- Accommodations for Students with Disabilities (p. 310)
- Personal Information (p. 311)
- Graduate Campus (p. 311)

## 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 12 quarter hours or four 3-credit courses or three 4-credit courses obtained at another institution may be accepted as transfer toward the degree, provided the credits consist of work taken at the graduate level for graduate credit, carry minimum grades of B (or 3.000 on a 4.000 scale), have been earned at an accredited institution or equivalent, and have not been used toward any baccalaureate or advanced degree or certificate of advanced graduate study at another institution.

Transfer credits must be no more than five academic years old at the time the student is admitted to graduate study. Courses older than five years will be accepted only in rare circumstances.

## Assessment of Prior Learning (APL)

Students may be eligible for APL credit if they have accrued a foundation of knowledge and skills equivalent to the content of courses offered by the College of Professional Studies.

Awarded credits are incorporated into a student's degree plan as transfer credits and are subject to the university's residency requirement. APL credit is limited to a maximum of 12 quarter hours for graduate students. Acceptable credits for APL review are credits from Certificates, Training, and a portfolio review of prior work experience. As part of consideration for APL credits, faculty will evaluate and map learning outcomes and achievement in alignment with NECHE accreditation requirement.

Potential APL credits should be considered and discussed as part of a student's transfer credits at the time of enrollment. Interested students should contact their career and academic coach for more information.

## Graduate Certificate Transfer Credit Policies

- A maximum of 4 quarter hours (one course) of transfer credit

## Master Degree Transfer Credit Policies

- A maximum of 12 quarter hours of transfer credit

## Doctoral Degree Transfer Credit Policies

- A maximum of 9 quarter hours of transfer credit for Doctor of Education students
- A maximum of 8 quarter hours of transfer credit for Transitional Doctor of Physical Therapy students
- No transfer credit is awarded for students in the Doctor of Law and Policy program

## 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 (<http://www.cps.neu.edu/admissions/graduate/special-students.php>).

- Students taking courses under special student status are expected to satisfy applicable course prerequisites before enrolling in a course.
- Students taking courses under special student status are not eligible for financial aid.
- Special student status does not guarantee acceptance.
- The maximum number of courses students may take under special student status is two. After completing two courses, students will be blocked from further course registration until they have been officially accepted into a program.

The following programs are not available for special student status: Master of Arts in Teaching (MAT); Master of Education, Special Education Concentration; Master of Science in Applied Nutrition; Doctor of Education; Doctor of Law and Policy.

Special student status is not an option for students seeking an F-1 visa.

## Personal Professional Enrichment (PPE)

Students interested in taking graduate-level (nondoctoral) courses for personal or professional enrichment (PPE) need to complete an online application (<http://www.cps.neu.edu/admissions/graduate/>) as PPE students. Once approved, students will be able to register through their myNortheastern account.

- Students on PPE status are expected to satisfy applicable course prerequisites before enrolling in a course.
- Students taking courses while on PPE status may elect to apply to a graduate certificate or degree program by completing the formal application process (<http://www.cps.neu.edu/admissions/graduate/>). Up to two qualifying courses (or 8 credits) completed while on PPE status may be applied to the intended program of study. To be eligible, the minimum earned grade for the course(s) must be B.
- Students taking courses under PPE status are not eligible for financial aid.

PPE status is not an option for students seeking an F-1 visa.

## New Student Orientation (On-Ground and Online)

New students taking courses on-ground receive an invitation to the on-ground orientation. The purpose of New Student Orientation is to provide information and tools for each student's success from the point of program entry to degree completion. All new students are expected to attend the on-ground orientation. If students cannot

attend the on-ground orientation, they should thoroughly review the Student Reference Guide (available on the CPS website (<https://cps.northeastern.edu/academic-resources/>)) and the New Admitted Student (<http://www.orientation.cps.northeastern.edu>) site.

## 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. See the version for desktop internet browsers (<http://nuonline.adobeconnect.com/academicintegritychecklist/>) or the version for mobile devices ([http://nuonline.adobeconnect.com/academicintegritychecklist\\_mobile/](http://nuonline.adobeconnect.com/academicintegritychecklist_mobile/)).

### Global Student Success

10 Belvedere  
617.373.2455  
globalss@neu.edu  
[www.cps.neu.edu/gss/](http://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/](http://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 Blackboard 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; therefore, attendance is mandatory. Individual instructors may have additional, course-specific, attendance policies. It is the student's responsibility to ascertain what each instructor requires. Failure to meet attendance requirements may force a student to drop the applicable courses. Students should not make conflicting commitments until the class schedules for each semester are final. Permission to make up work may be granted by instructors for reasonable cause. Requests must be made immediately upon a student's return to class. Laboratory



work can be made up only during the hours of regularly scheduled instruction.

### **Absence Because of University-Sponsored Activities**

Participation in university-sponsored activities, where the students are representing their university, college, or department, may cause absences from class that qualify as excused absences. Excused absences, with appropriate prior arrangement, are not subject to penalty, and missed work may be satisfied through agreement between the student and the instructor. University-sponsored activities that may justify excused absences include athletic competition, performing arts events, and research or other presentations.

Students must discuss absence(s) with instructors at least two weeks in advance of the university-sponsored activity, or as soon as possible if the activity is at the beginning of the term or is the result of an unforeseen circumstance. Instructors may require a written statement from the administrator in charge of the activity. Instructors are expected to make reasonable accommodations for these class absences, including administration of makeup assignments and exams whenever possible. It is expected that students seeking an excused absence will develop a plan and timetable to make up the missed course work with their instructor(s). Note, however, that the requirements of some courses or programs may preclude such accommodations.

### **Absence Because of Religious Beliefs**

Any student who is unable, because of his or her religious beliefs, to attend classes or to participate in any examination, study, or work requirement should be provided with an opportunity to make up such examination, study, or work requirement that he or she may have missed because of such absence on any particular day, provided that such makeup examination or work does not create an unreasonable burden upon the university. Students should make appropriate arrangements with the instructor in advance of the absence, preferably at least two weeks before the religious observance.

### **Absence Because of Jury Duty**

Members of the university community are expected to fulfill their obligations to serve on a jury if called upon. A student selected for jury duty should inform his or her instructors. They will provide a reasonable substitute or compensatory opportunities for any required work missed. A student with such an absence will not be penalized in any way.

### **Absence Because of Military Deployment**

See "Leave of Absence Due to Military Deployment (<http://catalog.northeastern.edu/undergraduate/academic-policies-procedures/leaves-of-absence-withdrawal/#military>)."

### **Other Absences**

Unforeseen events or circumstances, including illness, may cause a student to be absent from class. Students must notify their instructors and academic advisor, as appropriate, as soon as possible to apprise them of the circumstances leading to their absence, as well as how much time will be missed. Students must work with their instructors to develop a plan, with a timetable, to make up missed course work. Students cannot be required to provide medical documentation. (Faculty and students should note that the University Health and Counseling Service does not provide sick notes or medical excuses except for long-term illness.) Instructors are expected to make reasonable accommodations for warranted class absences, including administration of makeup assignments and exams, whenever possible.

### **Extended Absences**

A student who is absent from school for an extended period of time must inform his or her academic advisor by letter, email, or telephone. The expected length of the absence may determine whether the student should apply for a medical or emergency leave of absence (<http://catalog.northeastern.edu/undergraduate/academic-policies-procedures/leaves-of-absence-withdrawal/#medical>). It is strongly recommended that the student contact his or her academic advisor to discuss potential next steps, which could include incomplete grades; withdrawal from classes; or, in the event of an extended absence due to a chronic medical condition or disability, consultation with the Disability Resource Center to explore potential accommodation.

### **Nonattendance**

Nonattendance does not constitute official course dropping or withdrawal, which means the student is fully responsible for the academic and financial consequences. Like all grades for courses attempted and/or completed, a grade earned due to nonattendance impacts a student's academic progression, an international student's visa eligibility, and a federal financial aid recipient's aid eligibility and award.

### **Attendance Verification**

#### **"I Am Here" (IAH) Process**

After course registration, students are required to verify their intent to enroll in College of Professional Studies class(es) through their myNortheastern account during the first week of each class start. This verification process is called "I Am Here" (IAH). Students who fail to complete this process on time will be dropped from the class(es), which may impact their financial aid or international student visa eligibility.

Students are responsible for ensuring completion of the IAH process, which requires that they do not log out of the system early. Students who do not receive a "Successful Completion" message have not reached the end of the procedure and must start again. Sometimes it may take 24 hours before students can restart the procedure.

A student who registers for a course and completes the IAH process but does not officially drop the course by the deadline, regardless of his or her level of participation or attendance/nonattendance, is responsible for paying 100 percent of the tuition charges and applicable fees and the final earned grade. A student in this situation may earn an F grade that will be part of his or her permanent academic record.

Students registering for the first time after the start of classes will be considered "Here" for the semester.

Students who experience difficulty with the process or have questions should email the Office of the Registrar ([registrar@northeastern.edu](mailto:registrar@northeastern.edu)).

### **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 Advising (<http://www.cps.neu.edu/student-resources/OAA.php>) 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 readmission. If the program into which the student is seeking readmission is no longer offered, the student may apply to another program and must meet the admissions requirements for that program. Contact the Office of Admissions (<http://www.cps.neu.edu/admissions/>) for assistance and to complete the admission application.

If readmitted, transfer credits that a student was previously awarded will be reevaluated following the transfer credit award rules current at the time of readmission. It is at the discretion of the academic program to determine applicability of courses previously completed.

### Full-Time Status

A graduate (nondoctoral) student is considered a full-time student if he or she is enrolled in 9 quarter hours of graduate credit for the quarter. An exception is made for students matriculated in master's degree programs that only require 4-credit courses, in which case full-time student status is attained with enrollment in 8 quarter hours of graduate credit for the quarter.

A doctoral student's full-time status is determined by the structure of the program.

Note that full-time status may be defined differently for federal loan purposes. International students have other considerations/requirements to maintain their visa eligibility.

### Course Load

Federal financial aid recipients must be enrolled in and successfully complete a minimum number of credits each term to maintain eligibility. For more information, contact your financial aid counselor.

### Course Overload

A maximum course load (different from full-time status) for a graduate (nondoctoral) student is 16 credits taken across a 12-week term, with no more than 8 credits per 6-week session.

To be eligible for a course overload (greater than 16 credits per 12-week term or greater than 8 credits per 6-week session), a graduate (nondoctoral) student must:

- Have a record of successful study with 12 or more credits a term at Northeastern University
- Have a minimum cumulative grade-point average of 3.500
- Provide a rationale to support the request

Students need to complete the appropriate form and return it to their career and academic coach. Course overload is approved per term.

Each doctoral program has its own enrollment and course load requirements. Doctoral students who wish to seek a course overload must consult with the program director or designee.

## International Student Enrollment Requirements

### IMPORTANCE OF MAINTAINING F-1 STATUS

International students studying at Northeastern University, are responsible for maintaining compliance with U.S. federal regulations. Failure to maintain full-time enrollment, in accordance with these regulations, can result in consequences. It is important to consult regularly with college academic advisors, as well as, Office of Global Services (OGS) international student advisors, before taking any action that may impact immigration status and educational endeavors in the U.S.

### ACHIEVING FULL-TIME ENROLLMENT STATUS

Full-time enrollment status must be maintained by F-1 students throughout the academic year. To achieve full-time status, graduate students must be enrolled in 8–9 credits throughout each academic term. Students can consult with their college academic advisor prior to each term to develop a course schedule to maintain full-time status. F-1 students are expected to study on-ground and cannot enroll in an online course without first speaking to a college academic advisor to confirm eligibility. If approved, F-1 students who need to withdraw/drop from a course, must withdraw/drop from the additional online course first, and not any of the on-ground core courses in order to maintain full-time status.

### COLLEGE OF PROFESSIONAL STUDIES (CPS) ACADEMIC TERM

In CPS, each academic term in fall, winter and spring is defined as a quarter term consisting of 12 weeks. Some courses are scheduled for the entire 12 weeks, while others are scheduled for either the first 6 weeks or the last 6 weeks (parts of a term). A full summer term consists of 8 weeks. Some courses are scheduled for the entire 8 weeks of a term, while others are scheduled for parts of a term.

### FINAL TERM

F-1 students are required to maintain full-time enrollment status, except in the final academic term of degree completion. If the course requirements for degree completion are less than 8-9 credits, they must be completed on-ground throughout the entire final term.

### ELIGIBILITY FOR SUMMER TERM OFF

All students, regardless of the term in which they begin studies, (e.g., CPS Winter or Spring quarter terms) are eligible to take the Summer term off as their Standard Vacation term, as long as they confirm enrollment in the following Fall term and they are not starting or ending their program of study in that same Summer term.

### Directed Study

Directed studies are offered when a course is required for a student's program of study but said course is not available in a given academic term and there is immediacy for a student to complete said course. Academic deans/directors will make the decision if there is a compelling need to run a course as a directed study.

### Independent Study

Independent study is an opportunity for a degree student to work independently under the supervision of an instructor to undertake special research, literature review, or experimental study projects in areas related to his or her program of study that he or she cannot accomplish as part of a standard course in the curriculum. A degree student may take up to

two independent studies. The work to be done for an independent study is usually crafted by the student, with faculty input. Independent studies are entirely optional and not needed to graduate. A completed Request for Independent Study form, signed by both the student and the faculty member, must be submitted to the academic program for review and approval.

### 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 the College of Professional Studies webpage (<http://www.cps.neu.edu/class-registration/>).

Course registration procedures are as follows:

- Newly accepted and returning students add or drop courses through their myNortheastern account any time during the registration period.
- Certificate- and degree-seeking students whose studies have been interrupted voluntarily for one to three years or more need to first apply for reentry through the Office of Academic Advising before registering for course(s).
- Global program students should consult with their program to determine if they need to register on their own or if the program will register them.

All students need to be mindful of the college's course add/drop policies and deadlines to register as early as possible with the intent to secure a spot in the preferred course and to avoid being charged in full for missing the course drop/withdrawal deadline.

#### Auditing a Course

Graduate (nondoctoral) students are permitted to audit graduate (nondoctoral) courses, but they must complete the usual registration process and pay regular tuition fees. There is no reduction in fees for auditing.

An auditor may participate in class discussions, complete papers and projects, and take tests and examinations for informal evaluation. Regardless of the amount or quality of work completed, however, no academic credit will be granted at any time for audited courses. In addition, audited courses may not be used in the determination of enrollment status for financial aid purposes and do not count toward program completion.

The student's decision to audit a course must be communicated in writing to the Office of the University Registrar before the fourth class meeting for 12-week courses. For 4-, 6-, and 8-week courses, requests must be received by the second class meeting. No exception to this procedure may be approved without the authorization of the college's academic standing committee.

If approved, the student should inform the instructor of his or her status as auditor of the course.

#### Course Selection and Planning

Students should refer to their degree audits for program curriculum information, to select courses, and to monitor their progress toward degree completion. Students should access their degree audits through their myNortheastern account or request an audit from their student success specialist. Degree audits are unofficial records of academic progress. Students are encouraged to consult with their career and academic coach about their academic planning.

#### Course Prerequisites

Course prerequisites are courses that are required to have been completed prior to enrolling in another course. Before registering for a course through their myNortheastern account, students, regardless of matriculation status, should consult the College of Professional Studies website (<http://www.cps.neu.edu/degree-programs/prerequisites.php>) to determine whether they have satisfied the course prerequisites.

#### Course Corequisites

Course corequisites are courses that are required to be taken concurrently. Before registering for a course through their myNortheastern account, students, regardless of matriculation status, should read the course description to determine if there is a corequisite requirement and register for both courses.

#### Repeating a Course

If a student wishes to improve his or her cumulative grade-point average (GPA) by repeating a course, he or she may do so. 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

A course waiver may be awarded to a student who has completed the equivalent course at an accredited institution other than the College of Professional Studies in the past five years. The waiver will exempt the student from completing the required course. The student will complete another course, as approved by the program, to satisfy the number of credits required for the program.

Doctoral students must consult with their academic program to determine if course waivers are permitted.

#### Duration of Courses

Each full fall, winter, and spring term runs for 12 weeks. Each full summer term runs for 8 weeks.

Course durations are as follows:

- During the fall, winter, and spring terms, courses are scheduled for either 6 or 12 weeks.
- During the summer term, courses are scheduled for 4, 6, or 8 weeks.

## Course Add/Drop Policy

Refer to the academic calendar (<http://www.northeastern.edu/registrar/calendars.html>) for specific dates. Students should consult with their academic and career advisor before adding or dropping classes.

Students may add a 4-week or 6-week course within the first week of the course. For 8- and 12-week courses, students may add a course within the first 2 weeks of the course. Students who add a class during the add/drop period are responsible for all assignments missed prior to enrolling.

Enrolled students are responsible to attend classes during the add/drop period, and absences will be held accountable to the instructor's attendance policy.

Students who drop a course before the add/drop deadline will not be charged for the course and will not have a W (withdrawal) on their transcript. Thereafter, students are responsible for 100 percent of the tuition charges and applicable fees and the earned grade will be on the students' permanent academic record. All such dates are specified in the academic calendar.

Students must add/drop courses using their myNortheastern account.

A reduction in a student's course load could affect a student's international student visa status or financial aid eligibility.

Students who experience difficulty adding or dropping a course should promptly email ([registrar@northeastern.edu](mailto:registrar@northeastern.edu)) the Office of the University Registrar. If it is determined that there is an issue with the student's myNortheastern account or access, he or she needs to contact the Service Desk at 617.373.4357 (HELP); [help@northeastern.edu](mailto:help@northeastern.edu).

Students with holds (e.g., financial, judicial), may have restricted access to add, drop, or withdraw from a course. In such instances, students are responsible for resolving the hold immediately and to meet the established course registration deadlines.

## Course Withdrawal Policy

Refer to the academic calendar (<http://www.northeastern.edu/registrar/calendars.html>) for specific dates.

Students who withdraw from a course after the add/drop deadline and before the last day to withdraw will receive a W grade and will be responsible for 100 percent of the tuition charges and applicable fees. The W grade does not affect the calculation of the GPA but it does impact a student's academic progression, which may result in the student being placed on academic probation or dismissal.

Students must withdraw from courses using their myNortheastern account.

A reduction in a student's course load could affect a student's international student visa status or financial aid eligibility.

Students who experience difficulty withdrawing from a course should promptly contact the Service Desk at 617.373.4357 (HELP); [help@northeastern.edu](mailto:help@northeastern.edu).

Students who fail to withdraw from a course by the deadline, regardless of their level of class participation or attendance, are financially and academically responsible. A student's lack of participation/attendance will likely result in a final grade of F.

All students are encouraged to consult with their career and academic coach prior to withdrawing from a course. Withdrawals may impact a student's time to degree completion.

## Student Evaluation of Courses (EvaluationKit)

Students play a critical role in the university's commitment to quality teaching and academic excellence when they participate in the evaluation of courses through EvaluationKIT, an online survey students complete anonymously at the completion of a course. Students are expected to participate in EvaluationKIT with constructive feedback that is relevant to teaching and course content.

Students may access EvaluationKIT summary results from previous terms via their myNortheastern web portal (<http://www.myneu.neu.edu>). Courses with a response rate of less than 20 percent of enrolled students will be excluded from the results. Courses with three or fewer students enrolled are not surveyed.

## Academic Progression Standards

### Academic Progress/Standing

To be in good standing, a graduate student must continuously maintain a minimum cumulative grade-point average (GPA) of 3.000 on a 4.000 scale and must also make continuous satisfactory academic progress (SAP). To make SAP, a student must earn at least 66 percent of his or her cumulative attempted credits. Nonmatriculated students are required to be in good academic standing to be allowed to register for any subsequent classes.

Students are responsible for reviewing their grades and academic standing at the end of each term through their myNortheastern account. If there are any discrepancies, students should immediately contact the instructor(s) directly. Students who want to appeal a grade have 30 calendar days from the date the grade is posted to do so.

### Academic Probation and Dismissal

Notation of academic probation appears on a student's internal record but not on his or her permanent transcript.

With exception as specified by the program, a graduate (nondoctoral) student is placed on academic probation if his or her cumulative GPA is below 3.000 and/or if he or she does not earn at least 66 percent of his or her cumulative attempted credits. The student is strongly encouraged to consult with his or her academic and career advisor to develop an individualized success plan (ISP) to improve his or her academic standing. Otherwise, a registration hold may be placed on the student's account.

A student whose cumulative GPA remains below 3.000, and/or does not earn at least 66 percent of his or her cumulative attempted credits in the term of enrollment subsequent to the one after he or she was placed on academic probation, will be academically dismissed. A student who has been academically dismissed from the college is automatically dismissed from his or her program of study.

### Dismissal Notification

A student will be notified about his or her dismissal within one week following the end of the term and has the right to appeal the dismissal decision to the college's Academic Standing Committee (ASC) if he or she can provide documented evidence supporting an appeal. The notification of dismissal will include the appeal deadline.

Students appealing a dismissal decision may not be eligible to enroll in classes the term following their dismissal to allow time for the appeal process.

Students are responsible for reviewing their grades and academic standing at the end of each term through their myNortheastern account.

### 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 Advising (<http://www.cps.neu.edu/student-resources/OAA.php>).

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 grade-point average (GPA) of 3.000 or as outlined by the specific program.

#### Graduate Certificate Programs

To earn a graduate certificate, students must complete all courses as prescribed in the curriculum; the required number of credits as per the curriculum; the residency requirement; and maintain a minimum cumulative GPA of 3.000 or as outlined by the specific program.

#### Time Limit on Courses

Graduate course credits earned in the academic program or accepted by transfer are valid for a maximum of seven years.

#### Time Limit on Program Completion

- Graduate certificate students have up to three full years from the time of the first term of enrollment to complete the program.
- Master's degree students have up to seven full years from the time of the first term of enrollment to complete the program.
- Doctoral degree students, with the exception of the Transitional Doctor of Physical Therapy, have up to seven full years from the time of the first term of enrollment to complete the program.
- Transitional Doctor of Physical Therapy students who begin their program in the fall 2014 term or thereafter have up to four full years from the time of the first term of enrollment to complete the program.

*Note:* The College of Professional Studies makes adjustments to its academic program offerings and curricula to stay current and to be able to offer students the most relevant courses and knowledge in the field. Examples of such changes include adding new programs, adding/

adjusting course requirements, adding/adjusting courses, and adding/adjusting curriculum requirements.

When there is a change to a curriculum or program requirement, students already matriculated and actively enrolled in the program may continue to follow the program requirements at the time of matriculation or to follow the new curriculum/program requirements, unless it is otherwise specified by the academic program at the time of the announcement of said changes.

### Degrees, Majors, and Concentrations

#### Change of Major/Program of Study

A graduate (nondoctoral) student matriculated in a certificate/degree program who would like to enroll in a different graduate program, after consulting with their career and academic coach, must apply to the intended program by submitting the Change of Major form.

Previously awarded transfer credit awards are subject to change as a result of a program change. Students on financial aid or an international student visa are responsible for understanding the impact that results from a program change.

Doctoral students must consult with their program director or designee.

#### Concentrations

Only university-approved concentrations are noted on students' official academic records. If a student pursues a customized specialization, no concentration will be noted on his or her official academic transcript. Students who wish to pursue a customized specialization must seek prior approval from the academic program director.

#### 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' Department of Cooperative Education (<http://cps.northeastern.edu/experiential-learning/coops/>) 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 (<http://cps.northeastern.edu/experiential-learning/coops/>) 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.

- a. If the same course is required in the degree and certificate programs and the student has exceeded the maximum number of credits that can be applied in the certificate program, he or she may request a course 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.
  - a. If the same course is required in both certificate programs and the student has exceeded the maximum number of credits that can be applied in the second certificate program, he or she will request a course waiver to be permitted to take another course instead of repeating the course. See Course Waiver section.
5. A certificate earned at another accredited institution may be accepted as transfer credits to satisfy the requirements of a graduate degree with a cap of four 3-credit courses or three 4-credit courses (no more than 12 credits), if the contents are determined to be applicable per the program director and if the credits were earned within seven years of pursuit of the degree.

A graduate (nondoctoral) degree student who wishes to pursue a graduate certificate concurrently may seek admission in the certificate program by the end of his or her first term of matriculation in the degree program. Courses that satisfy requirements for both the degree and certificate will count for each.

- When the certificate is identical to a concentration in a degree program, only the certificate credential will be earned. The student's transcript will not indicate completion of a concentration

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

Only students who complete the graduation application process by specified deadlines will be considered for graduation and included in the graduation ceremony program. All qualified students must submit a graduation application in order to receive their diploma, regardless of whether they plan to attend the graduation ceremony.

Note important definitions: "Degree conferral date" and "graduation ceremony date" do not mean the same thing. Degree conferral date refers to the date of the university's official recognition of degree completion. For the purposes of the graduation application, that is accessed via a student's myNortheastern account. The "expected graduation date" (EGD) is the same as the degree conferral date. Northeastern University confers degrees four times each academic year: winter, spring, summer, and fall. The graduation ceremony date is the date that the college hosts the annual graduation ceremony.

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 summer degree conferral, a student must satisfy all degree requirements by the end of the previous spring 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 myNortheastern 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 learner services specialist.

For more information, visit the College of Professional Studies Graduation web page (<http://www.cps.neu.edu/student-resources/graduation/>).

### Diploma

The following rules apply to the diploma.

- Information that will be printed on diplomas:
  - Major for only nonspecified degrees (Master of Arts, Master of Science).
- Changes made to a student's name after the diploma has been printed may be subject to a \$50 fee and take more than one month to reprint.
- Changes made to a student's degree information and name submitted after the program deadline will not be noted in the graduation ceremony program. If a diploma was previously printed, it will need to be reprinted and can take more than one month.

## 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

20 Dodge Hall  
617.373.2675  
617.373.7800 (fax)  
Website (<http://www.northeastern.edu/drc/>)

Northeastern University and the Disability Resource Center (DRC) are committed to providing disability services that enable students who qualify under Section 504 of the Rehabilitation Act and the Americans with Disabilities Act Amendments Act (ADAAA) to participate fully in the activities of the university. To receive accommodations through the DRC, students must provide appropriate documentation that demonstrates a

current substantially limiting disability. Accommodations are provided based on an evaluation of the information provided by students and their clinicians, on a case-by-case basis. These services are available for, but not limited to, students with the following diagnoses:

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

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

## 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. Official documentation of the name change is required.

### Change of Address

Report all address changes via the myNortheastern web portal (<http://myneu.northeastern.edu/>) or in person at the Office of the Registrar or Office of Student Accounts. Both the permanent home address and the local address are required. International students must also report any changes of address to the Office of Global Services (OGS (<http://www.northeastern.edu/ogs/>)) within 10 days in order to ensure compliance with Student and Exchange Visitor Information System (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.

## Doctoral Degree Programs

Guided by industry leading faculty, our innovative **doctoral programs** combine cutting-edge course work with professionally relevant research projects. These programs will provide you with the opportunity to earn the policy, research, and administrative foundation necessary to advance to the top of your career.

### Programs

#### Doctor of Education (EDD)

- Education (p. 311)

#### Doctor of Law and Policy (DLP)

- Law And Policy (p. 314)

## Transitional Doctor of Physical Therapy (DPT)

- Physical Therapy (p. 315)
- Physical Therapy—Direct Entry (p. 315)

## Education, EDD

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 experiences, 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 College of Professional Studies have the following admission requirements:

- Online application
- Academic transcripts (undergraduate **and** graduate)
- Admissions statement (1,000–1,200 words)
- Minimum of three years of professional work experience in a related field
- Professional resumé
- Faculty recommendation
- Two professional recommendations
- English-language proficiency proof (for non-native English-language speakers)

### Curriculum, Teaching, Learning, and Leadership Concentration

The Doctor of Education with Concentration in Curriculum, Teaching, Learning, and Leadership helps educational leaders develop the competencies, dispositions, and values required to pursue educational reform, based on a commitment to social justice. Students explore the relationship between effective educational leadership and the ways that curriculum and teaching can enhance learning opportunities for students across their life span.

This EdD concentration focuses on preparing transformational leaders who recognize the importance of providing quality educational experiences for all learners.

Key learning objectives include how to:

- Assess how issues of social justice play out in contemporary educational settings
- Analyze education systems to gain an understanding of the evolution of micro- and macrolevel policies and legislation
- Examine international curriculum and instruction research and practices

- Investigate the development and interaction of leadership roles within organizations
- Explore the theoretical and historical dimensions of curriculum, teaching, and learning in varied educational settings

### Higher Education Administration Concentration

The Doctor of Education with Concentration in Higher Education Administration includes the study of practice and scholarship within all sectors of postsecondary education including community colleges, four-year colleges, for-profit institutions, and research universities. The increased globalization of higher education is addressed throughout the program. The concentration allows experienced educators and administrators to reflect on and advance their knowledge in ways that will enhance their ability to make a contribution to higher education and further their careers.

This concentration offers students an opportunity to conduct research that addresses critical issues in higher education. This concentration 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 with Concentration in Organizational Leadership Studies positions experienced leaders to assume greater responsibilities within their organizations. Designed for leaders working in educational, government, healthcare, military, not-for-profit, for-profit, and management consulting organizations, this concentration combines theory, research, and practice to develop individuals who can effectively manage and lead change in today's fast-paced, global environment.

The interdisciplinary curriculum offers a strong foundation in leadership, culture, learning, change, communications, systems, and strategy. Students have an opportunity to conduct and apply doctoral research to develop real-world answers to the leadership challenges facing 21st-century organizations.

Throughout the course of the program, students have an opportunity to:

- Review contemporary leadership theory and models emphasizing recent conceptualizations such as adaptive, relational, distributed, complexity, and global leadership to refine their personal leadership knowledge, skills, and abilities
- Explore classical and modern theories of organization and design a forward-thinking organization creating all components, including vision, mission, strategy, structure, and processes
- Use both seminal and current theoretical approaches of organizational communication to investigate the dynamic interplay between communication processes and human organizing
- Examine seminal and modern group dynamics research to assess group processes and to stimulate group development inside their organizations
- Investigate topical consulting strategies and organizational assessment tools and conduct an organizational diagnosis to

- gain a comprehensive understanding of the models, variables, and perspectives used to understand complex organizational processes
- Integrate organizational power theory, research, and practical diagnostic tools to systematically identify and evaluate the political processes and behaviors at play inside their organizations

This program seeks to produce graduates who have the capacity to contribute new knowledge to leadership scholarship and become positive forces of change.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

*Note:* A minimum of 51 quarter hours must be taken at the College of Professional Studies.

### Required Foundation Courses

9 quarter hours

Must be completed in order listed:

Code	Title	Hours
EDU 7207	Introduction to Action Research and Social Change	3
EDU 7218	Leadership for Social Justice	3
EDU 7219	Collaborative Leadership	3

### Required Research Courses

12 quarter hours

Must be completed in order listed:

Code	Title	Hours
EDU 7225	Introduction to Research Design	3
EDU 7226	Intermediate Research Design	3
EDU 7294	Advanced Research Design	3
EDU 7295	Dissertation in Practice Seminar	3

### Concentrations

- Curriculum, Teaching, Learning, and Leadership
- Higher Education Administration
- Organizational Leadership Studies

### Program Credit/GPA Requirements

60 total quarter hours required

Minimum 3.000 GPA required

### CURRICULUM, TEACHING, LEARNING, AND LEADERSHIP CONCENTRATION

Code	Title	Hours
<b>Required Courses (12 quarter hours)</b>		
EDU 7244	Curriculum Theory and Practice Over Time: Implications for Educational Leadership	3
EDU 7217	Educational Systems: The Dynamics between Policy, Values, and Practice	3
EDU 7242	Situated Leadership	3
EDU 7213	Education Entrepreneurship	3
<b>Elective Courses (15 quarter hours)</b>		



Complete any four courses (or 12 quarter hours) at the EDU 7000 level that you are not already using as a foundation or concentration course. You may take a course from another concentration and/or you may choose from the Concentration Electives course list located at the end of this webpage. 12

Complete one of the following: 3

EDU 7227	The Power of Experiential Learning	
EDU 7228	Bringing Experiential Learning, Assessment, and Reflection to Life	
EDU 7229	The Experiential Learning Leader	
EDU 7230	Current and Emerging Practice in STEM Education	
EDU 7234	Thinking and Acting Entrepreneurially	
EDU 7235	Leading Entrepreneurial Practices in Organizations	
EDU 7245	Urban Education	

**HIGHER EDUCATION ADMINISTRATION CONCENTRATION**

**Code Title Hours**

**Required Courses (12 quarter hours) <sup>1</sup>**

EDU 7204	Global and Historical Perspectives on Higher Education	3
EDU 7250	Organizational Systems and Institutional Governance	3
EDU 7253	The Legal Environment of Higher Education	3
EDU 7258	Strategic Management in Higher Education	3

**Elective Courses (15 quarter hours) <sup>2</sup>**

Complete any four courses (or 12 quarter hours) at the EDU 7000 level that you are not already using as a foundation or concentration course. You may take a course from another concentration and/or you may choose from the Concentration Electives course list located at the end of this webpage. 12

Complete one of the following: 3

EDU 7251	Student Engagement in Higher Education	
EDU 7254	Postsecondary and Institutional Public Policy	
EDU 7256	Financial Decision Making in Higher Education	
EDU 7257	The Urban University in the United States	
EDU 7260	Comparative International/Global Higher Education	
EDU 7261	International Student Markets	
EDU 7264	Educating Global Students: Issues and Practices	
EDU 7266	Contemporary Issues in Community Colleges	
EDU 7269	Leadership in Higher Education: The College Presidency	

<sup>1</sup> Students who choose to pursue the **international higher education track within the higher education administration concentration** should complete Comparative International/Global Higher Education (EDU 7260) rather than Strategic Management in Higher Education (EDU 7258)

<sup>2</sup> Students who choose to pursue the **international higher education track within the higher education administration concentration** should complete Educating Global Students: Issues and Practices (EDU 7264) and EDU 7261 International Student Markets as an elective.

**ORGANIZATIONAL LEADERSHIP STUDIES CONCENTRATION**

**Code Title Hours**

**Required Courses (12 quarter hours) <sup>3</sup>**

EDU 7277	Organizational Learning, Innovation, and Systems Thinking	3
EDU 7275	Contemporary Leadership Perspectives	3
EDU 7272	Organizational Culture and Change	3
EDU 7276	Communication: Teams, Organizations, and Global Networks	3

**Elective Courses (15 quarter hours) <sup>4</sup>**

Complete any four courses (or 12 quarter hours) at the EDU 7000 level that you are not already using as a foundation or concentration course. You may take a course from another concentration and/or you may choose from the Concentration Electives course list located at the end of this webpage. 12

Complete one of the following courses: 3

EDU 7273	Professional Leadership and Communication	
EDU 7274	Doctoral Seminar in Organizational Leadership and Communication	
EDU 7278	Organization Theory and Design	
EDU 7279	Organizational Consulting	
EDU 7290	Contemporary Models of Sports Leadership	
EDU 7292	Social Justice in Sports	
EDU 7293	Legal and Ethical Issues in Sports Leadership	

<sup>3</sup> Students who choose to pursue the **sports leadership track within the organizational leadership concentration** should complete Contemporary Models of Sports Leadership (EDU 7290) rather than Contemporary Leadership Perspectives (EDU 7275).

<sup>4</sup> Students who choose to pursue the **sports leadership track within the organizational leadership concentration** should complete Social Justice in Sports (EDU 7292) and Legal and Ethical Issues in Sports Leadership (EDU 7293) as electives.

**Doctoral Thesis**

12 quarter hours

**Code Title Hours**

EDU 8796	Thesis Proposal and the Internal Review Board	
EDU 8797	Thesis Data Collection, Initial Analysis, and Management	
EDU 8798	Thesis Data Analysis and Presentation	
EDU 8799	Thesis Findings and Discussion	

**Residency Requirement:** Each student is required to satisfy two on-ground residencies. Dates and other event information are released annually. Seattle and Charlotte students will satisfy residency requirements through regional campus hybrid courses.

**CONCENTRATION ELECTIVES**

Concentration elective course options

**Note:** To complete the Concentration Electives requirement follow the required detailed instructions listed under the Elective Courses section located in the Concentration options listed above.

Code	Title	Hours
EDU 7227	The Power of Experiential Learning	3
EDU 7228	Bringing Experiential Learning, Assessment, and Reflection to Life	3
EDU 7229	The Experiential Learning Leader	3
EDU 7230	Current and Emerging Practice in STEM Education	3
EDU 7245	Urban Education	3
EDU 7251	Student Engagement in Higher Education	3
EDU 7254	Postsecondary and Institutional Public Policy	3
EDU 7256	Financial Decision Making in Higher Education	3
EDU 7257	The Urban University in the United States	3
EDU 7260	Comparative International/Global Higher Education	3
EDU 7261	International Student Markets	3
EDU 7264	Educating Global Students: Issues and Practices	3
EDU 7266	Contemporary Issues in Community Colleges	3
EDU 7269	Leadership in Higher Education: The College Presidency	3
EDU 7251	Student Engagement in Higher Education	3
EDU 7273	Professional Leadership and Communication	3
EDU 7274	Doctoral Seminar in Organizational Leadership and Communication	3
EDU 7278	Organization Theory and Design	3
EDU 7279	Organizational Consulting	3
EDU 7290	Contemporary Models of Sports Leadership	3
EDU 7292	Social Justice in Sports	3
EDU 7293	Legal and Ethical Issues in Sports Leadership	3

Doctor of Education Advanced Graduate Credit (<https://cps.northeastern.edu/admissions/graduate/transfer-credit/EdD-advanced-graduate-credit/>)

**Law And Policy, DLP**

Public servants, executives, and managers operate in an increasingly complex global environment. A doctoral education seeks to provide the policy, analytic, and research skills necessary to advance one's career.

Developed jointly by the College of Professional Studies and Northeastern's 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 (<http://www.northeastern.edu/cssh/policyschool/law-public-policy-phd/>).

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Required Courses**

Code	Title	Hours
LWP 6118	Historical Foundations of American Law	3
LWP 6119	Current Law and Policy Debates: Our Nation's Capital and Beyond	3
LWP 6120	Law and Legal Reasoning 1	3
LWP 6401	Law and Policy Concepts 1: The Policymaking Process	3
LWP 6424	Research Methods	3
LWP 6121	Law and Legal Reasoning 2	3
LWP 6402	Law and Policy Concepts 2: Strategizing for Public Policy	3
LWP 6423	Qualitative Methods	3
LWP 6122	Law and Legal Reasoning 3	3
LWP 6403	Law and Policy Concepts 3: Policy Case Studies	3
LWP 6420	Quantitative Methods	3
LWP 6123	Law and Legal Reasoning 4	3
LWP 6410	Economics for Policy Analysis	3
LWP 6404	Evaluation Research	3
LWP 6431	Political and Moral Ethics and Dilemmas	3
LWP 6500	Doctoral Research Design 1	3
LWP 6450	Public Policy Theory and Practice 1	3
LWP 6501	Doctoral Research Design 2	3
LWP 6451	Public Policy Theory and Practice 2	3
LWP 6502	Doctoral Research Design 3	3
LWP 6452	Public Policy Theory and Practice 3	3
LWP 6503	Doctoral Research Design 4	6

**Program Credit/GPA Requirements**

69 total quarter hours required

Minimum 3.000 GPA required

### Transitional Doctor of Physical Therapy, DPT

Designed for practicing physical therapists, the transitional Doctor of Physical Therapy (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 an earned 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 (PTH 6900), 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 orthopaedics, 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 are 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 are required.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

*Note:* 26 quarter hours are required for students entering with a Master of Science in Physical Therapy.

### Core Requirements

Code	Title	Hours
<b>Required Core</b>		
PTH 6100	Differential Diagnosis and Medical Screening	4
PTH 6110	Diagnostic Imaging	4
PTH 6130	Pharmacology	3
PTH 6900	Comprehensive Case Analysis	4
PTH 6140	Motor Control	4
<b>Nutrition</b>		
Complete one of the following:		3-4
PTH 6120	Clinical Nutrition	
NTR 6120	Healthy Aging: Nutrition Strategies for Optimal Longevity	

NTR 6119 Pediatric Nutrition

NTR 7147 Sports and Fitness Nutrition

### Elective

Code	Title	Hours
Complete one of the following:		
PTH 6430	Educational Strategies for Effective Healthcare Delivery	4-5
PTH 6480	Evidence-Based Exercise for the Older Adult	
PTH 6490	Pediatric Physical Therapy: Emerging Topics and Evidence-Based Practice	
PTH 6200	Research Methods and Statistical Analysis	
PTH 6235	Administrative and Management Keys for Contemporary Physical Therapist Practice	
PTH 6561	Evidence-Based Examination and Outcomes for the Cervical-Thoracic Spine and Temporomandibular Joint	
PTH 6563	Evidence-Based Examination and Outcomes for Lumbar Spine and Sacroiliac Joint	
PTH 6564	Evidence-Based Examination and Outcomes for Lower Extremity: Hip, Knee, Foot, and Ankle	

### Program Credit/GPA Requirements

26 total quarter hours required

Minimum 3.000 GPA required

### Transitional Doctor of Physical Therapy, DPT—Direct Entry

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 education, the degree curriculum provides you with the necessary knowledge base for today's doctorally prepared practitioners.

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 (PTH 6900), is a culmination of all work within the transitional DPT curriculum. Students will prepare a comprehensive and publishable case report or other scholarly work in partial fulfillment of the requirement for a transitional Doctor of Physical Therapy Degree.

The transitional Doctor of Physical Therapy also includes concentrations in a variety of areas such as orthopaedics, pediatrics, geriatrics, advanced nutrition, women's health, education, and business management. If you have a unique concentration interest, you may also complete a directed study on a preapproved topic of your choosing.

*Note:* Degree requirements differ for North Carolina students. For more information, visit the Northeastern University—Charlotte website ([http://www.northeastern.edu/charlotte/academic\\_program/transitional-doctor-of-physical-therapy/](http://www.northeastern.edu/charlotte/academic_program/transitional-doctor-of-physical-therapy/)).

## Program Requirements

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

Code	Title	Hours
PTH 6100	Differential Diagnosis and Medical Screening	4
PTH 6110	Diagnostic Imaging	4
PTH 6130	Pharmacology	3
PTH 6900	Comprehensive Case Analysis (All students should complete 14 credits including PTH 6100 prior to enrolling in PTH 6900)	4
PTH 6140	Motor Control	4
PTH 6200	Research Methods and Statistical Analysis	5

### Required Nutrition Course

Code	Title	Hours
Complete one of the following:		3-4
PTH 6120	Clinical Nutrition	
NTR 6120	Healthy Aging: Nutrition Strategies for Optimal Longevity	
NTR 6119	Pediatric Nutrition	
NTR 7147	Sports and Fitness Nutrition	

### Additional Required Elective for BS Entry Students

Code	Title	Hours
Complete one of the following:		4
PTH 6235	Administrative and Management Keys for Contemporary Physical Therapist Practice	
PTH 6430	Educational Strategies for Effective Healthcare Delivery	

### Elective Course

Code	Title	Hours
Complete one of the following:		4-5
PTH 6430	Educational Strategies for Effective Healthcare Delivery	
PTH 6480	Evidence-Based Exercise for the Older Adult	
PTH 6490	Pediatric Physical Therapy: Emerging Topics and Evidence-Based Practice	
PTH 6200	Research Methods and Statistical Analysis	
PTH 6235	Administrative and Management Keys for Contemporary Physical Therapist Practice	
PTH 6561	Evidence-Based Examination and Outcomes for the Cervical-Thoracic Spine and Temporomandibular Joint	
PTH 6563	Evidence-Based Examination and Outcomes for Lumbar Spine and Sacroiliac Joint	

PTH 6564

Evidence-Based Examination and Outcomes for Lower Extremity: Hip, Knee, Foot, and Ankle

### Program Credit/GPA Requirements

35 total quarter hours required  
Minimum 3.000 GPA required

## Master's Degree Programs

Representing in-demand fields such as education, technology, project management, and regulatory affairs, our **master's degree programs** are grounded in theory and applied in practice. Programs may be taken part-time or full-time, online, or on campus, providing you maximum flexibility and convenience for your busy schedule.

### Programs

#### Master of Arts (MA)

- Homeland Security (p. 317)
- Strategic Intelligence and Analysis (p. 318)

#### Master of Arts in Teaching (MAT)

- Teaching, Elementary Licensure (p. 319)
- Teaching, Secondary Licensure (p. 320)

#### Master of Education (MEd)

- Education (p. 321)
- Higher Education Administration (p. 323)

#### Master of Professional Studies (MPS)

- Analytics (p. 323)
- Digital Media (p. 324)
- Digital Media—Connect (p. 326)
- Enterprise Intelligence (p. 328)
- Geospatial Services (p. 329)
- Informatics (p. 330)

#### Master of Science (MS)

- Applied Nutrition (p. 331)
- Commerce and Economic Development (p. 332)
- Corporate and Organizational Communication (p. 333)
- Criminal Justice (p. 335)
- Global Studies and International Relations (p. 338)
- Human Resources Management (p. 336)
- Leadership (p. 339)
- Nonprofit Management (p. 341)
- Program and Portfolio Project Management (p. 342)
- Project Management (p. 343)
- Regulatory Affairs for Drugs, Biologics, and Medical Devices with Concentration in Clinical Research Regulatory Affairs (p. 346)
- Regulatory Affairs for Drugs, Biologics, and Medical Devices with Concentration in General Regulatory Affairs (p. 347)
- Regulatory Affairs for Drugs, Biologics, and Medical Devices with Concentration in International Regulatory Affairs (p. 348)
- Regulatory Affairs for Drugs, Biologics, and Medical Devices with Concentration in Medical Devices (p. 349)

- Regulatory Affairs for Drugs, Biologics, and Medical Devices with Concentration in Non-Clinical Biomedical Product Regulation (p. 350)
- Regulatory Affairs for Drugs, Biologics, and Medical Devices with Concentration in Operational Regulatory Affairs (p. 351)
- Regulatory Affairs for Drugs, Biologics, and Medical Devices with Concentration in Quality Assurance and Compliance (p. 352)
- Regulatory Affairs for Drugs, Biologics, and Medical Devices with Concentration in Strategic Regulatory Affairs (p. 353)
- Regulatory Affairs of Food and Food Industries (p. 354)
- Respiratory Care Leadership (p. 355)
- Technical Communication (p. 356)

## Master of Sports Leadership (MSLD)

- Sports Leadership (p. 357)

## Homeland Security, MA

The Master of Arts in Homeland Security is intended to prepare the next generation of emergency managers and homeland security professionals for leadership roles in the public and private sectors. The degree offers a comprehensive program of studies covering core elements of homeland security and emergency management at the graduate level, including management skills, intelligence gathering and analysis, risk management, emergency planning and management, legal issues, technological issues, and social psychology. The master's in homeland security program is designed to develop high-level operational expertise through the application of the above content to the implementation of emergency response protocols as executed in the United States.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

## Required Courses

Code	Title	Hours
CMN 6050	Crisis Communication	3
HLS 6000	Introduction to Homeland Security	3
HLS 6010	The Unconventional Threat to Homeland Security	3
HLS 6020	Technology for Homeland Security	3
HLS 6030	Intelligence for Homeland Security	3
HLS 6040	Critical Infrastructure: Vulnerability Analysis and Protection	3
HLS 6050	Multidisciplinary Approaches to Homeland Security	3

## Capstone/Thesis

Code	Title	Hours
Complete one of the following:		4
HLS 6983	Topics in Homeland Security	
HLS 7990	Thesis (Please Note: Student that are interested in taking HLS 7990 need to first take GST 6109 Basic Field Research)	

## Concentration

Complete one of the following concentrations:

### CONCENTRATION IN EMERGENCY MANAGEMENT

Code	Title	Hours
HLS 6060	Strategic Planning and Budgeting	3
HLS 6070	Emergency Management and Geographic Information Systems	3
HLS 6080	Continuity of Operations and Planning	3
HLS 6150	Essentials of Emergency Management	3
HLS 6155	Critical Infrastructure, Security, and Emergency Management	3
HLS 6160	Advanced Emergency Management	3

### CONCENTRATION IN GEOSPATIAL SERVICES

Code	Title	Hours
GIS 5103	Foundations of Geographic Information Science	4
GIS 6394	Crisis Mapping for Humanitarian Action	3
HLS 6060	Strategic Planning and Budgeting	3
HLS 6070	Emergency Management and Geographic Information Systems	3
HLS 6080	Continuity of Operations and Planning	3

### CONCENTRATION IN ORGANIZATION AND INFRASTRUCTURE CONTINUITY

Code	Title	Hours
CJS 6430	Risk Management	3
GIS 5103	Foundations of Geographic Information Science	4
HLS 6090	Organization and Structural Continuity Planning	3
ITC 6315	Information Security Risk Management	3
ITC 6310	Information Security Governance	3

### CONCENTRATION IN PORT SECURITY

Code	Title	Hours
Students selecting this concentration are only required to take 4 quarter hours of electives.		
HLS 6100	Maritime Port Security 1 (recommended taken concurrently with HLS 6120)	4
HLS 6110	Maritime Port Security 2	4
HLS 6120	Aviation Security 1 (recommended taken concurrently with HLS 6100)	4
HLS 6130	Aviation Security 2	4

## Elective

Code	Title	Hours
Complete one of the following:		
CMN 6060	Negotiation, Mediation, and Facilitation	3-4
CJS 5978	Independent Study	
CJS 6005	Legal and Regulatory Issues for Security Management	
CJS 6105	Domestic and International Terrorism	
CJS 6125	Issues in National Security	
CJS 6430	Risk Management	
GST 6109	Basic Field Research Methods	
GST 6300	Security and Terrorism	

HLS 6035	Advanced Intelligence Applications for Homeland Security
EDU 6184	Interdisciplinary Foundations
INT 6943	Integrative Experiential Learning

## Program Credit/GPA Requirements

45 total quarter hours required  
Minimum 3.000 GPA required

## Strategic Intelligence and Analysis, MA

The Master of Arts in Strategic Intelligence and Analysis is designed for students who seek careers in the intelligence field, as well as professionals whose agencies or clientele are charged with the acquisition and interpretation of intelligence. The degree features courses in fundamental intelligence disciplines, such as analysis and epistemology, intelligence collection, and others. Every analyst in the Intelligence Community is expected to be proficient in 6 core competencies. The competencies enumerated by the Director of National Intelligence (DNI) are as follows:

- Engagement and Collaboration
- Critical Thinking
- Personal Leadership and Integrity
- Accountability for Results
- Technical Expertise
- Communication

The program focuses on summarizing psychological theories relevant to critical thinking and analytical techniques, demonstrating knowledge, through examination procedures, of the major theories and research findings in intelligence analysis, becoming familiar with analytical literature through independent reading, and applying analytical techniques and theories to problem sets. The Master's in Strategic Intelligence and Analysis prepares the next generation of intelligence analysts for leadership roles in the public and private sectors.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
SIA 6000	Psychology of Intelligence Analysis	4
SIA 6010	Intelligence Operations Management	4
SIA 6020	Globalization and Intelligence Issues	4
SIA 6030	Intelligence Analysis and Policy Relationship	4
CJS 6125	Issues in National Security	3

### Capstone

Code	Title	Hours
Complete one of the following: 4		
SIA 6983	Topics in Strategic Intelligence and Analysis	
SIA 7990	Thesis (Please Note: Students that are interested in taking SIA 7990 need to first take and pass GST 6109 Basic Field Research)	

## Concentrations

Complete one of the following concentrations:

### ANALYSIS FOR HOMELAND SECURITY

Code	Title	Hours
HLS 6030	Intelligence for Homeland Security	3
HLS 6020	Technology for Homeland Security	3
HLS 6010	The Unconventional Threat to Homeland Security	3
HLS 6050	Multidisciplinary Approaches to Homeland Security	3
GST 6300	Security and Terrorism	4

### INTELLIGENCE COMMUNITY OPERATIONS AND ANALYSIS

Code	Title	Hours
SIA 6040	Interagency Collaboration	4
SIA 6050	All-Source Intelligence	4
SIA 6060	Human Intelligence Operations	4
SIA 6070	Analysis for Counterterrorism	4

### REMOTE SENSING

Code	Title	Hours
<b>Required Courses</b>		
RMS 5105	Fundamentals of Remote Sensing	3
RMS 6110	Introduction to Machine Learning for Image Data	3

### Electives

Complete four of the following:		12
RMS 6215	Unmanned Aerial Systems for Geospatial Analysts	
RMS 6230	Remote Sensing and Global Change	
RMS 6240	Introduction to Radar and LiDAR Remote Sensing	
RMS 6250	Spatial Analytics for Vegetation and Precision Agriculture	
RMS 6260	Remote Sensing for Archaeology and Cultural Resource Management	
RMS 6270	Remote Sensing for Disaster Management	
RMS 6280	Automated Feature Extraction for the Geospatial Professional	
RMS 6290	Spectroscopic Image Analysis	
GIS 6394	Crisis Mapping for Humanitarian Action	

### Electives

Code	Title	Hours
Complete 6–8 quarter hours from the following: 6-8		
SIA 6080	Culture and Psychology	
SIA 6110	Law and Psychology	
SIA 6090	Intelligence Collection	
GST 6300	Security and Terrorism	
ITC 6300	Foundations of Information Security	
CJS 6430	Risk Management	
EDU 6184	Interdisciplinary Foundations	
SIA 6100	Leadership for Intelligence Professionals	
GST 6109	Basic Field Research Methods	

GST 6501	Regional Studies: East Asia
GST 6502	Regional Studies: Middle East
GST 6503	Regional Studies: Sub-Saharan Africa
GST 6504	Regional Studies: Europe
GST 6505	Regional Studies: Southwest and Central Asia
GST 6506	Regional Studies: Latin America

## Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

### Teaching, Elementary Licensure, MAT

Designed for aspiring teachers and career changers, the Master of Arts in Teaching in Elementary Education (MAT)<sup>1</sup> 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.

<sup>1</sup> The MAT (grades 1–6) has been approved at the initial licensure level by the Massachusetts Department of Elementary and Secondary Education.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
EDU 6104	Child and Adolescent Development, Learning, and Teaching	4
EDU 6107	Inclusion, Equity, and Diversity	4
EDU 6101	Critical Issues in Education: Past and Present	2
EDU 6102	Reflection, Community Engagement, and Agency in Education	2
EDU 6086	Foundations of Literacy Development and Instruction	4
EDU 6154	Inquiry in the Sciences and Humanities	4
EDU 6155	Inquiry in Mathematics	4
EDU 6185	English-Language Learners in the General Education Classroom	4
EDU 6051	Culture, Equity, Power, and Influence	4
EDU 6183	Collaborative Strategies for Effective Classroom Management	3
EDU 6866	Teaching Practicum and Seminar	6

### Elective Courses

Code	Title	Hours
Complete 4 quarter hours from the following:		
EDU 6023	Institute in Creating a Community of Learners/Behaviors	4
EDU 6184	Interdisciplinary Foundations	

EDU 6300	Introduction to Language and Linguistics
EDU 6425	Special Education: Role of Special Educators in an Inclusive School
EDU 6426	Developmental Language, Literacy, and Writing: Assessment and Instruction
EDU 6429	Variations in Child and Adolescent Development
EDU 6437	Assessment in Education
EDU 6438	Teachers as Curriculum Leaders
EDU 6465	Critical and Creative Thinking
EDU 6516	Sheltered English Instruction and Assessment
EDU 6520	Learning and the Brain: Translating Research into Practice
EDU 6528	Adaptive Learning/Behavior Management Strategies: Consultation and Collaboration
EDU 6569	Differentiated Instruction and Assessment in Mathematics

## Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

### LOOKING TO DEEPEN YOUR KNOWLEDGE AND EXPERTISE?

The MAT+ offers qualifying students the opportunity to complete a MAT with further study in a selected area of expertise. Currently, students can take additional course work to earn either an additional license in special education (teacher of students of moderate disabilities, PreK–8 or 5–12).

### MAT+ IN SPECIAL EDUCATION

The MAT+ provides qualifying students with the opportunity to complete a Master of Arts in Teaching (MAT) with further study in a selected area of expertise. Currently, students can take additional course work to earn either an additional license in special education (teacher of students of moderate disabilities, PreK-8 or 5-12) or an additional license in ESL (teacher of English as a Second Language, PreK-8 or 5-12). Teacher candidates may also plan a program of study that allows for triple licensure in consultation with the program director.

The special education course requirements are:

Code	Title	Hours
EDU 6425	Special Education: Role of Special Educators in an Inclusive School	4
EDU 6426	Developmental Language, Literacy, and Writing: Assessment and Instruction	4
EDU 6528	Adaptive Learning/Behavior Management Strategies: Consultation and Collaboration	4
EDU 6569	Differentiated Instruction and Assessment in Mathematics	4
EDU 6874	Practicum, Portfolio, and Panel Review	4

### MAT+ IN ENGLISH AS A SECOND LANGUAGE (ESL)

This Commonwealth of Massachusetts-approved MAT+ program consists of five courses, some of which may be taken as electives in the MAT program.

The English as a Second Language course requirements are:

Code	Title	Hours
EDU 6300	Introduction to Language and Linguistics	4
EDU 6516	Sheltered English Instruction and Assessment	4
EDU 6517	Foundations of Teaching English as a Second Language: Research and Practice	4
EDU 6310	Literacy Development and the Academic Domains	4
EDU 6874	Practicum, Portfolio, and Panel Review	4

## Teaching, Secondary Licensure, MAT

Designed for aspiring teachers and career changers, the Master of Arts in Secondary Education (MAT)<sup>1</sup> 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

<sup>1</sup> The Master of Arts in Secondary Education (grades 8–12) has been approved at the initial licensure level by the Massachusetts Department of Elementary and Secondary Education.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
EDU 6104	Child and Adolescent Development, Learning, and Teaching	4
EDU 6107	Inclusion, Equity, and Diversity	4
EDU 6101	Critical Issues in Education: Past and Present	2
EDU 6102	Reflection, Community Engagement, and Agency in Education	2
EDU 6064	Curriculum and Assessment	4
EDU 6162	Language, Culture, and Literacy in Middle and High Schools	4
EDU 6185	English-Language Learners in the General Education Classroom	4
EDU 6051	Culture, Equity, Power, and Influence	4

EDU 6183	Collaborative Strategies for Effective Classroom Management	3
EDU 6866	Teaching Practicum and Seminar	6
Complete one of the following courses:		4
EDU 6122	Teaching the Language Arts	
EDU 6124	Teaching History and the Social Sciences	
EDU 6127	Teaching Science	
EDU 6129	Teaching Mathematics	

## Elective Courses

Code	Title	Hours
Complete 4 quarter hours from the following:		4
EDU 6023	Institute in Creating a Community of Learners/Behaviors	
EDU 6184	Interdisciplinary Foundations	
EDU 6300	Introduction to Language and Linguistics	
EDU 6425	Special Education: Role of Special Educators in an Inclusive School	
EDU 6426	Developmental Language, Literacy, and Writing: Assessment and Instruction	
EDU 6429	Variations in Child and Adolescent Development	
EDU 6437	Assessment in Education	
EDU 6438	Teachers as Curriculum Leaders	
EDU 6465	Critical and Creative Thinking	
EDU 6516	Sheltered English Instruction and Assessment	
EDU 6520	Learning and the Brain: Translating Research into Practice	
EDU 6528	Adaptive Learning/Behavior Management Strategies: Consultation and Collaboration	
EDU 6569	Differentiated Instruction and Assessment in Mathematics	

## Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

### LOOKING TO DEEPEN YOUR KNOWLEDGE AND EXPERTISE?

The MAT+ offers qualifying students the opportunity to complete a MAT with further study in a selected area of expertise. Currently, students can take additional course work to earn either an additional license in special education (teacher of students of moderate disabilities, PreK–8 or 5–12) or an additional license in ESL (teacher of English as a Second Language, PreK-8 or 5-12).

### MAT+ IN SPECIAL EDUCATION

The MAT+ provides qualifying students with the opportunity to complete a Master of Arts in Teaching (MAT) with further study in a selected area of expertise. Currently, students can take additional course work to earn either an additional license in special education (teacher of students of moderate disabilities, PreK-8 or 5-12) or an additional license in ESL (teacher of English as a Second Language, PreK-8 or 5-12). Teacher candidates may also plan a program of study that allows for triple licensure in consultation with the program director.

The special education course requirements are:



Code	Title	Hours
EDU 6425	Special Education: Role of Special Educators in an Inclusive School	4
EDU 6426	Developmental Language, Literacy, and Writing: Assessment and Instruction	4
EDU 6528	Adaptive Learning/Behavior Management Strategies: Consultation and Collaboration	4
EDU 6569	Differentiated Instruction and Assessment in Mathematics	4
EDU 6874	Practicum, Portfolio, and Panel Review	4

**MAT+ IN ENGLISH AS A SECOND LANGUAGE (ESL)**

This Commonwealth of Massachusetts-approved MAT+ program consists of five courses, some of which may be taken as electives in the MAT program.

The English as a Second Language course requirements are:

Code	Title	Hours
EDU 6300	Introduction to Language and Linguistics	4
EDU 6516	Sheltered English Instruction and Assessment	4
EDU 6517	Foundations of Teaching English as a Second Language: Research and Practice	4
EDU 6310	Literacy Development and the Academic Domains	4
EDU 6874	Practicum, Portfolio, and Panel Review	4

**Education, MEd**

**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; design environments that improve student learning to meet academic, personal, institutional, and organizational goals; and interpret and clearly communicate results to various stakeholders throughout the educational system

**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 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 Concentration in Special Education. Designed for educators who are licensed at the initial or professional level in another discipline, this innovative master’s degree program seeks to prepare you to meet the special needs of students across a variety of school environments.

This program meets the Massachusetts Department of Elementary and Secondary Education standards and competencies for an additional licensure as a Teacher of Students with Moderate Disabilities, PreK–8 and 5–12.

In this advanced program, you have an opportunity to explore specific topics on modifying curriculum, designing curriculum-based assessments, managing severe behaviors, developing individualized education programs (IEPs), leveraging community resources, and improving literacy. As a result, you have an opportunity to enhance your ability to meet the needs of a diverse student population and to achieve the competencies required for this specialized license.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Required Courses**

Code	Title	Hours
EDU 6050	Education as an Advanced Field of Study	5
EDU 6051	Culture, Equity, Power, and Influence	4

**Concentration**

Complete one of the following concentrations:

- eLearning and Instructional Design
- Learning and Instruction
- Special Education

**Program Credit/GPA Requirements**

45 total quarter hours required

Minimum 3.000 GPA required

**ELEARNING AND INSTRUCTIONAL DESIGN**

Code	Title	Hours
<b>Required Courses</b>		
EDU 6319	How People Learn	4
EDU 6321	Models for Learning Design	4
EDU 6323	Technology as a Medium for Learning	4
EDU 6324	Competencies, Assessment, and Learning Analytics	4
EDU 6331	E-Learning Design as a Collaborative Profession	4
<b>Capstone</b>		
EDU 6225	Capstone (to be taken last)	4
<b>Electives</b>		
Complete 12 quarter hours of the following:		12
EDU 6332	Open Learning	
EDU 6333	Social Media and Beyond	
EDU 6558	Issues in Education	
EDU 6202	Faculty, Curriculum, and Academic Community	
EDU 6329	Connecting Theory and Practice (This course should be taken at least 2 terms prior to Capstone to allow time for implementing a workplace-based experiential project that you will design as the signature assignment for the course.)	
EDU 6340	Learning Analytics Concepts and Theories	
EDU 6330	Digital Media Literacy	
EDU 6321	Models for Learning Design	
EDU 6184	Interdisciplinary Foundations	
EDU 6001	Experiential Learning Theory and Practice	
EDU 6002	Culturally Responsive Experiential Teaching and Learning	
EDU 6003	Applied Research in Experiential Teaching and Learning	
EDU 6004	Leading Experiential Teaching and Learning	

**LEARNING AND INSTRUCTION**

Code	Title	Hours
<b>Required Courses</b>		
EDU 6330	Digital Media Literacy	4
EDU 6328	Policy and Leadership	4
EDU 6437	Assessment in Education	4
Complete one of the following:		4
EDU 6465	Critical and Creative Thinking	
EDU 6520	Learning and the Brain: Translating Research into Practice	
EDU 6319	How People Learn	
<b>Capstone</b>		
EDU 6225	Capstone (to be taken last)	4
<b>Electives</b>		

Complete 16 quarter hours from any other degree concentration, or the following:		16
EDU 6201	The Landscape of Higher Education	
EDU 6447	The Demographics of Higher Education	
EDU 6221	Enrollment, Retention, Graduation, Success	
EDU 6450	The Globalization of Education	
EDU 6332	Open Learning	
EDU 6323	Technology as a Medium for Learning	
EDU 6426	Developmental Language, Literacy, and Writing: Assessment and Instruction	
EDU 6528	Adaptive Learning/Behavior Management Strategies: Consultation and Collaboration	
EDU 6429	Variations in Child and Adolescent Development	
EDU 6558	Issues in Education	
EDU 6185	English-Language Learners in the General Education Classroom	
EDU 6300	Introduction to Language and Linguistics	
EDU 6534	Bilingualism, Second Language, and Literacy Development	
EDU 6182	Educational Statistics	
EDU 6438	Teachers as Curriculum Leaders	
EDU 6184	Interdisciplinary Foundations	
EDU 6001	Experiential Learning Theory and Practice	
EDU 6002	Culturally Responsive Experiential Teaching and Learning	
EDU 6003	Applied Research in Experiential Teaching and Learning	
EDU 6004	Leading Experiential Teaching and Learning	

**SPECIAL EDUCATION**

Code	Title	Hours
<b>Required Courses</b>		
EDU 6425	Special Education: Role of Special Educators in an Inclusive School	4
EDU 6426	Developmental Language, Literacy, and Writing: Assessment and Instruction	4
EDU 6438	Teachers as Curriculum Leaders	4
EDU 6528	Adaptive Learning/Behavior Management Strategies: Consultation and Collaboration	4
EDU 6569	Differentiated Instruction and Assessment in Mathematics	4
EDU 6874	Practicum, Portfolio, and Panel Review	4
<b>Electives</b>		
Complete 12 quarter hours from the following:		12
EDU 6185	English-Language Learners in the General Education Classroom	
EDU 6429	Variations in Child and Adolescent Development	
EDU 6437	Assessment in Education	
EDU 6465	Critical and Creative Thinking	

EDU 6520	Learning and the Brain: Translating Research into Practice
EDU 6558	Issues in Education
EDU 6184	Interdisciplinary Foundations

## Higher Education Administration, MEd

Institutions of higher education around the world are facing considerable pressures that range from changing demographics to financial strain amid disruptions unimaginable 20 years ago. Administrators must develop foundational skills to create conditions that allow their students and institutions to thrive in a constantly changing world. The Master of Education in Higher Education Administration prepares practitioners for the unique and difficult challenges facing the next generation of higher education professionals. This program allows students the flexibility to build upon their skills in a customized manner with a focus on practical skills and course designs firmly grounded in experiential learning.

The Master of Education in Higher Education Administration degree program seeks to prepare student with the knowledge to understand the structure, governance, and operation of various higher education organizations. Within the context of classes, students have an opportunity to develop solutions to real world problems. This innovative master's degree program explores complex industry issues such as student demographics, financial concerns, legal and policy requirements, technology, and competitive forces.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### General Requirements

Code	Title	Hours
EDU 6051	Culture, Equity, Power, and Influence	4
EDU 6204	The Foundations of Higher Education	5

#### Required Courses

Code	Title	Hours
EDU 6205	The Demographics of the New College Student	4
EDU 6217	The History of Colleges and Universities	4
EDU 6218	Money Matters: Financial Management in Higher Education	4
EDU 6219	Higher Education Law and Policy	4
EDU 6234	Program Evaluation, Assessment, and Accreditation in Higher Education	4

#### Capstone

Code	Title	Hours
EDU 6222	Contemporary Issues Capstone	4

#### Electives

Code	Title	Hours
Complete 12 quarter hours from the following:		12
CMN 6050	Crisis Communication	
CMN 6065	Implementation and Management of Social Media Channels and Online Communities	
CMN 6045	Leveraging Digital Technologies: Strategy, Assessment, and Governance	

EDU 6202	Faculty, Curriculum, and Academic Community
EDU 6216	The College Student Experience
EDU 6223	Change Agency
EDU 6224	Strategic Leadership in Enrollment Management
EDU 6226	Budget Development
EDU 6227	The New Supervisor
EDU 6228	Supervising Through Change
EDU 6229	Challenges in Supervision
EDU 6231	Crisis Management
EDU 6232	Midlevel Strategic Planning
EDU 6233	Survey Design
EDU 6319	How People Learn
EDU 6329	Connecting Theory and Practice
EDU 6332	Open Learning
LDR 6100	Developing Your Leadership Capability
LDR 6110	Leading Teams
NPM 6110	Legal and Governance Issues in Nonprofit Organizations
NPM 6120	Financial Management for Nonprofit Organizations
NPM 6130	Fundraising and Development for Nonprofit Organizations
NPM 6140	Grant and Report Writing

### Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

## Analytics, MPS

With the proliferation of data across all sectors of the global economy, there is an immediate need for individuals to be knowledgeable in how to harness this data for continuous analysis and study. This spectrum spans from commercial to nonprofit, from higher education to government and is constantly expanding with new sectors, as data mining becomes the standard for knowledge gathering in the digital age.

The Master's in Analytics helps to meet the demand from employers with a graduate program that provides students with an end-to-end analytics education through a core curriculum with integrated experiential learning opportunities. The program prepares students with a deep understanding of the mechanics of working with data (i.e., its collection, modeling, and structuring) along with the capacity to identify and communicate data-driven insights that ultimately influence decisions.

Not only will students graduate with a portfolio of work samples that demonstrate their range and depth of skill, they will be part of a larger network of analytics professionals who will serve them now and in the future.

- Build portfolios of real-world projects demonstrating competency with key technologies, visualization and communication techniques, and the ability to translate information into recommended actions.
- Gain a core analytical skillset upon which to layer more specialized technical skillsets or industry-specific applications.

- Develop a relationship to industry leaders and peers so that you may leverage your Northeastern education long after your formal education ends.
- Choose from a host of flexible programming options—all of which share an industry-defined core curriculum and a required, credit-bearing experiential requirement.
- Anticipate and contribute to the future direction of data analytics.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
ALY 6000	Introduction to Analytics	3
ALY 6010	Probability Theory and Introductory Statistics	3
ALY 6015	Intermediate Analytics	3
ALY 6050	Introduction to Enterprise Analytics	3
ALY 6070	Communication and Visualization for Data Analytics	3

### Concentration

Complete one of the following three concentrations:

Code	Title	Hours
<b>Concentration in Statistical Modeling</b>		
ALY 6110	Data Management and Big Data	3
ALY 6020	Predictive Analytics	3
ALY 6040	Data Mining Applications	3
ALY 6983	Topics	3
GIS 5103	Foundations of Geographic Information Science	4

Code	Title	Hours
<b>Concentration in Evidence-Based Management</b>		
ALY 6060	Decision Support and Business Intelligence	3
ALY 6100	Data-Driven Decision Making	3
ALY 6120	Leadership in Analytics	3
ALY 6040	Data Mining Applications	3
ALY 6130	Risk Management for Analytics	3

Code	Title	Hours
<b>Concentration in Informational Design</b>		
ALY 6030	Data Warehousing and SQL	3
ALY 6040	Data Mining Applications	3
ITC 6015	Enterprise Information Architecture	3
ITC 6020	Information Systems Design and Development	3
ALY 6060	Decision Support and Business Intelligence	3

### Experiential Learning Course

Code	Title	Hours
ALY 6080	Integrated Experiential Learning	3

### Experiential Capstone Course

Code	Title	Hours
ALY 6980	Capstone	3

### Electives

Code	Title	Hours
Complete three of the following:		
ALY 6020	Predictive Analytics	3
ALY 6030	Data Warehousing and SQL	3
ALY 6040	Data Mining Applications	3
ALY 6050	Introduction to Enterprise Analytics	3
ALY 6060	Decision Support and Business Intelligence	3
ALY 6100	Data-Driven Decision Making	3
ALY 6110	Data Management and Big Data	3
ALY 6120	Leadership in Analytics	3
ALY 6130	Risk Management for Analytics	3
ALY 6140	Analytics Systems Technology	3
ALY 6150	Healthcare/Pharmaceutical Data and Applications	3
ALY 6160	Business Intelligence in Healthcare/Pharmaceutical	3
ALY 6983	Topics	3
CMN 6005	Foundations of Professional Communication	3
EDU 6184	Interdisciplinary Foundations	3
GIS 5201	Advanced Spatial Analysis	3
ITC 6000	Database Management Systems	3
ITC 6020	Information Systems Design and Development	3
ITC 6045	Information Technology Policy, Ethics, and Social Responsibility	3
ITC 6310	Information Security Governance	3
LDR 6110	Leading Teams	3
LDR 6135	Ethical Leadership	3
PJM 6005	Project Scope Management	3
PJM 6015	Project Risk Management	3
PJM 6125	Project Evaluation and Assessment	3
PJM 6180	Project Stakeholder Management	3

### Program Credit/GPA Requirements

45 total quarter hours required  
Minimum 3.000 GPA required

### Digital Media, MPS

Students in the Master of Professional Studies in Digital Media will build their skills and expertise while gaining experience using a variety of industry-standard and cutting-edge technologies and tools. Our curriculum is organized around three types of experiences: core courses, concentration electives, and a capstone that can be completed as an individual thesis or a team project.

Our core courses in media creation, interactive design, usability, design thinking, and narrative structure provide a baseline for producing content-rich experiences. A series of electives are offered in seven distinctive areas: 3-D animation, game design, digital video, social media, digital

media management, or one of two tracks in interactive design: visual design or usability and production. In the capstone experience, you'll work with the guidance of faculty to channel your passion into a project that provides tangible evidence of your abilities.

Whether you are a full- or part-time student, our cohort structure allows you to build meaningful working relationships with students from around the globe. Team-based assignments strengthen your project management and leadership skills and allow you to take part in the design and development of more complex media projects than you could by working alone. The team efforts will also prepare you for your future as a professional in digital media's collaboration-oriented culture.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Required Core Courses

Code	Title	Hours
DGM 6122	Foundations of Digital Storytelling	4
DGM 6145	Information Technology and Creative Practice	4
DGM 6521	Web Creation for Content Management Systems	2
Complete one of the following:		4
DGM 6140	Sound Design	
DGM 6168	Usability and Human Interaction	
Complete one of the following options:		8
<b>Thesis Option</b>		
DGM 6890	Thesis Proposal Development	
DGM 7990	Thesis	
<b>Capstone Option</b>		
DGM 7980	Capstone	
Technical course from the workshops list		

### Concentrations

Complete one of the following concentrations:

- 3-D Animation (p. 325)
- Digital Media Management (p. )
- Digital Video (p. )
- Game Design (p. )
- Interactive Design (p. )
- Social Media (p. )

### Elective

Code	Title	Hours
Complete one of the following:		3-4
ALY 6110	Data Management and Big Data	
DGM 6125	Time-Based Media	
DGM 6322	Advanced Digital Storytelling	
DGM 6550	Search Engine Optimization: Strategy and Implementation	
DGM 6943	Integrative Experiential Learning	

ITC 6410 Fundamentals of Human Behaviors for Interactive Systems

EDU 6184 Interdisciplinary Foundations

### Workshops

Optional digital media workshops are designed to provide valuable technical skills and tools for students in all graduate degree programs.

Code	Title	Hours
Students may complete one of the following:		
DGM 6506	Introduction to Digital Video	
DGM 6515	Introduction to After Effects	
DGM 6516	Virtual and Augmented Reality (VR/AR)	
DGM 6892	Capstone Project Preparation	
TCC 6410	Online Documentation	
TCC 6620	Collecting User Data	
TCC 6630	Introduction to XML	

### Program Credit/GPA Requirements

45 total quarter hours required  
Minimum 3.000 GPA required

#### 3-D ANIMATION

Code	Title	Hours
DGM 6450	Animation Basics	4
DGM 6510	3-D Modeling	4
DGM 6530	Character Animation	4
DGM 6535	Rigging Principles and Techniques	4
DGM 6540	Compositing	4

#### DIGITAL MEDIA MANAGEMENT

Code	Title	Hours
DGM 6230	Digital Media Entrepreneurship	4
DGM 6280	Managing for Digital Media	4
DGM 6285	Interactive Marketing Fundamentals	4
DGM 6290	Social Media and Brand Strategy Implementation	4
DGM 6279	Project Management for Digital Media	4

#### DIGITAL VIDEO

Code	Title	Hours
Complete 20 quarter hours from the following:		20
DGM 6435	Digital Video Production	
DGM 6440	Editing in the Digital Studio	
DGM 6520	Lighting for the Camera	
DGM 6540	Compositing	
DGM 6545	Documentary and Nonfiction Production	
DGM 6430	Screenwriting: Linear and Interactive	

#### GAME DESIGN

Code	Title	Hours
Complete 20 quarter hours from the following:		20
DGM 6308	Intermediate Programming for Digital Media	
DGM 6400	Game Design Fundamentals	
DGM 6405	Game Development	

DGM 6410	Game Design Technology Lab
DGM 6403	Game Engine Fundamentals

**INTERACTIVE DESIGN**

Code	Title	Hours
<b>Interactive Design</b>		
DGM 6461	Interactive Information Design 1	4
Complete four courses from one of the following tracks:		16
<b>Design Track</b>		
DGM 6217	Typography for Interactivity	
DGM 6463	Interactive Information Design 2	
DGM 6317	Screen-Based Publication Design	
DGM 6471	Designing Infographics	
<b>Usability and Development Track</b>		
DGM 6308	Intermediate Programming for Digital Media	
DGM 6451	Web Development	
DGM 6268	Usable Design for Mobile Digital Media	
DGM 6525	Research Methods for Global User Experiences	
TCC 6110	Information Architecture	
TCC 6710	Content Strategy	

**SOCIAL MEDIA**

Code	Title	Hours
Complete the following:		19-21
<b>Required</b>		
DGM 6285	Interactive Marketing Fundamentals	4
<b>Electives</b>		
Complete 15–17 quarter hours from the following:		
CMN 6040	Consumer Behaviors in the Online Environment	3
CMN 6045	Leveraging Digital Technologies: Strategy, Assessment, and Governance	3
CMN 6065	Implementation and Management of Social Media Channels and Online Communities	3
CMN 6075	Digital Marketing Analytics	3
DGM 6290	Social Media and Brand Strategy Implementation	4
DGM 6525	Research Methods for Global User Experiences	4
DGM 6550	Search Engine Optimization: Strategy and Implementation	4

**Digital Media, MPS—Connect**

Students in the Master of Professional Studies in Digital Media will build their skills and expertise while gaining experience using a variety of industry-standard and cutting-edge technologies and tools. Our curriculum is organized around three types of experiences: core courses, concentration electives, and a capstone that can be completed as an individual thesis or a team project.

Our core courses in media creation, interactive design, usability, design thinking, and narrative structure provide a baseline for producing content-rich experiences. A series of electives are offered in seven distinctive areas: 3-D animation, game design, digital video, social media, digital

media management, or one of two tracks in interactive design: visual design or usability and production. In the capstone experience, you'll work with the guidance of faculty to channel your passion into a project that provides tangible evidence of your abilities.

Whether you are a full- or part-time student, our cohort structure allows you to build meaningful working relationships with students from around the globe. Team-based assignments strengthen your project management and leadership skills and allow you to take part in the design and development of more complex media projects than you could by working alone. The team efforts will also prepare you for your future as a professional in digital media's collaboration-oriented culture.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Foundation Courses**

Code	Title	Hours
DGM 6105	Visual Communications Foundation	4
DGM 6108	Programming Foundations for Digital Media	4
DGM 6109	Lab for DGM 6108	2
DGM 6501	Web Creation Boot Camp	2

**Required Core Courses**

Code	Title	Hours
DGM 6122	Foundations of Digital Storytelling	4
DGM 6145	Information Technology and Creative Practice	4
DGM 6521	Web Creation for Content Management Systems	2
Complete one of the following:		4
DGM 6140	Sound Design	
DGM 6168	Usability and Human Interaction	
Complete one of the following options:		8

**Thesis Option**

DGM 6890	Thesis Proposal Development
DGM 7990	Thesis

**Capstone Option**

DGM 7980	Capstone
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Technical course from the workshops list

**Concentrations**

Complete one of the following concentrations:

- 3-D Animation (p. 327)
- Digital Media Management (p. )
- Digital Video (p. )
- Game Design (p. )
- Interactive Design (p. )
- Social Media (p. )

**Elective**

Code	Title	Hours
Complete one of the following:		3-4
ALY 6110	Data Management and Big Data	
DGM 6125	Time-Based Media	
DGM 6322	Advanced Digital Storytelling	
DGM 6550	Search Engine Optimization: Strategy and Implementation	
DGM 6943	Integrative Experiential Learning	
ITC 6410	Fundamentals of Human Behaviors for Interactive Systems	
EDU 6184	Interdisciplinary Foundations	

**Workshops**

Optional digital media workshops are designed to provide valuable technical skills and tools for students in all graduate degree programs.

Code	Title	Hours
Students may complete one of the following:		
DGM 6506	Introduction to Digital Video	
DGM 6515	Introduction to After Effects	
DGM 6516	Virtual and Augmented Reality (VR/AR)	
DGM 6892	Capstone Project Preparation	
TCC 6620	Collecting User Data	
TCC 6630	Introduction to XML	
TCC 6410	Online Documentation	

**Program Credit/GPA Requirements**

56 total quarter hours required

Minimum 3.000 GPA required

**3-D ANIMATION**

Code	Title	Hours
DGM 6450	Animation Basics	4
DGM 6510	3-D Modeling	4
DGM 6530	Character Animation	4
DGM 6535	Rigging Principles and Techniques	4
DGM 6540	Compositing	4

**DIGITAL MEDIA MANAGEMENT**

Code	Title	Hours
DGM 6230	Digital Media Entrepreneurship	4
DGM 6280	Managing for Digital Media	4
DGM 6285	Interactive Marketing Fundamentals	4
DGM 6290	Social Media and Brand Strategy Implementation	4
DGM 6279	Project Management for Digital Media	4

**DIGITAL VIDEO**

Code	Title	Hours
Complete 20 quarter hours from the following:		20
DGM 6435	Digital Video Production	
DGM 6440	Editing in the Digital Studio	
DGM 6520	Lighting for the Camera	
DGM 6540	Compositing	

DGM 6545	Documentary and Nonfiction Production	
DGM 6430	Screenwriting: Linear and Interactive	

**GAME DESIGN**

Code	Title	Hours
Complete 20 quarter hours from the following:		20
DGM 6308	Intermediate Programming for Digital Media	
DGM 6400	Game Design Fundamentals	
DGM 6405	Game Development	
DGM 6410	Game Design Technology Lab	
DGM 6403	Game Engine Fundamentals	

**INTERACTIVE DESIGN**

Code	Title	Hours
<b>Interactive Design</b>		
DGM 6461	Interactive Information Design 1	4
Complete four courses from one of the following tracks:		16
<b>Design Track</b>		
DGM 6217	Typography for Interactivity	
DGM 6463	Interactive Information Design 2	
DGM 6317	Screen-Based Publication Design	
DGM 6471	Designing Infographics	
<b>Usability and Development Track</b>		
DGM 6308	Intermediate Programming for Digital Media	
DGM 6451	Web Development	
DGM 6268	Usable Design for Mobile Digital Media	
DGM 6525	Research Methods for Global User Experiences	
TCC 6110	Information Architecture	
TCC 6710	Content Strategy	

**SOCIAL MEDIA**

Code	Title	Hours
Complete the following:		19-21
<b>Required</b>		
DGM 6285	Interactive Marketing Fundamentals	4
<b>Electives</b>		
Complete 15–17 quarter hours from the following:		
CMN 6040	Consumer Behaviors in the Online Environment	
CMN 6045	Leveraging Digital Technologies: Strategy, Assessment, and Governance	
CMN 6075	Digital Marketing Analytics	
CMN 6065	Implementation and Management of Social Media Channels and Online Communities	
DGM 6290	Social Media and Brand Strategy Implementation	
DGM 6525	Research Methods for Global User Experiences	
DGM 6550	Search Engine Optimization: Strategy and Implementation	

## Enterprise Intelligence, MPS

Humankind is on the threshold of a new era—an age of artificial intelligence (AI) as revolutionary in its global impact as the Industrial Revolution. With the proliferation of machine learning and AI across all sectors of the global society, and fields such as financial services, healthcare, and robotics, GEOINT and cybersecurity are already changing as intelligent computers take on once-indispensably human tasks. There is an immediate need for individuals to be knowledgeable in how to manage, analyze, communicate, visualize, and lead in the area of AI by being data, technology, and human literate. The experiential AI curricula includes an introductory core, as well as an advanced core with an end-to-end AI education in the areas of finance, HR, business ventures, and healthcare/pharmaceuticals. The goal is to proactively and thoughtfully prepare students for the evolving technology and the challenges it presents. The curricula framework adopts a multidisciplinary approach to problem solving by combining computer science and analytical skills with functional government and industry expertise, creativity, and leadership with program offerings on-ground and online.

The degree program is distinguished from others by:

- Focusing on the specific but widespread field of AI that exists within a variety of industries and applications
- Northeastern faculty experts, who have extensive and proven experience in computer science, analytics, geospatial science, information technology, etc.
- Courses that focus on providing critical skills in data management, data analysis, data visualization, problem solving, and advanced analytical tools, creating AI-driven decision making in fields like healthcare/pharmaceuticals, finance, HR, and business ventures

The learning outcome of our program focuses on providing students with both technical skills and design expertise:

- Investigate and identify opportunities to address applications of AI and machine learning in the world to answer or solve an organizational question or problem.
- Articulate and defend the significance and implications of the intersection of technology and application in the context of AI and machine learning across multiple industries and organizations.
- Integrate the principles, tools, and methods of AI and machine learning to solve an organizational problem by making informed decisions related to the design and deployment of systems in human environments and work flows within the organization.
- Develop a formally proposed solution and/or application, real or hypothetical, to address an AI and machine learning related to privacy and ethical dilemmas that may be complicated by competing political, social, economic, or environmental interests.
- Apply data management and strategic analysis, problem solving, decision making, effective visualization/communication, and leadership skills to the application or deployment of machine learning and AI technologies and products in a real-world scenario.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirements

Code	Title	Hours
EAI 6000	Fundamentals of Artificial Intelligence	3
EAI 6010	Applications of Artificial Intelligence	3

ALY 6110	Data Management and Big Data	3
EAI 6030	Usability and Human Interaction	3
EAI 6020	AI System Technologies	3

### Concentration

Complete one of the following concentrations:

- AI for Business Ventures (p. 328)
- AI for Finance (p. 328)
- AI for Healthcare (p. 329)
- AI for Human Resources (p. )

### Experiential Network and Capstone

Code	Title	Hours
INT 6940	Experiential Learning Projects for Professionals	3
EAI 6980	Integrated Experiential Capstone	3

### Elective Courses

Code	Title	Hours
Complete three of the following, or any concentration courses outside of your declared concentration:		9
ALY 6140	Analytics Systems Technology	
CED 6050	Commerce and Economic Development	
CMN 6000	Introduction to Organizational Communication	
GIS 5201	Advanced Spatial Analysis	
GIS 6360	Spatial Databases	
LDR 6135	Ethical Leadership	
PJM 6005	Project Scope Management	
PJM 6015	Project Risk Management	
PJM 6205	Leading and Managing Technical Projects	
EDU 6184	Interdisciplinary Foundations	

### Program Credit/GPA Requirements

45 total quarter hours required  
Minimum 3.000 GPA required

### Concentrations

#### AI FOR BUSINESS VENTURES

Code	Title	Hours
EDU 6558	Issues in Education	1-4
ALY 6040	Data Mining Applications	3
ITC 6015	Enterprise Information Architecture	3
EAI 6080	Advanced Analytical Utilization	3
EAI 6120	AI Communication and Visualization	3

#### AI FOR FINANCE

Code	Title	Hours
FIN 6101	Accounting Fundamentals for Financial Institutions	3,4
ALY 6040	Data Mining Applications	3
EAI 6050	Finance Information Processing	3
EAI 6080	Advanced Analytical Utilization	3
EAI 6120	AI Communication and Visualization	3



**AI FOR HEALTHCARE**

Code	Title	Hours
ALY 6150	Healthcare/Pharmaceutical Data and Applications	3
ALY 6040	Data Mining Applications	3
EAI 6060	Healthcare Information Processing	3
EAI 6080	Advanced Analytical Utilization	3
EAI 6120	AI Communication and Visualization	3

**AI FOR HUMAN RESOURCES**

Code	Title	Hours
HRM 6025	Workforce Analytics	3
ALY 6040	Data Mining Applications	3
EAI 6070	Human Resources Information Processing	3
EAI 6080	Advanced Analytical Utilization	3
EAI 6120	AI Communication and Visualization	3

**Geospatial Services, MPS**

The Northeastern University MPS in Geospatial Services program is designed for working professionals striving to maintain competitive, leading-edge capabilities at a time of rapidly growing utilization of geospatial data for diversity of government and business intelligence needs. Program strengths are highly correlated with geospatial workforce requirements as identified by geospatial enterprise leaders from government and industry (e.g., GEOINT Essential Body of Knowledge ([http://usgif.org/certification/geoint\\_EBK/](http://usgif.org/certification/geoint_EBK/))). Our curriculum incorporates tools, technologies, and services required in three primary sectors:

- *Location-based geodata* (collect, manage, distribute spatial information and imagery)
- *Geo-applications and devices* (devices and software for creating, visualizing, and sharing geospatial information)
- *Geo-expert industries* (turn location-based information into insights for commercial and government organizations)

Available 100 percent online and built to Northeastern University's high academic standards, our program's experiential focus emphasizes the connections between learning and workplace needs.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Required Courses**

Code	Title	Hours
GIS 5103	Foundations of Geographic Information Science	4
GIS 5201	Advanced Spatial Analysis	3
RMS 5105	Fundamentals of Remote Sensing	3
GIS 6980	Capstone	4
<b>Complete two of the following:</b>		6-7
EAI 6000	Fundamentals of Artificial Intelligence	
ITC 6045	Information Technology Policy, Ethics, and Social Responsibility	
ITC 6300	Foundations of Information Security	
ITC 6460	Cloud Analytics	

PJM 5900	Foundations of Project Management
PJM 6000	Project Management Practices

ITC 6300 and ITC 6460 are currently hybrid or on ground. If you are interested in taking one of these courses online please let your adviser know at the start of the school year.

**Concentrations**

Complete one of the following concentrations:

**GEOGRAPHIC INFORMATION SYSTEMS**

Code	Title	Hours
Complete six of the following:		18
ITC 6480	Amazon Web Service (AWS) Cloud Architecting	
GIS 6320	Use and Applications of Free and Open-Source GIS Desktop Software	
GIS 6340	GIS Customization	
GIS 6330	Building Geospatial Systems at Scale	
GIS 6345	Geospatial Programming	
GIS 6350	Planning a GIS Implementation	
GIS 6360	Spatial Databases	
GIS 6370	Internet-Based GIS	
GIS 6385	GIS/Cartography	
GIS 6983	Topics	
RMS 6293	Allied Technologies in Remote Sensing	

**REMOTE SENSING**

Code	Title	Hours
RMS 6110	Introduction to Machine Learning for Image Data	3
Complete five of the following:		15-16
GIS 6330	Building Geospatial Systems at Scale	
GIS 6345	Geospatial Programming	
ITC 6480	Amazon Web Service (AWS) Cloud Architecting	
RMS 6240	Introduction to Radar and LiDAR Remote Sensing	
RMS 6280	Automated Feature Extraction for the Geospatial Professional	
RMS 6290	Spectroscopic Image Analysis	
RMS 6293	Allied Technologies in Remote Sensing	
RMS 6983	Topics	

**GEOSPATIAL ANALYTICS**

Code	Title	Hours
Complete the following:		18
ALY 6020	Predictive Analytics	
ALY 6040	Data Mining Applications	
ALY 6030	Data Warehousing and SQL	
ALY 6070	Communication and Visualization for Data Analytics	
ALY 6110	Data Management and Big Data	
ALY 6983	Topics	

**Electives**

Open electives can be fulfilled by choosing 6-7 quarter hours from the courses listed above or the open electives listed below.

Code	Title	Hours
COP 6940	Personal and Career Development	3-4
INT 6940	Experiential Learning Projects for Professionals	1-4
EAI 6000	Fundamentals of Artificial Intelligence	3
EDU 6184	Interdisciplinary Foundations	2

## Program Credit/GPA Requirements

45 total quarter hours required  
Minimum 3.000 GPA required

### Informatics, MPS

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.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
ITC 6400	Foundations of Informatics	3
ITC 6000	Database Management Systems	3
ITC 6010	Information Technology Strategy and Governance	3
ITC 6020	Information Systems Design and Development	3
ITC 6035	Information Technology Project Management	3
<b>Capstone and Experiential Learning</b>		
ITC 6040	Informatics Capstone	3
INT 6940	Experiential Learning Projects for Professionals	1-4

## Concentration

Complete one of the following concentrations:

- Information Security Management (p. 330)
- Geographic Information Systems (p. 330)
- Leading and Managing Technical Projects (p. 330)
- Analytics (p. 330)
- Human-Centered Informatics (p. 331)
- Cloud Computing Application and Management (p. 331)

### INFORMATION SECURITY MANAGEMENT

Code	Title	Hours
ITC 6300	Foundations of Information Security	3
ITC 6305	IT Infrastructure (Systems, Networks, Telecom)	3

ITC 6315	Information Security Risk Management	3
ITC 6320	Information Security Technology (Complete three of the following courses)	3
ITC 6490	Ethical Hacking	3
Complete one of the following:		3-4
ITC 6325	CISA Preparation	
ITC 6330	CISSP Preparation	
ITC 6080	Network Security Concepts	
ITC 6082	Network Protection	

### GEOGRAPHIC INFORMATION SYSTEMS

Code	Title	Hours
Classes offered online only:		
GIS 5103	Foundations of Geographic Information Science	4
RMS 5105	Fundamentals of Remote Sensing	3
GIS 5201	Advanced Spatial Analysis	3
Complete three of the following:		9
GIS 6340	GIS Customization	
GIS 6350	Planning a GIS Implementation	
GIS 6360	Spatial Databases	
GIS 6370	Internet-Based GIS	
GIS 6385	GIS/Cartography	
GIS 6330	Building Geospatial Systems at Scale	
GIS 6345	Geospatial Programming	
GIS 6983	Topics	
RMS 6293	Allied Technologies in Remote Sensing	

### LEADING AND MANAGING TECHNICAL PROJECTS

Code	Title	Hours
PJM 6000	Project Management Practices	3
PJM 6205	Leading and Managing Technical Projects	3
PJM 6210	Communication Skills for Project Managers	3
PJM 6215	Leading Remote Project Teams	3
PJM 6810	Principles of Agile Project Management	3
PJM 6825	Agile Lean Product Development	3

### ANALYTICS

Code	Title	Hours
ALY 6000	Introduction to Analytics	3
ALY 6010	Probability Theory and Introductory Statistics	3
ALY 6020	Predictive Analytics	3
ALY 6040	Data Mining Applications	3
ALY 6070	Communication and Visualization for Data Analytics	3
Complete one of the following:		3
ALY 6015	Intermediate Analytics	
ALY 6030	Data Warehousing and SQL	
ALY 6110	Data Management and Big Data	

**HUMAN-CENTERED INFORMATICS**

Code	Title	Hours
ITC 6410	Fundamentals of Human Behaviors for Interactive Systems	3
DGM 6461	Interactive Information Design 1	4
DGM 6168	Usability and Human Interaction	4
DGM 6268	Usable Design for Mobile Digital Media	4
Complete one of the following:		3-4
DGM 6463	Interactive Information Design 2	
ALY 6070	Communication and Visualization for Data Analytics	
ITC 6355	Web Application Design and Development	

**CLOUD COMPUTING APPLICATION AND MANAGEMENT**

Code	Title	Hours
ITC 6420	Introduction to Cloud Computing Applications and Management	3
ITC 6450	Advanced Cloud Computing Applications and Management	3
ITC 6015	Enterprise Information Architecture	3
ITC 6320	Information Security Technology	3
ITC 6355	Web Application Design and Development	3
Complete one of the following:		3-4
ITC 6082	Network Protection	
ITC 6460	Cloud Analytics	
ITC 6470	Enterprise Data Storage and Management Technologies	
ITC 6480	Amazon Web Service (AWS) Cloud Architecting	

**Electives**

Code	Title	Hours
Complete 5–6 quarter hours from the following:		6
DGM 6501	Web Creation Boot Camp	
DGM 6521	Web Creation for Content Management Systems	
DGM 6145	Information Technology and Creative Practice	
EDU 6184	Interdisciplinary Foundations	
GIS 6360	Spatial Databases	
ITC 6030	Computer Systems and Networks	
ITC 6080	Network Security Concepts	
ITC 6082	Network Protection	
ITC 6430	Enterprise Information Technology Service Management	
ITC 6340	Mobile and Wireless Networks and Applications	
ITC 6345	Systems and Network Administration	
ALY 6050	Introduction to Enterprise Analytics	
ALY 6060	Decision Support and Business Intelligence	
ALY 6100	Data-Driven Decision Making	
ALY 6110	Data Management and Big Data	
ALY 6120	Leadership in Analytics	
ALY 6130	Risk Management for Analytics	

ALY 6015	Intermediate Analytics
ALY 6030	Data Warehousing and SQL
ITC 6045	Information Technology Policy, Ethics, and Social Responsibility
GIS 5103	Foundations of Geographic Information Science
GIS 6340	GIS Customization
GIS 6360	Spatial Databases
GIS 6391	Healthcare Applications of Geographic Information Systems
PJM 6000	Project Management Practices
PJM 6205	Leading and Managing Technical Projects
TCC 6110	Information Architecture

**Program Credit/GPA Requirements**

45 total quarter hours required

Minimum 3.000 GPA required

**Applied Nutrition, MS**

Increased attention on disease prevention through better dietary habits has heightened the demand for skilled nutrition professionals.

To meet the demands and need in the industry, this Master of Science in Applied Nutrition degree is designed to build upon your clinical knowledge and to allow you to concentrate in one of 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.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Required Courses**

Code	Title	Hours
NTR 6100	Advanced Nutrition and Metabolism	4
NTR 6110	Medical Nutrition Therapy	4
NTR 6112	Research Methods in Nutrition	4
NTR 6115	Health Promotion/Disease Prevention	4
NTR 6118	Clinical Health Behavior Change	4
NTR 6165	Food and Society	4
NTR 6866	Applied Research in Nutrition (Recommended as the last course taken)	1-4

**Concentration**

Complete one of the following four concentrations:<sup>1</sup>

**BUSINESS AND ENTREPRENEURSHIP IN NUTRITION**

Code	Title	Hours
NTR 6155	Nutrition Entrepreneurship	3
NTR 6130	Healthcare and Nutrition Communication	4
PJM 5900	Foundations of Project Management	4
NTR 6202	The Financing of Nutrition and Wellness	3
NTR 7880	Nutrition in Practice	1-4

**NUTRITION EDUCATION**

Code	Title	Hours
<b>Required Courses</b>		
NTR 6200	Nutrition Education	4
NTR 6130	Healthcare and Nutrition Communication	4
NTR 6201	Commercialization of Nutrition and Nutritional Information	3
NTR 7880	Nutrition in Practice	1-4

**Nutrition Education Elective**

Complete one of the following:		
NTR 6119	Pediatric Nutrition	4
NTR 6120	Healthy Aging: Nutrition Strategies for Optimal Longevity	4
NTR 6101	Nutrition Program Planning	4

**NUTRITION AND FITNESS**

Code	Title	Hours
<b>Required Courses</b>		
NTR 7147	Sports and Fitness Nutrition	3
NTR 6148	Exercise Physiology	3
NTR 6150	Sports Psychology	3
NTR 7880	Nutrition in Practice	1-4

**Nutrition and Fitness Elective**

Complete one of the following:		
NTR 6120	Healthy Aging: Nutrition Strategies for Optimal Longevity	4
NTR 6101	Nutrition Program Planning	4

**OBESITY AND NUTRITIONAL HEALTH**

Code	Title	Hours
<b>Required Courses</b>		
NTR 7130	Overweight and Obesity 1	4
NTR 7132	Overweight and Obesity 2	4
NTR 6201	Commercialization of Nutrition and Nutritional Information	3
NTR 7880	Nutrition in Practice	1-4

**Obesity and Nutritional Health Elective**

Complete one of the following:		
NTR 7140	Wellness and Nutrition	4
NTR 7135	Eating Disorders in Children and Adults	4

**Program Credit/GPA Requirements**

45 total quarter hours required

Minimum 3.000 GPA required

<sup>1</sup> Interdisciplinary Foundations (EDU 6184) may be taken as an elective.

**Commerce and Economic Development, MS**

Globalization has created a borderless economy with a host of new opportunities and challenges for those engaged in commerce and economic development. While global markets offer exciting growth prospects, navigating the world stage requires in-depth knowledge of the financial, regulatory, and economic environments and institutions that affect the global economy and international trade. To meet the need for both insight and skills development, Northeastern University's College of Professional Studies—in collaboration with Northeastern University's College of Social Sciences and Humanities—offers the online Master of Science in Commerce and Economic Development.

This graduate-level program integrates economics, leadership, institutional organization, technology, and public policy into a unique and focused educational experience designed to help guide and advance a rewarding career in the private or public sectors.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Required Courses**

Code	Title	Hours
CED 6010	Applied Microeconomic Theory 1	3
CED 6020	Applied Macroeconomic Theory 1	3
CED 6030	Mathematical Methods for Economics 1	3
CED 6040	Applied Econometrics	3
CED 6050	Commerce and Economic Development	3

**Capstone**

Code	Title	Hours
The following course should be taken last:		
CED 6910	Capstone: Master's Project	4

**Concentration**

Complete one of the following concentrations:

**ECONOMIC ANALYSIS**

Code	Title	Hours
CED 6011	Applied Microeconomic Theory 2	3
CED 6021	Applied Macroeconomic Theory 2	3
CED 6031	Mathematical Methods for Economics 2	3
CED 6041	Applied Econometrics II	3
CED 6051	Open Economy Macroeconomic Analysis	3

**ECONOMIC ENTREPRENEURSHIP**

Code	Title	Hours
CED 6070	Economics of Human Capital	3
ALY 6050	Introduction to Enterprise Analytics	3
CMN 6095	Foundations of Developing Cultural Awareness	3

GST 6430	Leadership and Management	4
CED 6140	Economics of E-Commerce	3

**DATA ANALYTICS**

Code	Title	Hours
ALY 6000	Introduction to Analytics	3
ALY 6015	Intermediate Analytics	3
ALY 6050 or ALY 6070	Introduction to Enterprise Analytics Communication and Visualization for Data Analytics	3
ALY 6100	Data-Driven Decision Making	3
ALY 6110	Data Management and Big Data	3

**FINANCIAL ECONOMICS**

Code	Title	Hours
FIN 6161	Investment Analysis	4
FIN 6102	Asset and Liability Management	4
FIN 6120	Building Financial Relationships	4
CED 6210	Managerial Finance	3
CED 6220	International Finance	3
CED 6230	Quantitative Methods	3
CED 6240	Financial Ethics	3
CED 6250	Derivatives and Alternative Investments	3

**Electives**

Complete 11-14 quarter hours from the CED subject area, or from any of the following:

Code	Title	Hours
CMN 6080	Intercultural Communication	4
COP 6940	Personal and Career Development	3
GST 6102	Global Corporate and Social Responsibility	3
CED 6090	Cultural Economic Development	3
CED 6110	Law and Economics	3
CED 6120	Environmental Economics	3
CED 6130	Sustainable Economic Development	3
EDU 6184	Interdisciplinary Foundations	3
LDR 6145	Global Leadership	3

**Program Credit/GPA Requirements**

45 total quarter hours required  
Minimum 3.000 GPA required

**Corporate and Organizational Communication, MS**

Across all industries and professions, strong written and oral communication skills are essential to success. Whether you are seeking to advance in a communications-related field or get ahead in your current organization, this program seeks to provide the practical knowledge and valuable perspectives you need to communicate across a variety of contexts and situations.

From negotiation and writing to crisis management and public speaking, the Master of Science in Corporate and Organizational Communication degree program examines topics that are critical to effective organizational communication. Incorporating best practices, case studies, and classroom learning, courses within this innovative master’s degree in communication address complex communication

challenges, seeking to provide you with a distinct advantage in today’s competitive marketplace.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Required Courses**

*Note:* Introduction to Organizational Communication (CMN 6000) is required for students who do not have any professional experience in communication. Students with professional communication experience should begin the program with Strategic Communication Management (CMN 6010):

Code	Title	Hours
CMN 6000 and INT 6000	Introduction to Organizational Communication and Writing Lab	4
CMN 6010	Strategic Communication Management	3
CMN 6020	Ethical Issues in Organizational Communication	3
CMN 6910	Organizational Communication Assessment	3
Complete two of the following:		6
CMN 6100	Communication Networks and Managing Information	3
CMN 6080	Intercultural Communication	3
CMN 6090	Organizational Culture, Climate, and Communication	3

**Capstone**

Code	Title	Hours
CMN 6940	Projects for Professionals	4

**Concentrations**

- Human Resource Management (p. 334)
- Public and Media Relations (p. 334)
- Leadership (p. 334)
- Project Management (p. 334)
- Social Media (p. 334)
- Cross-Cultural Communication (p. 335)

**ELECTIVE COURSES**

*Note:* Students who take Introduction to Organizational Communication (CMN 6000) are only required to take two courses in this section.

Code	Title	Hours
Complete three of the following:		4-12
ALY 6010	Probability Theory and Introductory Statistics	3
ALY 6070	Communication and Visualization for Data Analytics	3
CMN 6005	Foundations of Professional Communication	3
CMN 6025	Digital Era Skills: Platforms, Tools, and Techniques	3
CMN 6050	Crisis Communication	3

CMN 6110	Group Dynamics and Interpersonal Conflict: Meeting Management
CMN 6060	Negotiation, Mediation, and Facilitation
CMN 6095	Foundations of Developing Cultural Awareness
CMN 6085	Strategies for Cross-Cultural Facilitation and Negotiation
COP 6940	Personal and Career Development
DGM 6501	Web Creation Boot Camp
DGM 6521	Web Creation for Content Management Systems
INT 6900	International Field Study Experience
EDU 6184	Interdisciplinary Foundations

### Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

### HUMAN RESOURCES MANAGEMENT

Code	Title	Hours
<b>Required Courses</b>		
HRM 6015	Introduction to Human Resources Management	3
HRM 6025	Workforce Analytics	3
<b>HRM Concentration Electives</b>		
Note: Students who take HRM 6015 select three elective courses; students waived from HRM 6015 select four elective courses:		9-12
HRM 6005	Creating a High-Performance Organization: Strategic Organizational and HRM Choices	
HRM 6010	Compensation and Benefits	
HRM 6020	Talent Acquisition and Onboarding	
HRM 6030	The Employment Contract	
HRM 6042	Strategic Workforce Planning	
HRM 6047	Managing the Employee Life Cycle	
HRM 6050	Employee Engagement	
HRM 6060	Organizational Design	
HRM 6070	Global Human Resources Management	

### PUBLIC AND MEDIA RELATIONS

Code	Title	Hours
<b>Required Courses</b>		
PBR 6100	Introduction to Public Relations	3
PBR 6135	Public Relations Strategy and Planning	3
PBR 6710	Public Relations Research: Understanding External Audiences	3
<b>Public and Media Relations Electives</b>		
Complete two of the following:		6-7
CMN 6025	Digital Era Skills: Platforms, Tools, and Techniques	
CMN 6035	Legal, Policy, and Ethical Issues in the Digital Era	
CMN 6045	Leveraging Digital Technologies: Strategy, Assessment, and Governance	
CMN 6050	Crisis Communication	

DGM 6290	Social Media and Brand Strategy Implementation
PBR 6125	Community Relations and Corporate Social Responsibility
PBR 6130	Public Relations Content Development
PBR 6140	Advanced Public Relations Content Development

### LEADERSHIP

Code	Title	Hours
<b>Required Courses</b>		
CMN 6200	Strategic Communications Advisor: Roles and Responsibilities	3
LDR 6100	Developing Your Leadership Capability	3
<b>Leadership Electives</b>		
Complete three of the following:		9
CMN 6201	Managing Communication Resources	
CMN 6202	Management Symposium	
LDR 6110	Leading Teams	
LDR 6145	Global Leadership	
LDR 6150	Innovation and Organizational Transformation	

### PROJECT MANAGEMENT

Code	Title	Hours
<b>Required Courses</b>		
Note: Students with project management experience are not required to take PJM 5900:		
PJM 5900	Foundations of Project Management	4
PJM 6000	Project Management Practices	3
PJM 6005	Project Scope Management	3
PJM 6025	Project Scheduling and Cost Planning	3
PJM 6015	Project Risk Management	3
<b>Project Management Elective</b>		
Note: Students who take PJM 5900 are not required to take a course in this section.		
Complete one of the following:		3
PJM 6125	Project Evaluation and Assessment	
PJM 6135	Project Quality Management	
PJM 6140	Managing Troubled Projects	
PJM 6210	Communication Skills for Project Managers	
PJM 6710	Introduction to Program and Portfolio Management	

### SOCIAL MEDIA

Code	Title	Hours
<b>Required Course</b>		
DGM 6285	Interactive Marketing Fundamentals	4
<b>Electives</b>		
Complete 12–16 quarter hours from the following:		12-16
CMN 6040	Consumer Behaviors in the Online Environment	
CMN 6045	Leveraging Digital Technologies: Strategy, Assessment, and Governance	

CMN 6065	Implementation and Management of Social Media Channels and Online Communities	
CMN 6075	Digital Marketing Analytics	
DGM 6290	Social Media and Brand Strategy Implementation	
DGM 6525	Research Methods for Global User Experiences	
DGM 6550	Search Engine Optimization: Strategy and Implementation	

**CROSS-CULTURAL COMMUNICATION**

Code	Title	Hours
<b>Required Courses</b>		
CMN 6085	Strategies for Cross-Cultural Facilitation and Negotiation	3
CMN 6095	Foundations of Developing Cultural Awareness	3
Complete 9 quarter hours from one of the following:		9

**Social Justice Track**

PBR 6100	Introduction to Public Relations	
HSV 6120	Social Inequality, Social Change, and Community Building	
ITC 6045	Information Technology Policy, Ethics, and Social Responsibility	
HRM 6070	Global Human Resources Management	

**International Track**

GST 6100	Globalization and Global Politics and Economics	
GST 6101	Global Literacy, Culture, and Community	
LDR 6145	Global Leadership	
INT 6900	International Field Study Experience	

**Criminal Justice, MS**

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 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.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Foundation Courses**

Code	Title	Hours
CJS 6020	Contemporary Issues in Criminal Justice Policy	3

CJS 6400	Administration of Justice	3
CJS 6405	Criminological Theory for Criminal Justice Leaders	3
CJS 6415	Legal Decision Making and Leadership	3
CJS 6470	Criminal Justice Capstone (Recommended as the last course)	3

**Operations Courses**

Code	Title	Hours
CJS 6425	Research Methods	3
CJS 6435	Program Evaluations	3
CJS 6440	GIS, Evidence-Based Learning, and Policy	3
CMN 6050	Crisis Communication	3

**Concentration**

Complete one of the following six concentrations:

- Community and Family Justice
- Corrections
- Global Criminal Justice
- Leadership
- Policing
- Security

**Program Credit/GPA Requirements**

45 total quarter hours required  
Minimum 3.000 GPA required

**COMMUNITY AND FAMILY JUSTICE**

Code	Title	Hours
<b>Required Courses</b>		
CJS 6300	Communities and Crime	3
CJS 6330	Youth Justice and Crime	3
CJS 6340	Substance Abuse and Addictions	3
CJS 6135	Intimate Partner Violence	3
<b>Elective</b>		
Complete 6 quarter hours from the following:		6
CJS 6025	Genocide and War Crimes	
CJS 6450	Organizational Crisis Management: The Human Factor	
LDR 6360	Dynamics of Change at the Community and Social Level	
INT 6943	Integrative Experiential Learning	
EDU 6184	Interdisciplinary Foundations	

**CORRECTIONS**

Code	Title	Hours
<b>Required Courses</b>		
Complete the following:		12
CJS 6300	Communities and Crime	
CJS 6315	Administration of the Adult and Juvenile Correction Systems	
CJS 6325	Probation and Parole	
CJS 6340	Substance Abuse and Addictions	
<b>Elective</b>		
Complete 6 quarter hours from the following:		6

CJS 6330	Youth Justice and Crime
CJS 6450	Organizational Crisis Management: The Human Factor
INT 6943	Integrative Experiential Learning
EDU 6184	Interdisciplinary Foundations

**GLOBAL CRIMINAL JUSTICE**

Code	Title	Hours
<b>Required Courses</b>		
Complete five of the following:		15-16
CJS 6025	Genocide and War Crimes	
CJS 6030	Organized Crime	
CJS 6035	Corruption, Integrity, and Accountability	
CJS 6040	Human Trafficking and Exploitation	
CJS 6045	Policing Issues around the Globe	
CJS 6105	Domestic and International Terrorism	
CJS 6125	Issues in National Security	
GST 6300	Security and Terrorism	

**Elective**

Complete 3 quarter hours from the following:		3
CJS 6450	Organizational Crisis Management: The Human Factor	
INT 6943	Integrative Experiential Learning	
EDU 6184	Interdisciplinary Foundations	

**LEADERSHIP**

Code	Title	Hours
<b>Required Courses</b>		
Complete the following:		15
CJS 6450	Organizational Crisis Management: The Human Factor	
LDR 6100	Developing Your Leadership Capability	
LDR 6110	Leading Teams	
LDR 6120	Developing Organizational Leadership	
LDR 6150	Innovation and Organizational Transformation	
Complete one of the following:		3
LDR 6135	Ethical Leadership	
LDR 6140	Strategy Development and Implementation	

**Elective**

Additional optional electives listed below:		
CJS 6005	Legal and Regulatory Issues for Security Management	
INT 6943	Integrative Experiential Learning	
EDU 6184	Interdisciplinary Foundations	

**POLICING**

Code	Title	Hours
<b>Required Courses</b>		
Complete the following:		9
CJS 6035	Corruption, Integrity, and Accountability	
CJS 6045	Policing Issues around the Globe	
CJS 6300	Communities and Crime	

**Elective**

Complete 9 quarter hours from the following:		9
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CJS 6030	Organized Crime
CJS 6040	Human Trafficking and Exploitation
CJS 6450	Organizational Crisis Management: The Human Factor
INT 6943	Integrative Experiential Learning
EDU 6184	Interdisciplinary Foundations

**SECURITY**

Code	Title	Hours
<b>Required Courses</b>		
Complete five of the following:		15-16
CJS 6005	Legal and Regulatory Issues for Security Management	
CJS 6035	Corruption, Integrity, and Accountability	
CJS 6045	Policing Issues around the Globe	
CJS 6105	Domestic and International Terrorism	
CJS 6125	Issues in National Security	
GST 6300	Security and Terrorism	

**Elective**

Complete 3 quarter hours from the following:		3
CJS 6040	Human Trafficking and Exploitation	
CJS 6450	Organizational Crisis Management: The Human Factor	
INT 6943	Integrative Experiential Learning	
EDU 6184	Interdisciplinary Foundations	

**Human Resources Management, MS**

The human resources management program in the College of Professional Studies is designed to prepare students to make the connection between an organization's strategy and its people and other key stakeholders. The program focuses on vital human resource competencies and analytical skills—with an emphasis on experiential learning—required for students to serve as strategic business partners in their organizations. Students also have the opportunity to tailor their studies to support their specific career objectives.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Required Courses**

Code	Title	Hours
Based on your experience, complete one of the options below:		
<i>Two or more years of human resources experience:</i>		6
HRM 6025	Workforce Analytics	
HRM 6042	Strategic Workforce Planning	
<i>Fewer than two years of experience:</i>		9
HRM 6015	Introduction to Human Resources Management	
HRM 6025	Workforce Analytics	
HRM 6042	Strategic Workforce Planning	
Complete four of the following:		12
HRM 6005	Creating a High-Performance Organization: Strategic Organizational and HRM Choices	
HRM 6010	Compensation and Benefits	



HRM 6020	Talent Acquisition and Onboarding
HRM 6030	The Employment Contract
HRM 6047	Managing the Employee Life Cycle
HRM 6050	Employee Engagement
HRM 6060	Organizational Design
HRM 6070	Global Human Resources Management
CMN 6090	Organizational Culture, Climate, and Communication

**Concentrations**

Complete one of the following concentrations:

- Artificial Intelligence for Human Resources (p. )
- Digital Human Resources (p. )
- Global Talent Management (p. )
- Leadership (p. 337)
- Organizational Communication (p. )
- Project Management (p. 338)

**Capstone**

Code	Title	Hours
HRM 6940	Projects for Professionals	4

**Electives**

Code	Title	Hours
Complete a minimum of 5 quarter hours to reach 45 quarter hours:		
CMN 6110	Group Dynamics and Interpersonal Conflict: Meeting Management	3
CMN 6060	Negotiation, Mediation, and Facilitation	3
CMN 6025	Digital Era Skills: Platforms, Tools, and Techniques	3
ALY 6010	Probability Theory and Introductory Statistics	3
ALY 6070	Communication and Visualization for Data Analytics	3
TCC 6620	Collecting User Data	2
TCC 6610	Prototyping	2
COP 6940	Personal and Career Development	3-4

**Program Credit/GPA Requirements**

45 total quarter hours required  
 Minimum 3.000 GPA required

**ARTIFICIAL INTELLIGENCE FOR HUMAN RESOURCES**

Code	Title	Hours
<b>Required Courses</b>		
EAI 6070	Human Resources Information Processing	3
EAI 6080	Advanced Analytical Utilization	3
EAI 6120	AI Communication and Visualization	3
<b>Electives</b>		
Complete two of the following:		6
ALY 6010	Probability Theory and Introductory Statistics	
ALY 6040	Data Mining Applications	

ALY 6060	Decision Support and Business Intelligence
ALY 6100	Data-Driven Decision Making
ALY 6110	Data Management and Big Data

**DIGITAL HUMAN RESOURCES**

Code	Title	Hours
<b>Required Courses</b>		
HRM 6035		
ITC 6340	Mobile and Wireless Networks and Applications	3
CMN 6045	Leveraging Digital Technologies: Strategy, Assessment, and Governance	3
<b>Electives</b>		
Complete two of the following:		6
CMN 6065	Implementation and Management of Social Media Channels and Online Communities	
ALY 6010	Probability Theory and Introductory Statistics	
ALY 6060	Decision Support and Business Intelligence	
ALY 6100	Data-Driven Decision Making	
ALY 6110	Data Management and Big Data	

**GLOBAL TALENT MANAGEMENT**

Code	Title	Hours
<b>Required Courses</b>		
HRM 6072	Global and Comparative Employment/Employee Relations	3
HRM 6074	Global Talent Acquisition and Mobility	3
HRM 6076	International Compensation	3
<b>Electives</b>		
Complete two of the following:		6
LDR 6145	Global Leadership	
CMN 6085	Strategies for Cross-Cultural Facilitation and Negotiation	
CMN 6095	Foundations of Developing Cultural Awareness	
GST 6101	Global Literacy, Culture, and Community	

**LEADERSHIP**

Code	Title	Hours
<b>Required Courses</b>		
LDR 6100	Developing Your Leadership Capability	3
LDR 6120	Developing Organizational Leadership	3
<b>Electives</b>		
Complete three of the following:		9
LDR 6135	Ethical Leadership	
LDR 6140	Strategy Development and Implementation	
LDR 6145	Global Leadership	
LDR 6150	Innovation and Organizational Transformation	
LDR 6115	Leadership Communication	

**ORGANIZATIONAL COMMUNICATION**

Code	Title	Hours
<b>Required Courses</b>		
CMN 6020	Ethical Issues in Organizational Communication	3
CMN 6080	Intercultural Communication	3
CMN 6100	Communication Networks and Managing Information	3
<b>Electives</b>		
Complete two of the following:		6
CMN 6025	Digital Era Skills: Platforms, Tools, and Techniques	
CMN 6060	Negotiation, Mediation, and Facilitation	
CMN 6050	Crisis Communication	
CMN 6110	Group Dynamics and Interpersonal Conflict: Meeting Management	
CMN 6910	Organizational Communication Assessment	

**PROJECT MANAGEMENT**

Code	Title	Hours
<b>Required Courses</b>		
PJM 5900	Foundations of Project Management <sup>1</sup>	4
PJM 6000	Project Management Practices	3
PJM 6215	Leading Remote Project Teams	3
<b>Electives</b>		
Complete three of the following: <small>Students who take Foundations of Project Management (PJM 5900) are required to take two courses in this section.</small>		9
PJM 6005	Project Scope Management	
PJM 6175	Project Resource Management	
PJM 6180	Project Stakeholder Management	
PJM 6210	Communication Skills for Project Managers	

<sup>1</sup> This course is required for students who do not have at least two years of professional experience working on projects. This course is only intended for those who are not familiar with professional project work. Students with two years or more of professional project experience should not take Foundations of Project Management (PJM 5900).

**Global Studies and International Relations, MS**

Globalization has created a world of new opportunities for those savvy enough to recognize them and acquire the new skill sets needed for success in international government, consulting, business and industry, nonprofit, and educational sectors.

This program is designed to prepare students for internationally focused positions that range from traditional practitioners of diplomacy, to development workers, to executives employed in the dynamic world of international consultancy, trade, and industry. With courses enriched by classmates from every continent, students are active learners in a collaborative, cross-cultural setting from their very first course.

The core curriculum ensures all students have a solid grounding in foundational courses such as international politics, economics, security, and diplomacy. Students then select from a broad-based menu of concentrations, allowing them to develop specialties. The program culminates in a capstone experience in which students elect to write a

thesis, engage in a case study, or undertake short-term travel to conduct intensive field research.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Required Courses**

Code	Title	Hours
GST 6100	Globalization and Global Politics and Economics	4
GST 6101	Global Literacy, Culture, and Community	4
GST 6109	Basic Field Research Methods	4
GST 6320	Peace and Conflict	4

**Regional Studies Courses**

Code	Title	Hours
Complete one of the following:		
GST 6501	Regional Studies: East Asia	
GST 6502	Regional Studies: Middle East	
GST 6503	Regional Studies: Sub-Saharan Africa	
GST 6504	Regional Studies: Europe	
GST 6505	Regional Studies: Southwest and Central Asia	
GST 6506	Regional Studies: Latin America	

**Capstone**

Code	Title	Hours
Complete one of the following:		
GST 6920	Case Study in Global Studies	4
GST 7990	Thesis	
INT 6900	International Field Study Experience	

**Electives**

Code	Title	Hours
Complete 2–4 quarter hours from the following:		
GST 7983	Topics	
COP 6940	Personal and Career Development (Requires participation in the cooperative education program.)	
INT 6943	Integrative Experiential Learning	
EDU 6184	Interdisciplinary Foundations	

**Concentrations**

Complete one of the following five concentrations:

- Global Health and Development (p. )
- Conflict Resolution
- Diplomacy
- International Economics and Consulting
- Global Student Mobility

**Program Credit/GPA Requirements**

46-48 total quarter hours required  
Minimum 3.000 GPA required

**GLOBAL HEALTH AND DEVELOPMENT**

Code	Title	Hours
Complete five of the following (one of the courses can be from another global studies concentration, a regional studies course, or a special topics course if you choose):		20
GST 6210	The Developers	
GST 6340	Poverty and Wealth	
GST 6350	Global Economics of Food and Agriculture	
GST 6610	Sustainable Development	
GST 6700	Global Health Perspectives, Politics, and Experiences in International Development	
GST 6710	Critical Issues and Challenges in the Practice of Global Health	

**CONFLICT RESOLUTION**

Code	Title	Hours
Complete five of the following (one of the courses can be from another global studies concentration, a regional studies course, or a special topics course if you choose):		20
GST 6324	Divided Societies in the Modern World	
GST 6326	International Conflict and Cooperation	
GST 6327	Conflict and Postconflict Development	
GST 6300	Security and Terrorism	
GST 6360	Nuclear Nonproliferation	
GST 6740	Human Rights	

**DIPLOMACY**

Code	Title	Hours
Complete five of the following (one of the courses can be from another global studies concentration, a regional studies course, or a special topics course if you choose):		20
GST 6600	The Practice of Diplomacy	
GST 6540	Politics of the European Union	
GST 6550	U.S. Foreign Policy	
GST 6560	Multilateral Diplomacy	
GST 6590	Public Diplomacy	
GST 6740	Human Rights	

**INTERNATIONAL ECONOMICS AND CONSULTING**

Code	Title	Hours
Complete five of the following (one of the courses can be from another global studies concentration, a regional studies course, or a special topics course if you choose):		20
GST 6580	Opportunities in International Consulting	
GST 6102	Global Corporate and Social Responsibility	
GST 6200	The Funders	
GST 6220	Globalization of Emerging Economies	
GST 6310	Immigration and Labor	
GST 6340	Poverty and Wealth	
GST 6430	Leadership and Management	

**GLOBAL STUDENT MOBILITY**

Code	Title	Hours
Complete five of the following (one of the courses can be from another global studies concentration, a regional studies course, or a special topics course if you choose):		20
GST 6810	International Higher Education	
GST 6820	Managing Study Abroad	
GST 6830	Managing International Students	
GST 6840	The Business of International Education	
GST 6850	Immigration and Legal Issues in International Higher Education	
GST 6410	Global Education in the Internet Age	

**Leadership, MS**

As today's workforce continues to diversify, leadership tasks and responsibilities have become more complex. The Master of Science in Leadership seeks to prepare you to meet these evolving challenges by helping you cultivate a personal leadership philosophy. Leveraging students' interdisciplinary backgrounds, this master's degree in leadership combines real-world lessons with an action-learning approach that is designed to build and strengthen your leadership capabilities.

In September of 2009, the Master of Science in Leadership with a Concentration in Project Management received accreditation by the Project Management Institute's Global Accreditation Center (GAC), the world's leading association for project management professionals. Accreditation is achieved by meeting the GAC's rigorous standards, which include an assessment of program objectives and outcomes, a review of on-site and online resources, evaluations of faculty and students, and proof of continuous improvements in the area of project management.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Required Courses**

Code	Title	Hours
LDR 6100	Developing Your Leadership Capability	3
LDR 6101	Professional Leadership Lab/Core LDR Experience	1
LDR 6110	Leading Teams	3
LDR 6120	Developing Organizational Leadership	3
LDR 6135	Ethical Leadership	3
LDR 6140	Strategy Development and Implementation	3
LDR 6145	Global Leadership	3
LDR 6150	Innovation and Organizational Transformation	3
LDR 7980	Capstone	4

**Concentration**

Complete one of the following seven concentrations:

- Health Management (p. 340)
- Human Resources Management (p. 340)
- Leading and Managing Technical Projects (p. 340)
- Nonprofit Management (p. 340)

- Organizational Communication (p. 340)
- Project Management (p. 340)
- Sport and Social Change (p. 340)

## Electives

Code	Title	Hours
EDU 6184	Interdisciplinary Foundations	
Complete at least one of the following:		4
CMN 6000	Introduction to Organizational Communication	
LDR 6115	Leadership Communication	
Complete at least one of the following:		4
CMN 6095	Foundations of Developing Cultural Awareness	
COP 6940	Personal and Career Development	
INT 6000	Writing Lab	
INT 6900	International Field Study Experience	

## Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

## HEALTH MANAGEMENT

Code	Title	Hours
HMG 6110	Organization, Administration, Financing, and History of Healthcare	3
HMG 6130	Healthcare Strategic Management	3
HMG 6140	Principles of Population-Based Management	3
HMG 6160	Healthcare Information Systems Management	3
HMG 6170	Health Law, Politics, and Policy	3

## HUMAN RESOURCES MANAGEMENT

Code	Title	Hours
<b>Required Courses</b>		
HRM 6015	Introduction to Human Resources Management	3
HRM 6025	Workforce Analytics	3
<b>Electives</b>		
Complete three of the following. (Students waived out of HRM 6015, complete four of the following).		9
HRM 6005	Creating a High-Performance Organization: Strategic Organizational and HRM Choices	
HRM 6010	Compensation and Benefits	
HRM 6020	Talent Acquisition and Onboarding	
HRM 6030	The Employment Contract	
HRM 6042	Strategic Workforce Planning	
HRM 6047	Managing the Employee Life Cycle	
HRM 6050	Employee Engagement	
HRM 6060	Organizational Design	
HRM 6070	Global Human Resources Management	

## LEADING AND MANAGING TECHNICAL PROJECTS

Code	Title	Hours
PJM 6000	Project Management Practices	3
PJM 6205	Leading and Managing Technical Projects	3
PJM 6210	Communication Skills for Project Managers	3
PJM 6215	Leading Remote Project Teams	3
PJM 6810	Principles of Agile Project Management	3

## NONPROFIT MANAGEMENT

Code	Title	Hours
NPM 6110	Legal and Governance Issues in Nonprofit Organizations	3
NPM 6120	Financial Management for Nonprofit Organizations	3
NPM 6125	Promoting Nonprofit Organizations	3
NPM 6130	Fundraising and Development for Nonprofit Organizations	3
NPM 6140	Grant and Report Writing	3

## ORGANIZATIONAL COMMUNICATION

Code	Title	Hours
CMN 6000 and INT 6000	Introduction to Organizational Communication and Writing Lab	3/1
CMN 6020	Ethical Issues in Organizational Communication	3
CMN 6050	Crisis Communication	3
CMN 6090	Organizational Culture, Climate, and Communication	3
CMN 6110	Group Dynamics and Interpersonal Conflict: Meeting Management	3

## PROJECT MANAGEMENT

Code	Title	Hours
<b>Required Courses</b>		
Note: Students with project management experience are not required to take PJM 5900:		
PJM 5900	Foundations of Project Management	4
PJM 6000	Project Management Practices	3
PJM 6025	Project Scheduling and Cost Planning	3
PJM 6015	Project Risk Management	3
<b>Electives</b>		
Complete one of the following. (Note: Students who are not required to take PJM 5900 complete two of the following).		3
PJM 6125	Project Evaluation and Assessment	
PJM 6135	Project Quality Management	
PJM 6140	Managing Troubled Projects	
PJM 6710	Introduction to Program and Portfolio Management	

## SPORT AND SOCIAL CHANGE

Code	Title	Hours
LDR 6410	Leadership and Organization in Sport	3
GST 6102	Global Corporate and Social Responsibility	4
HSV 6120	Social Inequality, Social Change, and Community Building	3

LDR 6360	Dynamics of Change at the Community and Social Level	3
LDR 6427	Gender and Diversity in Sport	3

## Nonprofit Management, MS

Facing the threat of privatization and for-profit competition, nonprofit organizations are challenged to find leaders who not only possess keen business and managerial skills but can also effect change at a community or social level. Being successful in this dynamic and rewarding field requires strong leadership, managerial and interpersonal skills, as well as in-depth knowledge of fundraising, marketing, program development, and governance issues.

Integrating theoretical approaches with practical applications, the **Master of Science in Nonprofit Management** seeks to prepare you for a leadership position in a not-for-profit university, hospital, charity, foundation, or religious organization. Upon completion of this nonprofit degree, you emerge well-equipped to embark on a career in nonprofit management—prepared, and inspired, to make a meaningful impact.

The mission of the Master of Science in Nonprofit Management at the College of Professional Studies is to offer courses that further develop the students' knowledge, skills, talent, and abilities. Faculty in the program support students' development goals through action-oriented courses that link theoretical learning to practical application. Nonprofit management courses aim to prepare students to be mission-driven executive leaders, managers, employees, and board members in public and private nonprofit organizations.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
NPM 6100	Strategic Management for the Nonprofit Sector	3
NPM 6110	Legal and Governance Issues in Nonprofit Organizations	3
NPM 6120	Financial Management for Nonprofit Organizations	3
NPM 6125	Promoting Nonprofit Organizations	3
NPM 6130	Fundraising and Development for Nonprofit Organizations	3
NPM 6140	Grant and Report Writing	3
NPM 6150	Human Resources Management in Nonprofit Organizations	3
NPM 6980	Capstone	3

### Concentration

Complete one of the following concentrations:

- Fundraising (p. 341)
- Leadership and Communication (p. )
- Project Management
- Social Media Analytics (p. )
- Social Innovation

### Electives

Code	Title	Hours
Complete two of the following: 6		
ALY 6000	Introduction to Analytics	
CMN 6035	Legal, Policy, and Ethical Issues in the Digital Era	
DGM 6290	Social Media and Brand Strategy Implementation	
LDR 6110	Leading Teams	
LDR 6360	Dynamics of Change at the Community and Social Level	
CMN 6080	Intercultural Communication	
CMN 6050	Crisis Communication	
COP 6940	Personal and Career Development	
INT 6943	Integrative Experiential Learning	
EDU 6184	Interdisciplinary Foundations	

### Program Credit/GPA Requirements

45–47 total quarter hours required

Minimum 3.000 GPA required

### CONCENTRATIONS

Students must earn a minimum of 15 quarter hours from each concentration listed below.

#### Fundraising

Code	Title	Hours
<b>Required Courses</b>		
NPM 6210	Social Value Investing and Effective Partnerships	3
NPM 6220	Donor Research and Management	3
NPM 6230	Measuring Social Impact	3

#### Electives

Complete a minimum of 6 quarter hours from the following: 6		
ALY 6000	Introduction to Analytics	
ALY 6010 and ALY 6070	Probability Theory and Introductory Statistics and Communication and Visualization for Data Analytics	
DGM 6285	Interactive Marketing Fundamentals	
DGM 6290	Social Media and Brand Strategy Implementation	
NPM 6240	Innovation and Scaling for Impact	

#### Leadership and Communication

Code	Title	Hours
<b>Required Courses</b>		
CMN 6090	Organizational Culture, Climate, and Communication	3
LDR 6150	Innovation and Organizational Transformation	3

#### Electives

Complete a minimum of 9 quarter hours from the following: 9		
CMN 6000 and INT 6000	Introduction to Organizational Communication and Writing Lab	
CMN 6060	Negotiation, Mediation, and Facilitation	

CMN 6080	Intercultural Communication	
CMN 6100	Communication Networks and Managing Information	
LDR 6120	Developing Organizational Leadership	
LDR 6135	Ethical Leadership	
LDR 6140	Strategy Development and Implementation	
LDR 6150	Innovation and Organizational Transformation	
LDR 6110	Leading Teams	
LDR 6140	Strategy Development and Implementation	

**Project Management**

Code	Title	Hours
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**Required Courses**

Complete the courses that are required based on the number of years of project management experience you have completed. 6-7

Two-plus years project management experience:

PJM 6000	Project Management Practices	
PJM 6015	Project Risk Management	

Fewer than two years project management experience:

PJM 5900	Foundations of Project Management	
PJM 6000	Project Management Practices	
PJM 6015	Project Risk Management	

**Electives**

Complete a minimum of 5 quarter hours from the following:<sup>2</sup> 5

PJM 6005 and PJM 6125 or PJM 6140	Project Scope Management and Project Evaluation and Assessment Managing Troubled Projects	
PJM 6025	Project Scheduling and Cost Planning	
PJM 6135	Project Quality Management	

**Social Media Analytics**

Code	Title	Hours
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**Required Courses**

CMN 6045	Leveraging Digital Technologies: Strategy, Assessment, and Governance	3
CMN 6065	Implementation and Management of Social Media Channels and Online Communities	3
DGM 6285	Interactive Marketing Fundamentals	4

**Electives**

Complete a minimum of 5 quarter hours from the following: 5

ALY 6000	Introduction to Analytics	
ALY 6110 and ALY 6070	Data Management and Big Data and Communication and Visualization for Data Analytics	
ALY 6010	Probability Theory and Introductory Statistics	
ALY 6100	Data-Driven Decision Making	
DGM 6290	Social Media and Brand Strategy Implementation	

**Social Innovation**

Code	Title	Hours
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**Required Courses**

GST 6610	Sustainable Development	4
NPM 6230	Measuring Social Impact	3
NPM 6310	Social and Sustainable Entrepreneurship	3
NPM 6320	New Ventures in Social Entrepreneurship	3

**Electives**

Complete a minimum of 3 quarter hours from the following: 3

ALY 6000	Introduction to Analytics	
ALY 6010 and ALY 6070	Probability Theory and Introductory Statistics and Communication and Visualization for Data Analytics	
DGM 6285	Interactive Marketing Fundamentals	
DGM 6290	Social Media and Brand Strategy Implementation	
LDR 6120	Developing Organizational Leadership	
PJM 5900 and PJM 6000	Foundations of Project Management and Project Management Practices	

<sup>1</sup> This course is required for students who do not have **at least two years** of professional experience working on projects. This course is only intended for those who are not familiar with professional project work. Students with two years or more of professional project experience should not take Foundations of Project Management (PJM 5900).

<sup>2</sup> Students who take Foundations of Project Management (PJM 5900) are not required to take a course in this section.

## Program and Portfolio Project Management, MS

The Master of Science in Program and Portfolio Project Management is intended to prepare project professionals for the more advanced-level roles in the organization. It provides a natural alignment to the professional advancement that exists within industry—from project manager to program manager to portfolio manager. Managing programs and portfolios successfully in any environment requires a unique set of interdisciplinary skills. This program seeks to bring together and train students in those skills that are most critical: program and portfolio management processes and tools, financial analysis, strategic and leadership skills, and communication skills and strategies. Advanced course work in program and project portfolio management will support project professionals in being prepared to focus on formulating strategies appropriate for changing market conditions, prioritizing and funding the appropriate initiatives and/or projects, successfully executing initiatives and/or projects in order to deliver strategic results, and using the lessons from unsuccessful strategy for strategy formulation.

The increasingly important role of program and project portfolio managers is becoming clear as companies orient more and more of their work in a projectized fashion. Another driving factor is better alignment of projects to the firm's strategy, doing the right projects to advance the organization. This has been made clear through the creation of advanced industry certifications, such as the Program Management Professional (PgMP®) and the Portfolio Management Professional (PfMP®) credential by the Project Management Institute. This Master of Science degree will prepare these individuals with the knowledge, skills, and tools needed to effectively manage project-based programs and portfolios.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
PJM 6710	Introduction to Program and Portfolio Management	3
PJM 6715	Advanced Program Management	3
PJM 6720	Advanced Portfolio Management	3
PJM 6725	Program and Portfolio Leadership	3
PJM 6730	Program and Portfolio Evaluation	3
PJM 6735	Program and Portfolio Management Capstone	3
PJM 6740	Managing Program and Portfolio Risk and Complexity	3
PJM 6750	Strategic Management and Decision Making for Program and Project Portfolio Managers	3

### Required Electives

Code	Title	Hours
Complete two of the following:		6-7
CMN 6060	Negotiation, Mediation, and Facilitation	
CMN 6090	Organizational Culture, Climate, and Communication	
LDR 6135	Ethical Leadership	
LDR 6150	Innovation and Organizational Transformation	
INT 6943	Integrative Experiential Learning	
INT 6940	Experiential Learning Projects for Professionals	
EDU 6184	Interdisciplinary Foundations	

### Concentration

Complete one of the following concentrations:

#### AGILE PROJECT MANAGEMENT

Code	Title	Hours
<b>Required Courses</b>		
PJM 6810	Principles of Agile Project Management	3
PJM 6815	Advanced Agile Project Management	3
PJM 6820	Agile Implementation and Governance	3
PJM 6825	Agile Lean Product Development	3
<b>Elective</b>		
Complete one of the following:		3
PJM 6205	Leading and Managing Technical Projects	
CMN 6060	Negotiation, Mediation, and Facilitation	

#### LEADERSHIP

Code	Title	Hours
<b>Required Courses</b>		
LDR 6100	Developing Your Leadership Capability	3
LDR 6110	Leading Teams	3
LDR 6120	Developing Organizational Leadership	3
LDR 6150	Innovation and Organizational Transformation	3

<b>Elective</b>		
Complete one of the following:		3
LDR 6135	Ethical Leadership	
LDR 6140	Strategy Development and Implementation	

#### ORGANIZATIONAL COMMUNICATION

Code	Title	Hours
<b>Required Course</b>		
CMN 6000 and INT 6000	Introduction to Organizational Communication and Writing Lab	4
<b>Electives</b>		
Complete four of the following:		12
CMN 6020	Ethical Issues in Organizational Communication	
CMN 6050	Crisis Communication	
CMN 6060	Negotiation, Mediation, and Facilitation	
CMN 6080	Intercultural Communication	
CMN 6090	Organizational Culture, Climate, and Communication	
CMN 6110	Group Dynamics and Interpersonal Conflict: Meeting Management	

#### PROJECT BUSINESS ANALYSIS

Code	Title	Hours
PJM 6610	Foundations of Project Business Analysis	3
PJM 6620	Project Business Analysis: Needs Assessment	3
PJM 6630	Project Business Analysis: Requirements Planning and Analysis	3
ALY 6000	Introduction to Analytics	3
PJM 6640	Leadership Strategies for the Business Analyst	3

### Program Credit/GPA Requirements

45 total quarter hours required  
Minimum 3.000 GPA required

#### Project Management, MS

Companies succeed or fail based on their ability to bring quality products and services to market in a timely manner. Without skilled project managers in place, companies are challenged to deliver projects on time, on budget, and according to specifications. From inception to completion, project managers are responsible for every step in the process: project definition, cost and risk estimation, schedule planning and monitoring, budget management, negotiation and conflict resolution, project leadership, and project presentation and evaluation.

The Master of Science in Project Management is designed to provide you with the practical skills and theoretical concepts you need to lead complex projects. Featuring real-world case studies, this project management degree presents techniques and tools for managing long- and short-term projects successfully and cost-effectively. Augmenting the core project management courses are concentrations that seek to provide you with content-specific expertise that enables you to deepen your knowledge in your field of interest.

In September of 2009, the Master of Science in Project Management received accreditation by the Project Management Institute's Global Accreditation Center (GAC), the world's leading association for project management professionals. Accreditation is achieved by meeting the GAC's rigorous standards, which include an assessment of program objectives and outcomes, a review of on-site and online resources, evaluations of faculty and students, and proof of continuous improvements in the area of project management.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
Based on your experience, complete one of the options below (PJM 5900 is for students with less than three years experience directing or leading project tasks and is recommended for students who do not have a basic working knowledge of Microsoft Project software):		
<i>Fewer than 3 years experience</i>		
PJM 5900	Foundations of Project Management	4
PJM 6000	Project Management Practices	3
<i>3+ years of project management experience</i>		
PJM 6000	Project Management Practices	3
Complete the following:		
PJM 6005	Project Scope Management	3
PJM 6015	Project Risk Management	3
PJM 6025	Project Scheduling and Cost Planning	3
PJM 6135	Project Quality Management	3
The following course should be taken last:		
PJM 6910	Capstone	3

### Project Management Required Electives

Code	Title	Hours
Complete two of the following. Note: Students who take PJM 5900 are required to take only one course in this section:		
PJM 6125	Project Evaluation and Assessment	6
PJM 6140	Managing Troubled Projects	
PJM 6145	Global Project Management	
PJM 6710	Introduction to Program and Portfolio Management	
PJM 6075	Project Finance	

### Electives

Code	Title	Hours
Complete two of the following:		
CMN 6000	Introduction to Organizational Communication	5-7
CMN 6005	Foundations of Professional Communication	
CMN 6060	Negotiation, Mediation, and Facilitation	
CMN 6090	Organizational Culture, Climate, and Communication	
CMN 6095	Foundations of Developing Cultural Awareness	
CMN 6110	Group Dynamics and Interpersonal Conflict: Meeting Management	

COP 6940	Personal and Career Development
INT 6943	Integrative Experiential Learning
INT 6940	Experiential Learning Projects for Professionals
PJM 6205	Leading and Managing Technical Projects
PJM 6210	Communication Skills for Project Managers
PJM 6215	Leading Remote Project Teams
PJM 6175	Project Resource Management
PJM 6180	Project Stakeholder Management
EDU 6184	Interdisciplinary Foundations

### Concentrations

Complete one of the following concentrations:

- Clinical Trial Design (p. )
- Construction Management (p. 344)
- Geographic Information Systems (p. 345)
- Information Security Management (p. )
- Leadership (p. 345)
- Leading and Managing Technical Projects (p. )
- Organizational Communication (p. )
- Agile Project Management (p. 345)
- **Program and Portfolio Management**
- Project Business Analysis (p. )

### Program Credit/GPA Requirements

45–48 total quarter hours required  
Minimum 3.000 GPA required

### CLINICAL TRIAL DESIGN

Code	Title	Hours
<b>Required Courses</b>		
BTC 6211	Validation and Auditing of Clinical Trial Information	4
BTC 6213	Clinical Trial Design Optimization and Problem Solving	4
PMC 6212	Clinical Drug Development Data Analysis: Concepts	4
<b>Elective</b>		
Complete one of the following:		
RGA 6210	Strategic Planning and Project Management for Regulatory Affairs	4
BTC 6210	Human Experimentation: Methodological Issues Fundamentals	

### CONSTRUCTION MANAGEMENT

Code	Title	Hours
CMG 6400	Introduction to Construction Management	4
CMG 6402	Alternative Project Delivery Methods and Project Controls	4
CMG 6403	Safety, Project Risk, and Quality Management	4
CMG 6405	Construction Law	4



**GEOGRAPHIC INFORMATION SYSTEMS**

Code	Title	Hours
<b>Required Courses</b>		
GIS 5103	Foundations of Geographic Information Science	4
GIS 5201	Advanced Spatial Analysis	3
RMS 5105	Fundamentals of Remote Sensing	3
<b>Elective</b>		
Complete one of the following:		3
GIS 6340	GIS Customization	
GIS 6350	Planning a GIS Implementation	
GIS 6370	Internet-Based GIS	
GIS 6360	Spatial Databases	

**INFORMATION SECURITY MANAGEMENT**

Code	Title	Hours
<b>Required Courses</b>		
ITC 6300	Foundations of Information Security	3
ITC 6315	Information Security Risk Management	3
ITC 6310	Information Security Governance	3
ITC 6320	Information Security Technology	3
<b>Elective</b>		
Complete one of the following:		3
ITC 6020	Information Systems Design and Development	
ITC 6305	IT Infrastructure (Systems, Networks, Telecom)	
ITC 6335	Data Warehousing and Data Mining	
ITC 6345	Systems and Network Administration	

**LEADERSHIP**

Code	Title	Hours
<b>Required Courses</b>		
LDR 6100	Developing Your Leadership Capability	3
LDR 6110	Leading Teams	3
LDR 6120	Developing Organizational Leadership	3
LDR 6150	Innovation and Organizational Transformation	3
<b>Elective</b>		
Complete one of the following:		3
LDR 6135	Ethical Leadership	
LDR 6140	Strategy Development and Implementation	

**LEADING AND MANAGING TECHNICAL PROJECTS**

Code	Title	Hours
PJM 6205	Leading and Managing Technical Projects	3
PJM 6210	Communication Skills for Project Managers	3
PJM 6215	Leading Remote Project Teams	3
PJM 6810	Principles of Agile Project Management	3
PJM 6825	Agile Lean Product Development	3

**ORGANIZATIONAL COMMUNICATION**

Code	Title	Hours
<b>Required Course</b>		
CMN 6000 and INT 6000	Introduction to Organizational Communication and Writing Lab	3-4
<b>Electives</b>		
Complete four of the following:		12
CMN 6020	Ethical Issues in Organizational Communication	
CMN 6050	Crisis Communication	
CMN 6060	Negotiation, Mediation, and Facilitation	
CMN 6080	Intercultural Communication	
CMN 6090	Organizational Culture, Climate, and Communication	
CMN 6110	Group Dynamics and Interpersonal Conflict: Meeting Management	

**AGILE PROJECT MANAGEMENT**

Code	Title	Hours
Students in this concentration are only required to complete one project management required elective.		
PJM 6810	Principles of Agile Project Management	3
PJM 6815	Advanced Agile Project Management	3
PJM 6820	Agile Implementation and Governance	3
PJM 6825	Agile Lean Product Development	3
PJM 6205	Leading and Managing Technical Projects	3

**PROGRAM AND PORTFOLIO MANAGEMENT**

Code	Title	Hours
Students in this concentration are only required to complete one project management required elective.		
PJM 6710	Introduction to Program and Portfolio Management	3
PJM 6715	Advanced Program Management	3
PJM 6720	Advanced Portfolio Management	3
PJM 6725	Program and Portfolio Leadership	3
PJM 6730	Program and Portfolio Evaluation	3
PJM 6735	Program and Portfolio Management Capstone	3

**PROJECT BUSINESS ANALYSIS**

Code	Title	Hours
PJM 6610	Foundations of Project Business Analysis	3
PJM 6620	Project Business Analysis: Needs Assessment	3
PJM 6630	Project Business Analysis: Requirements Planning and Analysis	3
ALY 6000	Introduction to Analytics	3
PJM 6640	Leadership Strategies for the Business Analyst	3

## Regulatory Affairs for Drugs, Biologics, and Medical Devices with Concentration in Clinical Research Regulatory Affairs, MS

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.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
BTC 6211	Validation and Auditing of Clinical Trial Information	4
BTC 6213	Clinical Trial Design Optimization and Problem Solving	4
RGA 6101	Therapeutic Product Development: A Regulatory Overview	4
RGA 6202	Medical Device Development: A Regulatory Overview	4
RGA 6203	Pharmaceutical and Medical Device Law: Topics and Cases	5
or RGA 6204	Legal Issues in International Food, Drug, and Medical Device Regulation	
RGA 6228	Managing International Clinical Trials	4
RGA 6300	Practical Applications in Biomedical Product Global Regulatory Affairs	4

### Required Electives

Students must earn a minimum of 16 quarter hours by choosing at least one course from each elective category.

#### REGULATORY AND CLINICAL OPERATIONS

Code	Title	Hours
Complete at least one of the following:		3-4
RGA 6000	Introduction to Food and Drug Administration (FDA) Pharmaceutical Regulation	
RGA 6001	Introduction to Food and Drug Administration Medical Device Regulation	
RGA 6207	Global Impact of Electronic Common Technical Document (eCTD) Submissions	
RGA 6212	Introduction to Safety Sciences	

RGA 6230	Clinical Laboratory Management in Clinical Trials
RGA 6310	Regulatory Documentation Processes
RGA 6385	Operational Aspects of Electronic Common Technical Document (eCTD) Submissions
RGA 6431	Clinical Trial Agreements and Other Key Contracts in the Life Sciences

#### REGULATORY PERSPECTIVE: PRODUCT DEVELOPMENT, BUSINESS, AND STRATEGY

Code	Title	Hours
Complete at least one of the following:		2-4
BTC 6260	The Business of Medicine and Biotechnology	
RGA 6210	Strategic Planning and Project Management for Regulatory Affairs	
RGA 6211	Combination Products and Convergence	
RGA 6215	Project Management in Early Drug Discovery and Development	
RGA 6216	The Medical, Social, and Financial Dimensions of Orphan Drugs	
RGA 6217	Biomedical Product Development: From Biotech to Boardroom to Market	
RGA 6235	Emerging Product Categories in the Regulation of Drugs and Biologics	
RGA 6245	Regulation of Generic Pharmaceutical and Biosimilar Products	
RGA 6250	Financing and Reimbursement in Biomedical Product Development	
RGA 6430	Clinical Trial Quality Oversight	
RGA 6432	Real-World Evidence in Biomedical Research	
COP 6940	Personal and Career Development (Enrollment in COP 6940 requires participation in the cooperative education program [subject to availability.] Students must complete two of the following four courses prior to enrolling in COP 6940: RGA 6100, RGA 6201, RGA 6202, or BTC 6210.)	
EDU 6184	Interdisciplinary Foundations	
INT 6943 and RGA 6920	Integrative Experiential Learning and Internship Reflection	

#### INTERNATIONAL

Code	Title	Hours
Complete at least one of the following:		4-5
RGA 6221	European Union Compliance Process and Regulatory Affairs	
RGA 6223	Introduction to Australian, Asian, and Latin American Regulatory Affairs	
RGA 6224	Regulation of Biomedical Product Commercialization by Health Canada	
RGA 6241	Working in Multicultural Environments: Challenges and Opportunities	
RGA 6242	Preparing EU Medical Device Clinical Evaluations	

RGA 6247 Medicines Regulatory Harmonization in Africa

RGA 6101 Therapeutic Product Development: A Regulatory Overview 4

RGA 6202 Medical Device Development: A Regulatory Overview 4

RGA 6203 Pharmaceutical and Medical Device Law: Topics and Cases 5

RGA 6207 Global Impact of Electronic Common Technical Document (eCTD) Submissions 4

RGA 6300 Practical Applications in Biomedical Product Global Regulatory Affairs 4

## SPECIAL TOPICS

**Code** **Title** **Hours**

Choose at least one of the following elective options:

Code	Title	Hours
RGA 6255	Global Convergence of Regulatory Science and Reimbursement/Market Access	
RGA 6270	Patient-Centered Regulatory Policy at FDA	
RGA 6275	Product Development and Process Validation	
RGA 6405	Nonclinical Regulations in Biomedical Product Commercialization	
RGA 6410	Fundamentals of CMC Regulations and Methods	
RGA 6420	Global IVD Regulations and Submissions	
RGA 6461	Cybersecurity and Regulation of Digital Health Technologies by the FDA	

## Required Electives

Students must earn a minimum of 14 quarter hours by choosing at least one course from each category.

## REGULATORY AND CLINICAL OPERATIONS

**Code** **Title** **Hours**

Complete at least one of the following:

3-4

BTC 6211	Validation and Auditing of Clinical Trial Information	
BTC 6213	Clinical Trial Design Optimization and Problem Solving	
RGA 6385	Operational Aspects of Electronic Common Technical Document (eCTD) Submissions	
RGA 6212	Introduction to Safety Sciences	
RGA 6230	Clinical Laboratory Management in Clinical Trials	
RGA 6310	Regulatory Documentation Processes	
RGA 6370	Advanced Regulatory Writing: Medical Device Submissions	
RGA 6380	Advanced Regulatory Writing: New Drug Applications	
RGA 6233	Application of Quality System Regulation in Medical Device Design and Manufacturing	
RGA 6234	Drug and Device Supplier Risk Management: Compliance and Processes	

## REGULATORY PERSPECTIVE: PRODUCT DEVELOPMENT, BUSINESS, AND STRATEGY

**Code** **Title** **Hours**

Complete at least one of the following:

2-4

BTC 6260	The Business of Medicine and Biotechnology	
RGA 6215	Project Management in Early Drug Discovery and Development	
RGA 6216	The Medical, Social, and Financial Dimensions of Orphan Drugs	
RGA 6217	Biomedical Product Development: From Biotech to Boardroom to Market	
RGA 6219	Advanced Topics in Advertising and Promotion of Drugs and Medical Devices	
PMC 6212	Clinical Drug Development Data Analysis: Concepts	

## Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

### Regulatory Affairs for Drugs, Biologics, and Medical Devices with Concentration in General Regulatory Affairs, MS

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.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

## Required Courses

Code	Title	Hours
RGA 6000	Introduction to Food and Drug Administration (FDA) Pharmaceutical Regulation	2
RGA 6001	Introduction to Food and Drug Administration Medical Device Regulation	2
BTC 6210	Human Experimentation: Methodological Issues Fundamentals	4
RGA 6002	Regulatory Compliance Culture	2

RGA 6112	Biomedical Intellectual Property Management Strategy: Patents and Trade Secrets
RGA 6205	Emerging Trends and Issues in the Medical Device Industry
RGA 6210	Strategic Planning and Project Management for Regulatory Affairs
RGA 6211	Combination Products and Convergence
RGA 6245	Regulation of Generic Pharmaceutical and Biosimilar Products
RGA 6250	Financing and Reimbursement in Biomedical Product Development
COP 6940	Personal and Career Development (Enrollment in COP 6940 requires participation in the cooperative education program [subject to availability.] Students must complete two of the following four courses prior to enrolling in COP 6940: RGA 6100, RGA 6201, RGA 6202, or BTC 6210.)
INT 6943 and RGA 6920	Integrative Experiential Learning and Internship Reflection
EDU 6184	Interdisciplinary Foundations

**INTERNATIONAL**

Code	Title	Hours
Complete at least one of the following:		4-5
RGA 6221	European Union Compliance Process and Regulatory Affairs	
RGA 6222	European Medical Device Regulations	
RGA 6223	Introduction to Australian, Asian, and Latin American Regulatory Affairs	
RGA 6224	Regulation of Biomedical Product Commercialization by Health Canada	
RGA 6225	Japanese Medical Device Regulations and Registration	
RGA 6226	Canadian and Australian Medical Device Regulations	
RGA 6227	Emerging Medical Device Markets	
RGA 6228	Managing International Clinical Trials	
RGA 6241	Working in Multicultural Environments: Challenges and Opportunities	
RGA 6247	Medicines Regulatory Harmonization in Africa	

**SPECIAL TOPICS**

Code	Title	Hours
Choose at least one of the following electives:		
RGA 6461	Cybersecurity and Regulation of Digital Health Technologies by the FDA	
RGA 6470	Research Ethics	
RGA 6460	Intellectual Property in the Life Sciences	
RGA 6420	Global IVD Regulations and Submissions	
RGA 6410	Fundamentals of CMC Regulations and Methods	

**Program Credit/GPA Requirements**

45 total quarter hours required  
Minimum 3.000 GPA required

### Regulatory Affairs for Drugs, Biologics, and Medical Devices with Concentration in International Regulatory Affairs, MS

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.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Required Courses**

Code	Title	Hours
BTC 6210	Human Experimentation: Methodological Issues Fundamentals	4
RGA 6000	Introduction to Food and Drug Administration (FDA) Pharmaceutical Regulation	2
RGA 6001	Introduction to Food and Drug Administration Medical Device Regulation	2
RGA 6002	Regulatory Compliance Culture	2
RGA 6101	Therapeutic Product Development: A Regulatory Overview	4
RGA 6202	Medical Device Development: A Regulatory Overview	4
RGA 6204	Legal Issues in International Food, Drug, and Medical Device Regulation	5
RGA 6207	Global Impact of Electronic Common Technical Document (eCTD) Submissions	4
RGA 6300	Practical Applications in Biomedical Product Global Regulatory Affairs	4

**Required Electives**

Students must earn a minimum of 14 quarter hours by choosing at least one course from each elective category.

**REGULATORY AND CLINICAL OPERATIONS**

Code	Title	Hours
Complete at least one of the following:		
BTC 6211	Validation and Auditing of Clinical Trial Information	3-4

BTC 6213	Clinical Trial Design Optimization and Problem Solving
RGA 6212	Introduction to Safety Sciences
RGA 6370	Advanced Regulatory Writing: Medical Device Submissions
RGA 6380	Advanced Regulatory Writing: New Drug Applications
RGA 6385	Operational Aspects of Electronic Common Technical Document (eCTD) Submissions

### REGULATORY PERSPECTIVE

Code	Title	Hours
Complete at least one of the following:		2-5
BTC 6260	The Business of Medicine and Biotechnology	
RGA 6112	Biomedical Intellectual Property Management Strategy: Patents and Trade Secrets	
RGA 6203	Pharmaceutical and Medical Device Law: Topics and Cases	
RGA 6205	Emerging Trends and Issues in the Medical Device Industry	
RGA 6210	Strategic Planning and Project Management for Regulatory Affairs	
RGA 6211	Combination Products and Convergence	
RGA 6216	The Medical, Social, and Financial Dimensions of Orphan Drugs	
RGA 6217	Biomedical Product Development: From Biotech to Boardroom to Market	
RGA 6235	Emerging Product Categories in the Regulation of Drugs and Biologics	
RGA 6245	Regulation of Generic Pharmaceutical and Biosimilar Products	
COP 6940	Personal and Career Development (Enrollment in COP 6940 requires participation in the cooperative education program, subject to availability.)	
INT 6943 and RGA 6920	Integrative Experiential Learning and Internship Reflection	
EDU 6184	Interdisciplinary Foundations	

### INTERNATIONAL

Code	Title	Hours
Complete at least one of the following:		4
RGA 6211	Combination Products and Convergence	
RGA 6221	European Union Compliance Process and Regulatory Affairs	
RGA 6222	European Medical Device Regulations	
RGA 6223	Introduction to Australian, Asian, and Latin American Regulatory Affairs	
RGA 6224	Regulation of Biomedical Product Commercialization by Health Canada	
RGA 6225	Japanese Medical Device Regulations and Registration	
RGA 6227	Emerging Medical Device Markets	

RGA 6228	Managing International Clinical Trials
RGA 6229	Biomedical Product Regulatory Affairs in Emerging Markets: Russia and Kazakhstan
RGA 6241	Working in Multicultural Environments: Challenges and Opportunities
RGA 6243	Medical Device Product Development in Canada
RGA 6244	Therapeutic Product Development in Canada
RGA 6247	Medicines Regulatory Harmonization in Africa
RGA 6249	Chinese Food and Drug Administration Regulation of Biomedical Product Commercialization

### SPECIAL TOPICS

Code	Title	Hours
Complete at least one of the following:		2-4
RGA 6242	Preparing EU Medical Device Clinical Evaluations	
RGA 6255	Global Convergence of Regulatory Science and Reimbursement/Market Access	
RGA 6270	Patient-Centered Regulatory Policy at FDA	
RGA 6275	Product Development and Process Validation	
RGA 6405	Nonclinical Regulations in Biomedical Product Commercialization	
RGA 6410	Fundamentals of CMC Regulations and Methods	
RGA 6420	Global IVD Regulations and Submissions	

### Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

### Regulatory Affairs for Drugs, Biologics, and Medical Devices with Concentration in Medical Devices, MS

The medical devices regulation concentration within the master's degree for drugs, biologics, and medical devices program enables students to focus specifically on regulatory issues associated with global commercialization of medical device products and services. Medical device regulation, in many aspects, differs substantially from regulation of drug and biologic product commercialization. In addition to significant geographic variability between these product groups from a regulatory perspective, most of the regulatory operational functions associated with commercializing medical device products and services are unique to that product category. Moreover, these differences extend to both the preapproval and postapproval aspects of compliance reporting between the two sets of product groups. Given this variability, the medical devices regulation concentration gives students the opportunity to study the global regulatory marketing approval processes, compliance issues, and operational details specific to this product group. The concentration also enables students to compare and contrast both the similarities

and differences between global medical device product and service regulations and those of drug and biologic product regulation.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
BTC 6210	Human Experimentation: Methodological Issues Fundamentals	4
RGA 6001	Introduction to Food and Drug Administration Medical Device Regulation	2
RGA 6002	Regulatory Compliance Culture	2
RGA 6202	Medical Device Development: A Regulatory Overview	4
RGA 6203	Pharmaceutical and Medical Device Law: Topics and Cases	5
or RGA 6204	Legal Issues in International Food, Drug, and Medical Device Regulation	
RGA 6300	Practical Applications in Biomedical Product Global Regulatory Affairs	4
RGA 6370	Advanced Regulatory Writing: Medical Device Submissions	4

### Electives

Code	Title	Hours
Complete 20 quarter hours from the following. At least one elective must be taken from each of the categories below.		20

#### Regulatory and Clinical Operations

RGA 6233	Application of Quality System Regulation in Medical Device Design and Manufacturing
RGA 6234	Drug and Device Supplier Risk Management: Compliance and Processes

#### Regulatory Perspective: Product Development, Business, and Strategy

RGA 6112	Biomedical Intellectual Property Management Strategy: Patents and Trade Secrets
RGA 6205	Emerging Trends and Issues in the Medical Device Industry
RGA 6210	Strategic Planning and Project Management for Regulatory Affairs
RGA 6211	Combination Products and Convergence
RGA 6219	Advanced Topics in Advertising and Promotion of Drugs and Medical Devices
COP 6940	Personal and Career Development (Enrollment in COP 6940 requires participation in the cooperative education program, subject to availability.)
EDU 6184	Interdisciplinary Foundations
INT 6943 and RGA 6920	Integrative Experiential Learning and Internship Reflection

International	
RGA 6222	European Medical Device Regulations
RGA 6225	Japanese Medical Device Regulations and Registration
RGA 6227	Emerging Medical Device Markets
RGA 6241	Working in Multicultural Environments: Challenges and Opportunities
RGA 6247	Medicines Regulatory Harmonization in Africa
Special Topics	
RGA 6242	Preparing EU Medical Device Clinical Evaluations
RGA 6243	Medical Device Product Development in Canada
RGA 6270	Patient-Centered Regulatory Policy at FDA
RGA 6275	Product Development and Process Validation
RGA 6405	Nonclinical Regulations in Biomedical Product Commercialization
RGA 6420	Global IVD Regulations and Submissions
RGA 6461	Cybersecurity and Regulation of Digital Health Technologies by the FDA

### Program Credit/GPA Requirements

45 total quarter hours required  
Minimum 3.000 GPA required

## Regulatory Affairs for Drugs, Biologics, and Medical Devices with Concentration in Non-Clinical Biomedical Product Regulation, MS

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 offer students an 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.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
RGA 6002	Regulatory Compliance Culture	2
RGA 6203	Pharmaceutical and Medical Device Law: Topics and Cases	5

or RGA 6204	Legal Issues in International Food, Drug, and Medical Device Regulation	
RGA 6207	Global Impact of Electronic Common Technical Document (eCTD) Submissions	4
RGA 6215	Project Management in Early Drug Discovery and Development	4
RGA 6300	Practical Applications in Biomedical Product Global Regulatory Affairs	4
RGA 6405	Nonclinical Regulations in Biomedical Product Commercialization	4
RGA 6410	Fundamentals of CMC Regulations and Methods	4

## Required Electives

Students must earn a minimum of 18 quarter hours by choosing course work from the electives listed below.

Code	Title	Hours
RGA 6101	Therapeutic Product Development: A Regulatory Overview	4
RGA 6112	Biomedical Intellectual Property Management Strategy: Patents and Trade Secrets	4
RGA 6202	Medical Device Development: A Regulatory Overview	4
RGA 6210	Strategic Planning and Project Management for Regulatory Affairs	4
RGA 6233	Application of Quality System Regulation in Medical Device Design and Manufacturing	4
RGA 6234	Drug and Device Supplier Risk Management: Compliance and Processes	4
RGA 6245	Regulation of Generic Pharmaceutical and Biosimilar Products	4
RGA 6250	Financing and Reimbursement in Biomedical Product Development	4
RGA 6310	Regulatory Documentation Processes	4
RGA 6370	Advanced Regulatory Writing: Medical Device Submissions	4
RGA 6380	Advanced Regulatory Writing: New Drug Applications	4
RGA 6420	Global IVD Regulations and Submissions	4
RGA 6460	Intellectual Property in the Life Sciences	2
RGA 6463	Regulatory Strategy for Product Development and Life-Cycle Management	4
RGA 6461	Cybersecurity and Regulation of Digital Health Technologies by the FDA	2

## Program Credit/GPA Requirements

45 total quarter hours required  
Minimum 3.000 GPA required

## Regulatory Affairs for Drugs, Biologics, and Medical Devices with Concentration in Operational Regulatory Affairs, MS

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.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

## Required Courses

Code	Title	Hours
RGA 6000	Introduction to Food and Drug Administration (FDA) Pharmaceutical Regulation	2
RGA 6001	Introduction to Food and Drug Administration Medical Device Regulation	2
RGA 6002	Regulatory Compliance Culture	2
RGA 6101	Therapeutic Product Development: A Regulatory Overview	4
RGA 6202	Medical Device Development: A Regulatory Overview	4
RGA 6203	Pharmaceutical and Medical Device Law: Topics and Cases	5
or RGA 6204	Legal Issues in International Food, Drug, and Medical Device Regulation	
RGA 6207	Global Impact of Electronic Common Technical Document (eCTD) Submissions	4
RGA 6300	Practical Applications in Biomedical Product Global Regulatory Affairs	4
RGA 6385	Operational Aspects of Electronic Common Technical Document (eCTD) Submissions	4

## Required Electives

Students must earn a minimum of 14 quarter hours by completing at least three courses from the lists below.

## REGULATORY AND CLINICAL OPERATIONS

Code	Title	Hours
BTC 6210	Human Experimentation: Methodological Issues Fundamentals	
BTC 6211	Validation and Auditing of Clinical Trial Information	

RGA 6212	Introduction to Safety Sciences
RGA 6310	Regulatory Documentation Processes
RGA 6370	Advanced Regulatory Writing: Medical Device Submissions
RGA 6380	Advanced Regulatory Writing: New Drug Applications

**REGULATORY PERSPECTIVE: PRODUCT DEVELOPMENT, BUSINESS, AND STRATEGY**

Code	Title	Hours
BTC 6260	The Business of Medicine and Biotechnology	
RGA 6112	Biomedical Intellectual Property Management Strategy: Patents and Trade Secrets	
RGA 6205	Emerging Trends and Issues in the Medical Device Industry	
RGA 6210	Strategic Planning and Project Management for Regulatory Affairs	
RGA 6211	Combination Products and Convergence	
RGA 6215	Project Management in Early Drug Discovery and Development	
RGA 6235	Emerging Product Categories in the Regulation of Drugs and Biologics	
RGA 6245	Regulation of Generic Pharmaceutical and Biosimilar Products	
COP 6940	Personal and Career Development (Enrollment in COP 6940 requires participation in the cooperative education program [subject to availability.] Students must complete two of the following four courses prior to enrolling in COP 6940: RGA 6100, RGA 6201, RGA 6202, or BTC 6210.)	
EDU 6184	Interdisciplinary Foundations	
INT 6943 and RGA 6920	Integrative Experiential Learning and Internship Reflection	

**INTERNATIONAL**

Code	Title	Hours
RGA 6221	European Union Compliance Process and Regulatory Affairs	
RGA 6222	European Medical Device Regulations	
RGA 6223	Introduction to Australian, Asian, and Latin American Regulatory Affairs	
RGA 6224	Regulation of Biomedical Product Commercialization by Health Canada	
RGA 6225	Japanese Medical Device Regulations and Registration	
RGA 6228	Managing International Clinical Trials	
RGA 6241	Working in Multicultural Environments: Challenges and Opportunities	
RGA 6247	Medicines Regulatory Harmonization in Africa	

**SPECIAL TOPICS**

Code	Title	Hours
RGA 6270	Patient-Centered Regulatory Policy at FDA	

RGA 6275	Product Development and Process Validation
RGA 6405	Nonclinical Regulations in Biomedical Product Commercialization
RGA 6410	Fundamentals of CMC Regulations and Methods
RGA 6420	Global IVD Regulations and Submissions
RGA 6431	Clinical Trial Agreements and Other Key Contracts in the Life Sciences
RGA 6461	Cybersecurity and Regulation of Digital Health Technologies by the FDA

**Program Credit/GPA Requirements**

45 total quarter hours required  
Minimum 3.000 GPA required

**Regulatory Affairs for Drugs, Biologics, and Medical Devices with Concentration in Quality Assurance and Compliance, MS**

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.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Required Courses**

Code	Title	Hours
BTC 6210	Human Experimentation: Methodological Issues Fundamentals	4
BTC 6211	Validation and Auditing of Clinical Trial Information	4
RGA 6000	Introduction to Food and Drug Administration (FDA) Pharmaceutical Regulation	2
RGA 6001	Introduction to Food and Drug Administration Medical Device Regulation	2
RGA 6002	Regulatory Compliance Culture	2
RGA 6203	Pharmaceutical and Medical Device Law: Topics and Cases	5
RGA 6234	Drug and Device Supplier Risk Management: Compliance and Processes	4



RGA 6275	Product Development and Process Validation	2
RGA 6300	Practical Applications in Biomedical Product Global Regulatory Affairs	4

## Required Electives

Students must earn a minimum of 16 quarter hours by completing at least one course from each elective category.

### REGULATORY AND CLINICAL OPERATIONS

Code	Title	Hours
Complete at least one of the following: 4		
BTC 6213	Clinical Trial Design Optimization and Problem Solving	
RGA 6212	Introduction to Safety Sciences	
RGA 6230	Clinical Laboratory Management in Clinical Trials	
RGA 6233	Application of Quality System Regulation in Medical Device Design and Manufacturing	
RGA 6462	Regulatory Compliance in the Pharmaceutical Industry: A Collaborative Approach	
RGA 6207	Global Impact of Electronic Common Technical Document (eCTD) Submissions	

### REGULATORY PERSPECTIVE: PRODUCT DEVELOPMENT, BUSINESS, AND STRATEGY

Code	Title	Hours
Complete at least one of the following: 2-4		
RGA 6205	Emerging Trends and Issues in the Medical Device Industry	
RGA 6210	Strategic Planning and Project Management for Regulatory Affairs	
RGA 6211	Combination Products and Convergence	
RGA 6235	Emerging Product Categories in the Regulation of Drugs and Biologics	
RGA 6245	Regulation of Generic Pharmaceutical and Biosimilar Products	
COP 6940	Personal and Career Development (Enrollment in COP 6940 requires participation in the cooperative education program [subject to availability.] Students must complete two of the following four courses prior to enrolling in COP 6940: RGA 6100, RGA 6201, RGA 6202, or BTC 6210.)	
INT 6943 and RGA 6920	Integrative Experiential Learning and Internship Reflection	
EDU 6184	Interdisciplinary Foundations	

### INTERNATIONAL

Code	Title	Hours
Complete at least one of the following: 4		
RGA 6204	Legal Issues in International Food, Drug, and Medical Device Regulation	
RGA 6221	European Union Compliance Process and Regulatory Affairs	

RGA 6222	European Medical Device Regulations	
RGA 6223	Introduction to Australian, Asian, and Latin American Regulatory Affairs	
RGA 6224	Regulation of Biomedical Product Commercialization by Health Canada	
RGA 6225	Japanese Medical Device Regulations and Registration	
RGA 6226	Canadian and Australian Medical Device Regulations	
RGA 6228	Managing International Clinical Trials	
RGA 6247	Medicines Regulatory Harmonization in Africa	

### SPECIAL TOPICS

Code	Title	Hours
Complete at least one of the following:		
RGA 6410	Fundamentals of CMC Regulations and Methods	
RGA 6420	Global IVD Regulations and Submissions	
RGA 6430	Clinical Trial Quality Oversight	
RGA 6431	Clinical Trial Agreements and Other Key Contracts in the Life Sciences	
RGA 6461	Cybersecurity and Regulation of Digital Health Technologies by the FDA	

### Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

### Regulatory Affairs for Drugs, Biologics, and Medical Devices with Concentration in Strategic Regulatory Affairs, MS

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.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
RGA 6101	Therapeutic Product Development: A Regulatory Overview	4
RGA 6202	Medical Device Development: A Regulatory Overview	4

RGA 6203	Pharmaceutical and Medical Device Law: Topics and Cases	5
or RGA 6204	Legal Issues in International Food, Drug, and Medical Device Regulation	
RGA 6210	Strategic Planning and Project Management for Regulatory Affairs	4
RGA 6217	Biomedical Product Development: From Biotech to Boardroom to Market	4
RGA 6300	Practical Applications in Biomedical Product Global Regulatory Affairs	4

### Required Electives

Students must earn a minimum of 20 quarter hours by completing at least one course from each elective category.

### REGULATORY AND CLINICAL OPERATIONS

Code	Title	Hours
Complete one of the following:		4
BTC 6211	Validation and Auditing of Clinical Trial Information	
BTC 6213	Clinical Trial Design Optimization and Problem Solving	
RGA 6207	Global Impact of Electronic Common Technical Document (eCTD) Submissions	
RGA 6212	Introduction to Safety Sciences	
RGA 6234	Drug and Device Supplier Risk Management: Compliance and Processes	
RGA 6385	Operational Aspects of Electronic Common Technical Document (eCTD) Submissions	

### REGULATORY PERSPECTIVE: PRODUCT DEVELOPMENT, BUSINESS, AND STRATEGY

Code	Title	Hours
Complete one of the following:		2-4
BTC 6260	The Business of Medicine and Biotechnology	
RGA 6112	Biomedical Intellectual Property Management Strategy: Patents and Trade Secrets	
RGA 6205	Emerging Trends and Issues in the Medical Device Industry	
RGA 6211	Combination Products and Convergence	
RGA 6216	The Medical, Social, and Financial Dimensions of Orphan Drugs	
RGA 6235	Emerging Product Categories in the Regulation of Drugs and Biologics	
RGA 6245	Regulation of Generic Pharmaceutical and Biosimilar Products	
RGA 6250	Financing and Reimbursement in Biomedical Product Development	
RGA 6255	Global Convergence of Regulatory Science and Reimbursement/Market Access	
RGA 6432	Real-World Evidence in Biomedical Research	

RGA 6461	Cybersecurity and Regulation of Digital Health Technologies by the FDA
RGA 6463	Regulatory Strategy for Product Development and Life-Cycle Management
COP 6940	Personal and Career Development (Enrollment in COP 6940 requires participation in the cooperative education program [subject to availability.] Students must complete two of the following four courses prior to enrolling in COP 6940: RGA 6100, RGA 6201, RGA 6202, or BTC 6210.)
EDU 6184	Interdisciplinary Foundations
INT 6943 and RGA 6920	Integrative Experiential Learning and Internship Reflection

### INTERNATIONAL

Code	Title	Hours
Complete one of the following:		2-4
RGA 6221	European Union Compliance Process and Regulatory Affairs	
RGA 6222	European Medical Device Regulations	
RGA 6223	Introduction to Australian, Asian, and Latin American Regulatory Affairs	
RGA 6224	Regulation of Biomedical Product Commercialization by Health Canada	
RGA 6225	Japanese Medical Device Regulations and Registration	
RGA 6227	Emerging Medical Device Markets	
RGA 6241	Working in Multicultural Environments: Challenges and Opportunities	
RGA 6247	Medicines Regulatory Harmonization in Africa	

### SPECIAL TOPICS

Code	Title	Hours
Complete one of the following:		2-4
RGA 6405	Nonclinical Regulations in Biomedical Product Commercialization	
RGA 6270	Patient-Centered Regulatory Policy at FDA	
RGA 6275	Product Development and Process Validation	
RGA 6410	Fundamentals of CMC Regulations and Methods	
RGA 6420	Global IVD Regulations and Submissions	

### Program Credit/GPA Requirements

45 total quarter hours required  
Minimum 3.000 GPA required

### Regulatory Affairs of Food and Food Industries, MS

The Master of Science in Regulatory Affairs of Food and Food Industries is designed to offer a combination of theory and practical training for professionals looking to enter into, or advance in, the field of food regulatory affairs.

Our courses and curriculum are cross disciplinary, covering topics and methods that lie at the intersection of the life sciences, agricultural planning, food science, nutrition, law, economics, international relations, and regulatory policy. The breadth of the curriculum provides students from various educational and employment backgrounds with the opportunity to contribute to an evolving market.

Successful graduates of the program will gain the necessary knowledge and requisite skills to serve as leaders in the domain of food regulatory affairs. They will be equipped to serve instrumental roles in the formation of public policies, the implementation of regulatory guidelines, industry's compliance with regulations, and the regulatory strategies of companies looking to create a sustainable competitive advantage in the food industry.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
RFA 6100	Introduction to Regulatory Affairs of Food and Food Industries	3
RFA 6110	From Farm to Family Table: Understanding the Food Regulatory Life Cycle	3
RFA 6120	Economic and Social Aspects of Food	3
RFA 6130	Food Law in the United States	3
RFA 6200	Comparing U.S. Regulatory Systems and Agencies	3
RFA 6215	Risk Analysis and Hazard Analysis in the Food Industry	3
RFA 6225	Introduction to Food Science	3
RFA 6235	Regulatory Differences and Similarities: An International Investigation	3
RFA 6300	Capstone: Regulatory Affairs of Food	3

### Elective Courses

#### REGULATORY PROCESSES

Code	Title	Hours
RFA 6210	Food Safety and Modernization	3
RFA 6220	Food Safety and Surveillance: Concepts and Applications	3

#### BUSINESS AND MARKETING

Note: Personal and Career Development (COP 6940) or Integrative Experiential Learning (INT 6943) may only count toward one of the business and marketing elective courses. Enrollment in either of these courses requires participation in the cooperative education program (<http://www.cps.neu.edu/degree-programs/internships-co-ops/>) (subject to availability).

Code	Title	Hours
Complete two of the following: 6-7		
RFA 6310	Food Across International Borders: The International Food Trade	
RFA 6350	Political, Social, and Economic Influences on Food Law, Regulation, and Policy	
NTR 6155	Nutrition Entrepreneurship	
NTR 6165	Food and Society	

COP 6940	Personal and Career Development	
INT 6943	Integrative Experiential Learning	
EDU 6184	Interdisciplinary Foundations	
Total Hours		6-7

### INTERNATIONAL FOOD REGULATIONS

Code	Title	Hours
Complete two of the following: 6-7		
RFA 6410	Landmark Changes in International Food Policy	
RFA 6411	International Surveillance and Regulation of Food	
RFA 6412	FDA Model Food Code: Implications for Industry	
RFA 6413	Total Food Protection from Farm to Fork	
GST 6350	Global Economics of Food and Agriculture	

### Program Credit/GPA Requirements

45 total quarter hours required  
Minimum 3.000 GPA required

### Respiratory Care Leadership, MS

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 four concentrations: adult and organizational learning, clinical trial design, health management, and respiratory specialty practice.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Required Respiratory Care Courses

Code	Title	Hours
RPT 7200	Advanced Cardiopulmonary Physiology	4
RPT 7205	The Evolving Roles of Respiratory Care Professionals	4
RPT 7210	Research Design	4
RPT 7215	Applied Research in Respiratory Care	4
RPT 7300	Development of Clinical Practice Guidelines and Respiratory Care Protocols	4
RPT 7302	Respiratory Therapist Education	4

**Required Leadership Courses**

Code	Title	Hours
Complete two of the following:		6-12
LDR 6100	Developing Your Leadership Capability	
LDR 6110	Leading Teams	
LDR 6135	Ethical Leadership	
LDR 6140	Strategy Development and Implementation	

**Concentration**

Complete one of the following concentrations:<sup>1</sup>

**ADULT AND ORGANIZATIONAL LEARNING**

Code	Title	Hours
Complete four of the following:		16
EDU 6051	Culture, Equity, Power, and Influence	
EDU 6201	The Landscape of Higher Education	
EDU 6202	Faculty, Curriculum, and Academic Community	
EDU 6221	Enrollment, Retention, Graduation, Success	
EDU 6319	How People Learn	
EDU 6323	Technology as a Medium for Learning	
EDU 6447	The Demographics of Higher Education	

**CLINICAL TRIAL DESIGN**

Code	Title	Hours
Complete four of the following:		16
BTC 6210	Human Experimentation: Methodological Issues Fundamentals	
BTC 6211	Validation and Auditing of Clinical Trial Information	
BTC 6213	Clinical Trial Design Optimization and Problem Solving	
BTC 6260	The Business of Medicine and Biotechnology	
RGA 6000	Introduction to Food and Drug Administration (FDA) Pharmaceutical Regulation	
RGA 6001	Introduction to Food and Drug Administration Medical Device Regulation	
RGA 6202	Medical Device Development: A Regulatory Overview	
RGA 6205	Emerging Trends and Issues in the Medical Device Industry	

**HEALTH MANAGEMENT**

Code	Title	Hours
Complete five of the following:		15
HMG 6110	Organization, Administration, Financing, and History of Healthcare	
HMG 6120	Human Resource Management in Healthcare	
HMG 6130	Healthcare Strategic Management	
HMG 6140	Principles of Population-Based Management	

HMG 6160	Healthcare Information Systems Management	
HMG 6170	Health Law, Politics, and Policy	
NPM 6120	Financial Management for Nonprofit Organizations	
NPM 6125	Promoting Nonprofit Organizations	
NPM 6130	Fundraising and Development for Nonprofit Organizations	

**RESPIRATORY SPECIALTY PRACTICE**

Code	Title	Hours
RPT 7400	Pulmonary Diseases and Disorders	4
RPT 7401	Cardiopulmonary Assessment and Diagnostics	4
Complete two of the following:		8
RPT 7402	Adult Critical Care	
RPT 7403	Neonatal and Pediatric Care	
RPT 7405	Development of Patient Management Plans	

**Program Credit/GPA Requirements**

45 total quarter hours required  
Minimum 3.000 GPA required

<sup>1</sup> Interdisciplinary Foundations (EDU 6184) may be taken as an elective.

**Technical Communication, MS**

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 Studies 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 three concentrations from which to choose—computer industry writing, social media and online communities, or usability/user experience—this graduate degree in technical communication seeks to prepare you for a rewarding career as a technical writer, editor, tool expert, or technical trainer.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Required Courses**

Code	Title	Hours
TCC 6100	Introduction to Technical and Professional Writing	4
TCC 6102	Editing Technical Content	4
TCC 6110	Information Architecture	4
TCC 6120	Usability and User Experience	4
The following course should be taken last:		
TCC 6850	Technical Communications Capstone Project	4

**Concentration**

If students prefer to focus their studies on a particular concentration, they may select 16–24 quarter hours from one of the concentrations

below and complement their studies with 2–10 quarter hours of elective courses to meet the minimum 46-quarter-hour degree requirement.

Students are not required to complete a concentration. Any combination of 26 quarter hours from concentration and elective courses will satisfy degree requirements.

### COMPUTER INDUSTRY WRITING

Code	Title	Hours
Complete four of the following:		16
TCC 6430	Writing for the Computer Industry	
TCC 6440	Advanced Writing for the Computer Industry	
TCC 6400	Structured Documentation	
TCC 6450	Managing Technical Publications	
TCC 6410	Online Documentation	
TCC 6630	Introduction to XML	

### SOCIAL MEDIA

Code	Title	Hours
<b>Required Course</b>		
DGM 6285	Interactive Marketing Fundamentals	4
<b>Electives</b>		
Complete 16-20 quarter hours from the following:		16-20
CMN 6040	Consumer Behaviors in the Online Environment	
CMN 6045	Leveraging Digital Technologies: Strategy, Assessment, and Governance	
CMN 6065	Implementation and Management of Social Media Channels and Online Communities	
CMN 6075	Digital Marketing Analytics	
DGM 6290	Social Media and Brand Strategy Implementation	
DGM 6525	Research Methods for Global User Experiences	
DGM 6550	Search Engine Optimization: Strategy and Implementation	

### USABILITY/USER EXPERIENCE

Code	Title	Hours
Choose any combination of the following courses to complete 16 quarter hours:		16
DGM 6268	Usable Design for Mobile Digital Media	
TCC 6610	Prototyping	
TCC 6420	Information Design for the Web	
TCC 6470	Web Accessibility for Technical Communicators	
TCC 6490	Usability Testing for Technical Communicators	
TCC 6620	Collecting User Data	
TCC 6710	Content Strategy	

### Electives

Code	Title	Hours
Choose a combination of 2–10 quarter hours of electives from the list below and any concentration courses listed above:		2-10
TCC 6150	Writing Portfolio	

TCC 6200	Ethics in Technical Communication
TCC 6480	Instructional Design for Technical Communicators
TCC 6495	Document Design
TCC 6640	Wiki-Based Documentation
EDU 6184	Interdisciplinary Foundations

### Program Credit/GPA Requirements

46 total quarter hours required  
Minimum 3.000 GPA required

### Sports Leadership, MSLD

The practice-oriented sports leadership master's degree is structured to accommodate midcareer athletic administrators and coaches, as well as individuals seeking to prepare for careers in the sports industry.

Developed in collaboration with Northeastern University's Center for the Study of Sport in Society, the Master of Sports Leadership seeks to prepare you for a variety of sport-related occupations—whether it's working with a professional or intercollegiate sports team; with a fitness club or wellness organization; or in marketing, communication, or sports management. Courses within this unique graduate degree examine the social and business issues that are critical to sports leadership. Offered in an online format with 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.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

*Note:* Sport in Society (LDR 6405) and Sports Media Relations (LDR 6441) are summer institute courses, available on-campus in Boston. Winter institute course available on campus in Charlotte, North Carolina.

Code	Title	Hours
LDR 6100	Developing Your Leadership Capability	3
LDR 6135	Ethical Leadership	3
LDR 6405	Sport in Society	3
LDR 6410	Leadership and Organization in Sport	3
LDR 6430	Sports Law	3
LDR 6441	Sports Media Relations	3

### Internship/Capstone

Code	Title	Hours
Complete one of the following. This course should be the last course taken and requires faculty advisor approval:		3
LDR 6961	Internship	
LDR 6980	Capstone	

### Elective Courses

Code	Title	Hours
Choose two of the following:		6
CMN 6015	Introduction to the Digital Era: The Power of Social Media	
LDR 6443	Ticket Sales and Strategies	

LDR 6470	Bystander Strategies for the Prevention of Gender-Based Violence
INT 6943	Integrative Experiential Learning
EDU 6184	Interdisciplinary Foundations

## Concentration

### PROFESSIONAL SPORTS ADMINISTRATION

Code	Title	Hours
LDR 6323	Event Management	3
LDR 6400	Sports Management	3
LDR 6435	Fiscal Practices in Sports	3
LDR 6440	Sports Marketing and Promotions	3
LDR 6445	Corporate Sponsorships	3
LDR 6460	Risk Management in Athletics	3

### COLLEGIATE ATHLETICS ADMINISTRATION

Code	Title	Hours
LDR 6400	Sports Management	3
LDR 6427	Gender and Diversity in Sport	3
LDR 6442	Athletic Fund-Raising	3
LDR 6455	NCAA Compliance	3
LDR 6465	Title IX	3
LDR 6615	Academic Advising for Student-Athletes	3

## Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

## Graduate Certificate Programs

Enhance your skills and career potential with a graduate certificate from Northeastern University's College of Professional Studies. We offer over 45 certificates that represent fast-growing fields such as education, project management, leadership, and technology. **Courses are delivered online, on campus, or in a hybrid format**, offering you maximum flexibility and convenience for your busy schedule.

## Programs

- 3-D Animation (p. 358)
- Adult and Organizational Learning (p. 359)
- Advanced Study in Orthopedics (p. 359)
- Agile Project Management (p. 359)
- Biopharmaceutical (p. 362) Domestic (p. 362) Regulatory Affairs (p. 362)
- Cloud Computing Application and Management (p. 360)
- Collegiate Athletics Administration (p. 360)
- Computer Industry Writing (p. 361)
- Construction Management (p. 361)
- Cross-Cultural Communication (p. 361)
- Digital Media Management (p. 362)
- Digital Video (p. 362)
- E-Learning and Instructional Design (p. 363)
- Emergency Management (p. 363)
- Experiential Teaching and Learning (p. 363)
- Financial Markets and Institutions (p. 364)
- Forensic Accounting (p. 364)
- Game Design (p. 364)

- Geographic Information Systems (p. 365)
- Global Student Mobility (p. 365)
- Global Studies and International Relations (p. 365)
- Health Management (p. 366)
- Higher Education Administration (p. 366)
- Human-Centered Informatics (p. 367)
- Human Resources Management (p. 367)
- Information Security Management (p. 367)
- Interactive Design (p. 368)
- Interdisciplinary Professional Studies (p. 368)
- International Biopharmaceutical Regulatory Affairs (p. 369)
- Leadership (p. 370)
- Leading and Managing Technical Projects (p. 370)
- Learning Analytics (p. 371)
- Medical Devices Regulatory Affairs (p. 371)
- Nonclinical Biomedical Product Regulation (p. 372)
- Nonprofit Management (p. 372)
- Organizational Communication (p. 373)
- Port Security (p. 373)
- Professional Sports Administration (p. 373)
- Program and Portfolio Management (p. 374)
- Project Business Analysis (p. 374)
- Project Management (p. 374)
- Public and Media Relations (p. 375)
- Quality Assurance in Biomedical Products Regulation (p. 375)
- Remote Sensing (p. 376)
- Respiratory Specialty Practice (p. 376)
- Social Media and Online Communities (p. 377)
- Teaching English to Speakers Of Other Languages (p. 377)
- Usability (p. 377)

## 3-D Animation, Graduate Certificate

3-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 3D Animation offers a practice-oriented approach to the art and science of animation, with a particular emphasis on the special requirements of 3D modeling and animating for the gaming industry. Course work is designed to develop students' powers of visualization as well as provide a conceptual basis for visual narrative. The program seeks to produce graduates who are skilled in the use of industry-standard animation applications; understand visual principles of lighting, modeling, and surfacing; and are conversant with motion and special effects compositing.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

## Required Courses

Code	Title	Hours
DGM 6450	Animation Basics	4
DGM 6510	3-D Modeling	4
DGM 6515	Introduction to After Effects	2
DGM 6530	Character Animation	4
DGM 6540	Compositing	4
Complete one from the following:		4
DGM 6122	Foundations of Digital Storytelling	
DGM 6535	Rigging Principles and Techniques	

## Program Credit/GPA Requirements

22 total quarter hours required  
Minimum 3.000 GPA required

### Adult and Organizational Learning, Graduate Certificate

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.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

## Required Core Courses

Code	Title	Hours
EDU 6319	How People Learn	4
EDU 6323	Technology as a Medium for Learning	4
Complete one of the following:		4
EDU 6324	Competencies, Assessment, and Learning Analytics	
EDU 6437	Assessment in Education	
Complete one of the following:		4
EDU 6331	E-Learning Design as a Collaborative Profession	
EDU 6450	The Globalization of Education	

## Program Credit/GPA Requirements

16 total quarter hours required  
Minimum 3.000 GPA required

### Advanced Study In Orthopedics, Graduate Certificate

The Northeastern University Graduate Certificate in Advanced Study of Orthopedics is designed for licensed physical therapists interested in developing advanced skills in orthopedic physical therapy. This program will consist of five courses (18 credits) and be taught 100 percent online. The online design of the program will provide practicing physical therapists the flexibility to adapt to their demanding schedules, save time on travel, and complete the program from the comfort of their homes.

The program can be completed in 18 to 36 months with fall, winter, and summer start dates. The online format will foster the development of critical reflective thinking through case studies and discussions focusing on the most current information in orthopedic physical therapy.

## Program Objectives

- Prepare physical therapists to integrate the current research into their orthopedic clinical practice
- Apply knowledge of the anatomy and biomechanics to the evaluation and treatment of the musculoskeletal system
- Interpret and analyze medical and physical examination findings based on the Patient/Client Management Model
- Analyze current surgical interventions for the musculoskeletal system as it applies to physical therapy care
- Provide the student with the knowledge and skills required to sit for the American Physical Therapy Association's Board of Physical Therapy Specialist Orthopaedic clinical specialization examination

*Note:* Contact Eric Folmar, program director, for further information: e.folmar@neu.edu (e.folmar@neu.edu?subject=CPS%20Website%20Inquiry) or 617.304.9253.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
PTH 6560	Patient Management Models and Evidence-Based Practice in Orthopedics	2
PTH 6561	Evidence-Based Examination and Outcomes for the Cervical-Thoracic Spine and Temporomandibular Joint	4
PTH 6562	Evidence-Based Examination and Outcomes for Upper Extremity: Shoulder, Elbow, and Hand	4
PTH 6563	Evidence-Based Examination and Outcomes for Lumbar Spine and Sacroiliac Joint	4
PTH 6564	Evidence-Based Examination and Outcomes for Lower Extremity: Hip, Knee, Foot, and Ankle	4

An optional two-and-a-half-day hands-on lab that will include components of each of the courses (upper extremity, lower extremity, spine) will be offered each spring. People enrolled in the program will have the option to take the hands-on labs for an extra fee.

## Program Credit/GPA Requirements

18 total quarter hours required  
Minimum 3.000 GPA required

### Agile Project Management, Graduate Certificate

Northeastern University's graduate certificate in agile is designed to empower students to explore agile principles and practice and remain up-to-date with current trends in the agile framework. The increasingly important role of agile practitioners and managers is becoming clear as agile business development processes are being adopted by major companies because of its high degree of success in achieving improved

time to market, reducing costs, and increasing overall customer satisfaction.

The graduate certificate in agile is led by highly credentialed faculty members that are agile practitioners with decades of experience in helping companies successfully implement agile in their organizations.

Through courses you take online, our agile graduate certificate project management curriculum will give you the opportunity to:

- Develop a strong framework and understanding of the role of agile management
- Develop an understanding of the agile management processes and methodologies
- Develop an understanding of how an agile approach to managing projects can deliver value to the organization
- Develop a personal leadership strategy for success as an agile practitioner
- Develop an agile evaluation plan to measure success

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
PJM 6810	Principles of Agile Project Management	3
PJM 6815	Advanced Agile Project Management	3
PJM 6820	Agile Implementation and Governance	3
PJM 6825	Agile Lean Product Development	3
PJM 6205	Leading and Managing Technical Projects	3
CMN 6060	Negotiation, Mediation, and Facilitation	3

### Program Credit/GPA Requirements

18 total quarter hours required  
Minimum 3.000 GPA required

## Cloud Computing Application and Management, Graduate Certificate

Cloud computing is the delivery of computing services over the internet. Due to the relatively lower cost of IT solutions, many organizations have started to take advantage of cloud services provided by Amazon Web Services, Microsoft Azure, IBM Cloud and Softlayer, Google Cloud Platform, Salesforce, and so on. These web service providers offer a broad range of global cloud-based IT products, including computing technologies, storage, databases, analytics, networking, mobile, developer tools, management tools, Internet of Things connectivity, and security and enterprise applications. These services can help organizations move faster, facilitate agile development, and better manage scalability.

The cloud computing application and management (CCA&M) graduate certificate offers students an opportunity to develop technical and management skills to address the needs of enterprise IT services. They will study theoretical and practical aspects of distributed systems from both technical and business perspectives. Successful students will be able to identify frameworks, techniques, and existing IT solutions to manage internet services at different levels (infrastructure, platform, and software). Students in the CCA&M graduate certificate program will also be able to demonstrate the ability to use APIs to integrate applications and business operations into the cloud. They can be directly employed

by web service providers or instead work as IT solutions managers in organizations that contract with web service providers.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirement

Code	Title	Hours
<b>Required Courses</b>		
ITC 6420	Introduction to Cloud Computing Applications and Management	3
ITC 6450	Advanced Cloud Computing Applications and Management	3
ITC 6015	Enterprise Information Architecture	3
ITC 6320	Information Security Technology	3
ITC 6355	Web Application Design and Development	3

### Elective

Complete one of the following:		3-4
ITC 6082	Network Protection	
ITC 6460	Cloud Analytics	
ITC 6470	Enterprise Data Storage and Management Technologies	

### Program Credit/GPA Requirements

18 total quarter hours required  
Minimum 3.000 GPA required

## Collegiate Athletics Administration, Graduate Certificate

College athletics in the United States is comprised of more than 1,200 schools, conferences, and organizations that collectively invest in the well-being of student-athletes—both on and off the field.

The Graduate Certificate in Collegiate Athletics Administration offers students an opportunity to obtain an in-depth understanding of the largest amateur segment of the sports industry. Through the program's curriculum, students will be given the opportunity to acquire leadership skills and knowledge in a variety of collegiate athletics topics including sports management, NCAA compliance, fund-raising, academic advising, gender and diversity in sport, and Title IX legislation.

Upon completion, all credits earned in the collegiate athletics administration certificate can also be applied directly into the Master of Sports Leadership (p. 357) program.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
LDR 6400	Sports Management	3
LDR 6427	Gender and Diversity in Sport	3
LDR 6442	Athletic Fund-Raising	3
LDR 6455	NCAA Compliance	3
LDR 6465	Title IX	3
LDR 6615	Academic Advising for Student-Athletes	3



## Program Credit/GPA Requirements

18 total quarter hours required  
Minimum 3.000 GPA required

### Computer Industry Writing, Graduate Certificate

The Graduate Certificate in Computer Industry Writing delivers in-demand technical writing and editing skills used in high-tech companies. You'll have the opportunity to develop several types of technical documentation, including online help, user manuals, screencasts, quick reference guides, and a DITA project. Our courses also give you ample exposure to popular software tools used by technical communicators in the field today. Courses from this certificate also serve as a concentration the Master of Science in Technical Communication (MSTC). You can directly apply the certificate courses to the MSTC.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
TCC 6400	Structured Documentation	4
TCC 6410	Online Documentation	4
TCC 6430	Writing for the Computer Industry	4
TCC 6440	Advanced Writing for the Computer Industry	4
TCC 6630	Introduction to XML	2
TCC 6150	Writing Portfolio	2

## Program Credit/GPA Requirements

20 total quarter hours required  
Minimum 3.000 GPA required

### Construction Management, Graduate Certificate

Over the last two decades, construction in both the public and private sector has become increasingly complex, requiring construction and project managers to have a stronger skill base to be successful in acquiring and executing projects.

The Graduate Certificate in Construction Management is intended to serve owners' representatives, consulting engineers, architects, design engineers, contractors, and subcontractors. Individuals who have a bachelor's degree, but not necessarily in construction, and who have been identified by their companies as having high potential for advancement are also good candidates for this program.

Courses from this certificate may be applied toward the Master of Science in Project Management.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
CMG 6400	Introduction to Construction Management	4
CMG 6402	Alternative Project Delivery Methods and Project Controls	4

CMG 6403	Safety, Project Risk, and Quality Management	4
CMG 6405	Construction Law	4

## Program Credit/GPA Requirements

16 total quarter hours required  
Minimum 3.000 GPA required

### Cross-Cultural Communication, Graduate Certificate

The Graduate Certificate in Cross-Cultural Communication will help to equip professionals with the knowledge and competencies to:

- Analyze personal cross-cultural awareness and implicit bias, in addition to interpret organizational cross-cultural communication strategy to develop effective communication processes and activities
- Evaluate communication audiences from a holistic perspective, thereby constructing effective verbal and nonverbal interactions based on cross-cultural consumption
- Formulate enlightened cross-cultural communication and inclusive diversity strategies, processes, and policies
- Demonstrate critical thinking skills through research, case analysis, role-plays, and experiential learning demonstrating agility, quick response, and diplomacy employing cross-cultural communication strategies

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
CMN 6085	Strategies for Cross-Cultural Facilitation and Negotiation	3
CMN 6095	Foundations of Developing Cultural Awareness	3

### Required Track

Students must earn a minimum of 12 quarter hours from one of the following tracks:

#### SOCIAL JUSTICE TRACK

Code	Title	Hours
PBR 6100	Introduction to Public Relations	3
HSV 6120	Social Inequality, Social Change, and Community Building	3
ITC 6045	Information Technology Policy, Ethics, and Social Responsibility	3
HRM 6070	Global Human Resources Management	3

#### INTERNATIONAL TRACK

Code	Title	Hours
GST 6100	Globalization and Global Politics and Economics	4
GST 6101	Global Literacy, Culture, and Community	4
LDR 6145	Global Leadership	3
INT 6900	International Field Study Experience	3,4

## Program Credit/GPA Requirements

18 total quarter hours required

Minimum 3.000 GPA required

### Digital Media Management, Graduate Certificate

The digital media market space can present unexpected challenges to standard business models. The Graduate Certificate in Digital Media Management offers courses designed to help managers apply best business practices to these nontraditional challenges. Students are offered the opportunity to gain skills in managing functionally diverse digital media teams, responding effectively to response-critical projects, and implementing marketing strategy in a variety of media channels.

Courses in the program were selected by faculty from the College of Professional Studies' Master of Professional Studies in Digital Media. The certificate consists of one core course selected from the MPS in Digital Media (p. 324) curriculum combined with existing concentration courses.

#### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Required Courses

Code	Title	Hours
DGM 6145	Information Technology and Creative Practice	4
DGM 6279	Project Management for Digital Media	4
DGM 6280	Managing for Digital Media	4
DGM 6285	Interactive Marketing Fundamentals	4

#### Electives

Code	Title	Hours
Complete one of the following:		3-4
DGM 6230	Digital Media Entrepreneurship	
DGM 6290	Social Media and Brand Strategy Implementation	
CMN 6010	Strategic Communication Management	
CMN 6110	Group Dynamics and Interpersonal Conflict: Meeting Management	

#### Program Credit/GPA Requirements

19 total quarter hours required  
Minimum 3.000 GPA required

### Digital Video, Graduate Certificate

With the quality and ease of use of digital video camcorders, anyone can capture moving images, but the result is like a Stradivarius violin: It takes training to make music. The Graduate Certificate in Digital Video is a hands-on introduction to digital video technologies, as well as an examination of the social, cultural, and political implications of moving-image production in the digital age. Students have an opportunity to gain competency in digital production and postproduction while exploring various formal, conceptual, and structural strategies. Students will also have an opportunity to learn to generate digital video that communicates effectively and inventively, in preparation for positions in the creative industries of gaming, design, and media production.

The courses in this program also serve as a concentration in the Master of Professional Studies in Digital Media.

#### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Required Courses

Code	Title	Hours
DGM 6506	Introduction to Digital Video	2
DGM 6435	Digital Video Production	4
DGM 6440	Editing in the Digital Studio	4

#### Electives

Code	Title	Hours
Complete two of the following:		8
DGM 6125	Time-Based Media	
DGM 6430	Screenwriting: Linear and Interactive	
DGM 6545	Documentary and Nonfiction Production	

#### Program Credit/GPA Requirements

18 total quarter hours required  
Minimum 3.000 GPA required

### Biopharmaceutical Domestic Regulatory Affairs, Graduate Certificate

The biotechnology and pharmaceutical industries continue to experience rapid growth in the U.S. market. As companies in these industries seek approval to market their products in the United States, demand for qualified regulatory affairs professionals continues to increase. Product development scientists, marketers, quality personnel, as well as legal experts that guide companies through the Food and Drug Administration (FDA) approval process, will benefit from regulatory affairs training.

The Graduate Certificate in Biopharmaceutical 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.

#### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Required Courses

Code	Title	Hours
RGA 6000	Introduction to Food and Drug Administration (FDA) Pharmaceutical Regulation	2
RGA 6101	Therapeutic Product Development: A Regulatory Overview	4
Complete the appropriate number of electives to meet the minimum quarter-hour requirement:		10-12
BTC 6210	Human Experimentation: Methodological Issues Fundamentals	
RGA 6002	Regulatory Compliance Culture	

RGA 6203	Pharmaceutical and Medical Device Law: Topics and Cases
RGA 6207	Global Impact of Electronic Common Technical Document (eCTD) Submissions
RGA 6210	Strategic Planning and Project Management for Regulatory Affairs
RGA 6212	Introduction to Safety Sciences
RGA 6215	Project Management in Early Drug Discovery and Development
RGA 6216	The Medical, Social, and Financial Dimensions of Orphan Drugs
RGA 6217	Biomedical Product Development: From Biotech to Boardroom to Market
RGA 6380	Advanced Regulatory Writing: New Drug Applications
RGA 6410	Fundamentals of CMC Regulations and Methods

### Program Credit/GPA Requirements

16 total quarter hours required  
Minimum 3.000 GPA required

### e-Learning and Instructional Design, Graduate Certificate

The e-learning and instructional design certificate increases opportunities for professional diversification and advancement as the contemporary landscape of learning increasingly requires a digital component. This curriculum is designed to prepare professionals to design pedagogically sound online, blended, and technology-enhanced educational experiences from stand-alone workshops to program suites.

Certificate participants investigate the latest research on the science of learning, draw on research-based principles to design engaging online and mobile environments, and become prepared to respond innovatively to societal and institutional changes that impact the field of online and mobile education.

Students will have the option of applying their four courses toward the e-learning and instructional design MEd program if they decide to pursue that degree.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
EDU 6319	How People Learn	4
EDU 6321	Models for Learning Design	4
EDU 6323	Technology as a Medium for Learning	4

### Elective

Code	Title	Hours
Complete one of the following:		
EDU 6324	Competencies, Assessment, and Learning Analytics	4
EDU 6331	E-Learning Design as a Collaborative Profession	

EDU 6332	Open Learning
EDU 6333	Social Media and Beyond

### Program Credit/GPA Requirements

16 total quarter hours required  
Minimum 3.000 GPA required

### Emergency Management, Graduate Certificate

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
HLS 6060	Strategic Planning and Budgeting	3
HLS 6070	Emergency Management and Geographic Information Systems	3
HLS 6080	Continuity of Operations and Planning	3
HLS 6150	Essentials of Emergency Management	3
HLS 6155	Critical Infrastructure, Security, and Emergency Management	3
HLS 6160	Advanced Emergency Management	3
HLS 6170	Emergency Management Capstone	3

### Program Credit/GPA Requirements

21 total quarter hours required  
Minimum 3.000 GPA required

### Experiential Teaching and Learning, Graduate Certificate

Experiential learning has been documented to be an effective pedagogy for promoting deeper learning, fostering student engagement, and ultimately closing the opportunity gap for underserved students. However, many educators and educational leaders are not familiar with best-practice strategies for leading, practicing, and researching experiential learning in their classrooms and therefore need themselves to become adult learners to begin the process of pedagogical transformation.

The Graduate Certificate in Experiential Teaching and Learning is designed to provide K–12 experiential educators with the knowledge, skills, and attitudes needed to design, facilitate, research, and lead engaging and meaningful learning experiences. The program explores the theoretical foundations, approaches, and strategies for learning through experience and how to apply these competencies with a commitment toward fostering educational equity.

Classroom teachers who are interested in transforming their practice as well as educators who are interested in seeking out leadership roles within schools will benefit from earning the Graduate Certificate in Experiential Teaching and Learning as the certificate covers content and skills needed for leading both student and adult experiential learning.

The certificate is comprised of 16 quarter hours, which may be applied toward the Master of Education in Learning and Instruction.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

## Required Courses

Code	Title	Hours
EDU 6001	Experiential Learning Theory and Practice	4
EDU 6002	Culturally Responsive Experiential Teaching and Learning	4
EDU 6003	Applied Research in Experiential Teaching and Learning	4
EDU 6004	Leading Experiential Teaching and Learning	4

## Program Credit/GPA Requirements

16 total quarter hours required  
Minimum 3.000 GPA required

### Financial Markets and Institutions, Graduate Certificate

In this rapidly changing business environment, the barriers between institutions are eroding, and competition is increasing due to deregulation and new product development. Managing internal operations more efficiently and adapting to the changing external environment is critical to the long-term survival of institutions. The Graduate Certificate in Financial Markets and Institutions seeks to prepare students to measure the impact of accounting decisions on performance; to manage risks, assets, and liabilities to meet corporate goals; to understand domestic and international financial systems and the institutions within them; and to build financial relationships that foster marketing financial products.

An examination of financial services industry principles and practices seeks to provide individuals working in brokerage houses, investment or commercial banks, insurance companies, or real estate with a greater understanding of financial systems as well as how to manage risks, assets, and liabilities in meeting corporate goals.

*Note:* Courses from this certificate may not be applied toward the Master of Science in Leadership.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

## Required Courses

Code	Title	Hours
FIN 6101	Accounting Fundamentals for Financial Institutions	4
FIN 6161	Investment Analysis	4
FIN 6102	Asset and Liability Management	4
FIN 6120	Building Financial Relationships	4

## Program Credit/GPA Requirements

16 total quarter hours required  
Minimum 3.000 GPA required

### Forensic Accounting, Graduate Certificate

News surrounding corporate corruption has had a significant impact on businesses, particularly the accounting industry. In response, the government has enacted sweeping accounting and business laws such as the Sarbanes-Oxley 2002 legislation. Additionally, many professional organizations, including the American Institute of Certified Public Accountants (AICPA) and the Association of Certified Fraud Examiners

(ACFE), have made the prevention, detection, and prosecution of fraud and accounting abuse a priority.

This **four-course graduate certificate in forensic accounting** is designed to help students apply techniques in identifying, collecting, and examining evidence, including how to identify financial statement misrepresentation, transaction reconstruction, and tax evasion.

*Note:* Courses from this certificate may not be applied toward the Master of Science in Leadership.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

## Required Courses

Courses should be taken in the following sequence:

Code	Title	Hours
ACC 6210	Forensic Accounting Principles	4
ACC 6220	Dissecting Financial Statements	4
ACC 6230	Investigative Accounting and Fraud Examination	4
ACC 6240	Litigation Support	4

## Program Credit/GPA Requirements

16 total quarter hours required  
Minimum 3.000 GPA required

### Game Design, Graduate Certificate

Game design is one of the fastest-growing fields in entertainment, business, and education. From healthcare to political science, companies use games to educate their constituents and enhance employee skills.

The Graduate Certificate in Game Design offers a practice-oriented approach to the art and science of game making. The program emphasizes visual design and programming for video games and fosters conceptual understanding of the principles of game design for all varieties of games—from educational board games to iPhone games.

Courses in this program also serve as a concentration in the Master of Professional Studies in Digital Media.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

## Required Courses

Code	Title	Hours
DGM 6122	Foundations of Digital Storytelling	4
DGM 6308	Intermediate Programming for Digital Media (Must take Test to qualify, if not take DMG 6108))	4
DGM 6400	Game Design Fundamentals	4
DGM 6403	Game Engine Fundamentals	4
DGM 6405	Game Development	4

## Program Credit/GPA Requirements

20 total quarter hours required  
Minimum 3.000 GPA required

## Geographic Information Systems, Graduate Certificate

A geographic information system (GIS) combines layers of data to give needed information on specific locations. Such a system can map environmental sensitivities or geological features or can report on how best to speed emergency personnel to an accident or crime scene. Current fields using GIS include healthcare, public safety, environmental management, transportation and operations technology, real estate, and public utilities.

The Graduate Certificate in Geographic Information Systems program offers hands-on training, seeking to give students the necessary skills and understanding to apply GIS competently and effectively. As a result of the certificate curriculum, students should be well versed in GIS theory, have practical hands-on exposure to GIS software and hardware, understand the representation of data in both mapped and tabular forms, and know how to plan and construct spatial databases.

The courses in this certificate program may be applied to the Master of Professional Studies in Geographic Information Technology.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
GIS 5103	Foundations of Geographic Information Science	4
RMS 5105	Fundamentals of Remote Sensing	3
GIS 5201	Advanced Spatial Analysis	3

### Electives

Code	Title	Hours
Complete two of the following:		6
ITC 6480	Amazon Web Service (AWS) Cloud Architecting	
GIS 6320	Use and Applications of Free and Open-Source GIS Desktop Software	
GIS 6330	Building Geospatial Systems at Scale	
GIS 6340	GIS Customization	
GIS 6345	Geospatial Programming	
GIS 6350	Planning a GIS Implementation	
GIS 6360	Spatial Databases	
GIS 6370	Internet-Based GIS	
GIS 6385	GIS/Cartography	
GIS 6983	Topics	
RMS 6293	Allied Technologies in Remote Sensing	

### Program Credit/GPA Requirements

16 total quarter hours required  
Minimum 3.000 GPA required

## Global Student Mobility, Graduate Certificate

The Graduate Certificate in Global Student Mobility offers an in-depth look at the dynamic field of international higher education for those wishing to administer programs for domestic and/or international students, faculty, and institutions. Students will receive a grounding

in cross-cultural theories while also exploring the widening range of program types, methods of delivery, and the importance of experiential and service-learning exchanges. Courses explore U.S.–government-sponsored programs, the role of nongovernmental organizations (NGOs) dedicated to international academic exchanges, and the fast-growing world of third-party providers. Taught by practitioners with real-world experience, students will have ample opportunity to review case studies illustrating both challenges and innovative practices in this essential and highly specialized area of higher education.

The continual expansion of globalization has changed the landscape of higher education worldwide and fueled the demand for professionals with the skills and knowledge to enter this increasingly specialized field. The graduate certificate is designed to prepare students for employment in various sectors of the international education field including:

- Study abroad
- International student and scholar services
- International admissions and recruitment
- The development and administration of international study, work, and volunteer exchange
- Student ESL and language programs
- The complex range of U.S.–government-sponsored international exchange programs such as Fulbright, Humphrey, Muskie, YES, and scores of others
- NGOs supporting these exchanges such as IIE, Amideast, American Councils, and many others
- Creating and administering exchange programs for working professionals outside of higher education, targeting religious, philanthropic, and thematic programs

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
GST 6810	International Higher Education	4
GST 6820	Managing Study Abroad	4
GST 6830	Managing International Students	4

### Elective

Code	Title	Hours
Complete one of the following:		4
GST 6101	Global Literacy, Culture, and Community	
INT 6900	International Field Study Experience (Requires co-registration in a 1 q.h. directed study. Students interested in taking INT 6900 should contact their Academic Advisor.)	

### Program Credit/GPA Requirements

16 total quarter hours required  
Minimum 3.000 GPA required

## Global Studies and International Relations, Graduate Certificate

The Graduate Certificate in Global Studies and International Relations is designed to provide students with the skills and training necessary to analyze, research, and evaluate a topic of interest in a global location. Overall, the program curriculum focuses on the themes of transition

and development in the global world. Core courses provide a base of knowledge about global issues and are combined with an elective that allows students to focus on a specific area of interest.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Required Courses

Code	Title	Hours
GST 6100	Globalization and Global Politics and Economics	4
GST 6101	Global Literacy, Culture, and Community	4
GST 6320	Peace and Conflict	4

#### Elective

Code	Title	Hours
Complete one of the following: 4		
GST 6501	Regional Studies: East Asia	
GST 6502	Regional Studies: Middle East	
GST 6503	Regional Studies: Sub-Saharan Africa	
GST 6504	Regional Studies: Europe	
GST 6505	Regional Studies: Southwest and Central Asia	
GST 6506	Regional Studies: Latin America	

### Program Credit/GPA Requirements

16 total quarter hours required  
Minimum 3.000 GPA required

#### Health Management, Graduate Certificate

Projections for the healthcare industry state that job growth will remain above average into the next decade. The needs of an aging population along with the increased human life cycle are just some of the factors contributing to this growth.

The Graduate Certificate in Health Management examines the financial, political, legal, and operational aspects of a healthcare facility and explores the evolution of healthcare delivery in the United States.

Health managers are found in different roles across healthcare organizations including:

- Strategic planning
- Operations
- Human resources
- Fund-raising
- Purchasing

Health managers are responsible for designing, administering, managing, and evaluating health policies, programs, and services. The courses in this certificate also serve as a concentration in the Master of Science in Leadership program.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
HMG 6110	Organization, Administration, Financing, and History of Healthcare	3
HMG 6120	Human Resource Management in Healthcare	3
NPM 6120	Financial Management for Nonprofit Organizations	3
HMG 6130	Healthcare Strategic Management	3

### Elective Courses

Code	Title	Hours
Complete two of the following (minimum of 6 quarter hours): 6		
NPM 6110	Legal and Governance Issues in Nonprofit Organizations	
NPM 6150	Human Resources Management in Nonprofit Organizations	
HMG 6140	Principles of Population-Based Management	
HMG 6160	Healthcare Information Systems Management	
HMG 6170	Health Law, Politics, and Policy	
HRM 6020	Talent Acquisition and Onboarding	

### Program Credit/GPA Requirements

18 total quarter hours required  
Minimum 3.000 GPA required

#### Higher Education Administration, Graduate Certificate

The effective administration of higher education institutions has never been as critical as 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 is comprised of 16 quarter hours, which may be applied toward the Master of Education in Higher Education Administration.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

## Required Core Courses

Code	Title	Hours
EDU 6201	The Landscape of Higher Education	4
EDU 6202	Faculty, Curriculum, and Academic Community	4
EDU 6203	Education Law, Policy, and Finance	4

## Elective

Code	Title	Hours
Complete one of the following:		
EDU 6520	Learning and the Brain: Translating Research into Practice	4
EDU 6319	How People Learn	
EDU 6332	Open Learning	
EDU 6330	Digital Media Literacy	
EDU 6558	Issues in Education	

## Program Credit/GPA Requirements

16 total quarter hours required  
Minimum 3.000 GPA required

### Human-Centered Informatics, Graduate Certificate

Human-centered informatics (HCI) focuses on the design, development, and evaluation of IT systems with a particular emphasis on the relations and interactions between people and IT systems. The emphasis of understanding users experience when they interact with technology in the information-rich environment and the design of interfaces between users and systems makes it different from the focus of software engineering programs or visual and artistic design programs.

The human-centered informatics graduate certificate offers students the opportunity to learn the theories of cognitive and social psychology as well as universal principles of design adopted in human-computer interaction. Students develop the technical skills to study user experience in various IT environments (home, business, social media, healthcare, etc.), focusing on user needs, information architecture, and design of user interfaces. Successful students that graduate with the HCI graduate certificate will be able to propose innovative or improve design solutions to real-world problems.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
<b>Required Courses</b>		
ITC 6410	Fundamentals of Human Behaviors for Interactive Systems	3
DGM 6461	Interactive Information Design 1	4
DGM 6168	Usability and Human Interaction	4
DGM 6268	Usable Design for Mobile Digital Media	4
<b>Elective</b>		
Complete one of the following:		
DGM 6463	Interactive Information Design 2	3-4
ALY 6070	Communication and Visualization for Data Analytics	

ITC 6355	Web Application Design and Development
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## Program Credit/GPA Requirements

18 total quarter hours required  
Minimum 3.000 GPA required

### Human Resources Management, Graduate Certificate

In today's multifaceted organizations, human resource professionals must respond to the growing challenges of regulatory compliance, complex benefit plans, and training and motivating employees.

The Graduate Certificate in Human Resources Management seeks to foster a deep understanding of organizational development and effective change management, workforce planning and strategic recruitment, and training and performance management.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

## Required Courses

Code	Title	Hours
HRM 6015	Introduction to Human Resources Management	3
HRM 6025	Workforce Analytics	3

## Electives

Code	Title	Hours
Complete four of the following. Students waived out of HRM 6015, complete five of the following:		
HRM 6005	Creating a High-Performance Organization: Strategic Organizational and HRM Choices	
HRM 6010	Compensation and Benefits	
HRM 6020	Talent Acquisition and Onboarding	
HRM 6030	The Employment Contract	
HRM 6042	Strategic Workforce Planning	
HRM 6047	Managing the Employee Life Cycle	
HRM 6050	Employee Engagement	
HRM 6060	Organizational Design	
HRM 6070	Global Human Resources Management	

## Program Credit/GPA Requirements

18 total quarter hours required  
Minimum 3.000 GPA required

### Information Security Management, Graduate Certificate

Information security is a management issue with global business implications. To succeed in today's network economy requires more than simply a focus on information technology (IT) issues. Succeeding also requires a focus on security strategy and management. IT security governance is an overarching consideration in all risk-assessment and management-related endeavors and is important for information security since many issues have legal, regulatory, policy, and ethical considerations. The associated risks of business today must be clearly understood and managed.

The Graduate Certificate in Information Security Management is designed to provide a conceptual and practical overview of information security management. It begins with an overview of key information security management issues and principles. It presents security governance challenges including the policy, law, regulatory, and ethical accountability frameworks that information security risk managers must work within. The program includes review courses that prepare students for the CISSP and CISA exams.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
ITC 6300	Foundations of Information Security	3
ITC 6305	IT Infrastructure (Systems, Networks, Telecom)	3
ITC 6310	Information Security Governance	3
ITC 6315	Information Security Risk Management	3
ITC 6320	Information Security Technology	3

### Electives

Code	Title	Hours
Complete one of the following:		3-4
ITC 6325	CISA Preparation	
ITC 6330	CISSP Preparation	
ITC 6080	Network Security Concepts	

### Program Credit/GPA Requirements

18–19 total quarter hours required  
Minimum 3.000 GPA required

## Interactive Design, Graduate Certificate

Digital media plays an increasingly significant role in the global culture and economy. The Graduate Certificate in Interactive Design offers an overview of courses in the creative process of storytelling and communicating through visuals and sound. Students have an opportunity to gain expertise in time-based design and interface and experience design through a practice-oriented problem-solving approach.

The courses in this program also serve as a concentration in the Master of Professional Studies in Digital Media.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirement

Code	Title	Hours
<b>Required Courses</b>		
DGM 6501	Web Creation Boot Camp	2
DGM 6521	Web Creation for Content Management Systems	2
DGM 6168 or TCC 6120	Usability and Human Interaction Usability and User Experience	4
DGM 6461	Interactive Information Design 1	4
DGM 6268	Usable Design for Mobile Digital Media	4

### Electives

Complete one of the following:		4
DGM 6217	Typography for Interactivity	
TCC 6490	Usability Testing for Technical Communicators	

### Program Credit/GPA Requirements

20 total quarter hours required  
Minimum 3.000 GPA required

## Interdisciplinary Professional Studies, Graduate Certificate

The contemporary workplace challenges professionals to develop and sustain the ever-changing skill sets and multidisciplinary workplace competencies required for success as innovators, leaders, and change agents. Organizations are similarly challenged in fostering employee professional development to meet the fluctuating demands of a highly technological and global economy. Today's professionals desire state-of-the-art approaches for continuing their education, including shorter, flexible, modularized, and just-in-time academic opportunities. To meet the growing demand for 21st-century learning, custom tailored to individual and organizational needs, Northeastern University's College of Professional Studies created the Interdisciplinary Graduate Certificate in Professional Studies—or iCert for short.

iCert represents a radically different approach to professional and academic learning. This first-of-its-kind certificate is uniquely designed to provide flexible multidisciplinary course options aligned with individual or organizational needs by incorporating three powerful learning components:

1. Intentional planning and reflection: Students identify and reflect on professional strengths, needs, aptitudes, and career interests in their iCert foundations course, resulting in a personalized professional learning plan (PLP).
2. Individualized program design: Students choose courses from multiple program areas, based on their PLP, customized to meet their academic goals.
3. Innovative experiential learning: Students choose from credit or noncredit real-world learning opportunities through Northeastern's online Experiential Network and their final iCert capstone course, connecting classroom learning to their current or future professional aspirations.

iCert graduates are encouraged to:

- Identify, reflect on, and articulate professional goals in order to envision a future self
- Develop a career focus that integrates and builds or enhances knowledge, skills, and attitudes around the following multidisciplinary workplace competencies:
  - Communications
  - Creative problem solving
  - Cultural responsiveness
  - Leadership
  - Lifelong learning
  - Management
  - Systems thinking
  - Technological proficiency
- Translate classroom learning into practice through authentic workplace experiences



- Build a professional practice as individuals, members of organizations, and socially responsible members of the global community
- Continue graduate studies in the following 10 master's degrees:
  - Corporate and organizational communication
  - Education
  - Homeland security
  - Human services
  - Leadership
  - Learning analytics
  - Nonprofit management
  - Project management
  - Sports leadership
  - Technical communication

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
EDU 6184	Interdisciplinary Foundations	2
EDU 6980	Interdisciplinary Capstone	2

Choose a minimum of 12 quarter hours from the following:

#### CORPORATE AND ORGANIZATIONAL COMMUNICATION

Code	Title	Hours
CMN 6080	Intercultural Communication	3
CMN 6020	Ethical Issues in Organizational Communication	3
CMN 6015	Introduction to the Digital Era: The Power of Social Media	3
CMN 6110	Group Dynamics and Interpersonal Conflict: Meeting Management	3
CMN 6060	Negotiation, Mediation, and Facilitation	3
CMN 6025	Digital Era Skills: Platforms, Tools, and Techniques	3

#### EDUCATION

Code	Title	Hours
EDU 6319	How People Learn	4
EDU 6323	Technology as a Medium for Learning	4
EDU 6051	Culture, Equity, Power, and Influence	4
EDU 6333	Social Media and Beyond	4
EDU 6450	The Globalization of Education	4

#### LEARNING ANALYTICS

Code	Title	Hours
EDU 6340	Learning Analytics Concepts and Theories	4
EDU 6341	Introduction to Data Mining in Education	4
EDU 6343	Predictive Modeling for Learning Analytics	4
EDU 6182	Educational Statistics	4

#### HOMELAND SECURITY

Code	Title	Hours
HLS 6000	Introduction to Homeland Security	3

#### HUMAN SERVICES

Code	Title	Hours
HSV 6100	Theory and Practice of Human Services	3
HSV 6110	Human Services Management and Development	3
HSV 6120	Social Inequality, Social Change, and Community Building	3

#### LEADERSHIP

Code	Title	Hours
LDR 6100	Developing Your Leadership Capability	3
LDR 6110	Leading Teams	3
LDR 6120	Developing Organizational Leadership	3

#### NONPROFIT MANAGEMENT

Code	Title	Hours
NPM 6110	Legal and Governance Issues in Nonprofit Organizations	3
NPM 6120	Financial Management for Nonprofit Organizations	3
NPM 6150	Human Resources Management in Nonprofit Organizations	3

#### PROJECT MANAGEMENT

Code	Title	Hours
PJM 5900	Foundations of Project Management	4
PJM 6000	Project Management Practices	3
PJM 6205	Leading and Managing Technical Projects	3
PJM 6210	Communication Skills for Project Managers	3
PJM 6215	Leading Remote Project Teams	3

#### SPORTS LEADERSHIP

Code	Title	Hours
LDR 6400	Sports Management	3

#### TECHNICAL COMMUNICATION

Code	Title	Hours
TCC 6100	Introduction to Technical and Professional Writing	4
TCC 6450	Managing Technical Publications	4
TCC 6430	Writing for the Computer Industry	4

### Program Credit/GPA Requirements

16 total quarter hours required  
Minimum 3.000 GPA required

### International Biopharmaceutical Regulatory Affairs, Graduate Certificate

To work in today's global biopharmaceutical industry, there is a strong need to understand international regulations that impact the development, marketing, and manufacturing of pharmaceutical and biotechnology products.

The Graduate Certificate in Biopharmaceutical International Regulatory Affairs curriculum focuses on factors that facilitate the safety, performance, and efficacy of biomedical goods. Program training covers the assessment of international regulations and interpretation of their likely impact on a company's global commercialization strategies. Through participation in the program, students will have an opportunity to gain an understanding of international regulatory requirements necessary to implement such strategies.

Course work covers biotechnology and pharmaceutical product approval processes, regulatory analysis, and liability laws as they exist across different regulatory systems. The graduate certificate will provide core regulatory knowledge to students entering into the field from bench research, clinical studies, quality control/assurance, pharmacy, bioengineering, business, and legal analysis. The curriculum covers regulatory environments in Europe, Latin America, Australia, Japan, and other emerging economies. Courses from this certificate may be applied toward the Master of Science in Regulatory Affairs for Drugs, Biologics, and Medical Devices.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Required Courses

Code	Title	Hours
RGA 6221	European Union Compliance Process and Regulatory Affairs	4
RGA 6241	Working in Multicultural Environments: Challenges and Opportunities	2
Complete a minimum of 10 quarter hours		10
RGA 6204	Legal Issues in International Food, Drug, and Medical Device Regulation	
RGA 6207	Global Impact of Electronic Common Technical Document (eCTD) Submissions	
RGA 6210	Strategic Planning and Project Management for Regulatory Affairs	
RGA 6212	Introduction to Safety Sciences	
RGA 6223	Introduction to Australian, Asian, and Latin American Regulatory Affairs	
RGA 6224	Regulation of Biomedical Product Commercialization by Health Canada	
RGA 6229	Biomedical Product Regulatory Affairs in Emerging Markets: Russia and Kazakhstan	
RGA 6244	Therapeutic Product Development in Canada	
RGA 6245	Regulation of Generic Pharmaceutical and Biosimilar Products	
RGA 6249	Chinese Food and Drug Administration Regulation of Biomedical Product Commercialization	
RGA 6255	Global Convergence of Regulatory Science and Reimbursement/Market Access	

### Program Credit/GPA Requirements

16 total quarter hours required  
Minimum 3.000 GPA required

### Leadership, Graduate Certificate

Today's cross-functional teams and organizations require a leadership style that capitalizes on the collective expertise and capabilities of the group. The development and mastery of collaborative leadership skills are not typically part of one's focused discipline preparation; hence, leadership requires deliberate development by those who assume leadership roles.

The Graduate Certificate in Leadership starts with the premise that everyone is capable of leadership. The program studies every aspect of leadership dynamics from the leader as an individual to working in teams and from the organization itself to the development of strategic leadership techniques. Course work exposes participants to a series of alternative perspectives of leadership, including collaborative models. Using the course's action-learning methods, participants build a personal model of leadership that they can put to immediate use in their workplace.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Required Courses

Code	Title	Hours
LDR 6100	Developing Your Leadership Capability	3
LDR 6110	Leading Teams	3
LDR 6120	Developing Organizational Leadership	3
LDR 6140	Strategy Development and Implementation	3

#### Leadership Electives

Code	Title	Hours
Complete two of the following:		6
LDR 6135	Ethical Leadership	
HRM 6005	Creating a High-Performance Organization: Strategic Organizational and HRM Choices	
LDR 6150	Innovation and Organizational Transformation	
CMN 6010	Strategic Communication Management	

### Program Credit/GPA Requirements

18 total quarter hours required  
Minimum 3.000 GPA required

### Leading and Managing Technical Projects, Graduate Certificate

Whether you're an established project manager, or you're working in a technical field and aspire to be one, Northeastern's Graduate Certificate in Leading and Managing Technical Projects seeks to give you the foundational skills and practical knowledge you need to be successful.

Through courses you take online, our technical project management curriculum will give you the opportunity to:

- Develop the leadership and management skills to lead technical projects
- Learn how to communicate technical content to a nontechnical audience

- Gain practice leading remote teams, including global teams
- Plan and schedule projects using the most current and relevant methodologies
- Develop a personal leadership approach to motivate and inspire others

And should you choose, you can apply the credits you earn toward your certificate directly to our master's in project management (p. 343), master's in leadership (p. 339), or master's in informatics (p. 330).

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
PJM 6000	Project Management Practices	3
PJM 6205	Leading and Managing Technical Projects	3
PJM 6210	Communication Skills for Project Managers	3
PJM 6215	Leading Remote Project Teams	3
PJM 6825	Agile Lean Product Development	3
PJM 6810	Principles of Agile Project Management	3

### Program Credit/GPA Requirements

18 total quarter hours required  
Minimum 3.000 GPA required

### Learning Analytics, Graduate Certificate

Educators today are "swimming" in data about curricula, student assessment, social media, registrations, and demographics stored in data warehouses and "the cloud." This data makes it possible to collect, manage, and maintain massive amounts of educational information. The need to analyze and make data-based decisions in education has led to the emergence of a new field called learning analytics.

Through a set of focused courses, our curriculum will give you the opportunity to:

- Articulate and integrate diverse perspectives in the field of learning analytics, including learning analytics assumptions, theories, epistemologies, and debates
- Align learning analytics processes to address the needs of educational institutions and answer questions posed by educational leaders
- Select, prepare, implement, interpret, and evaluate learning analytic models appropriately

And should you choose, you can apply the credits you earn toward your certificate directly to our Master of Education concentration in learning analytics

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

## Required Courses

Code	Title	Hours
EDU 6340	Learning Analytics Concepts and Theories	4
EDU 6341	Introduction to Data Mining in Education	4
EDU 6182	Educational Statistics	4
EDU 6343	Predictive Modeling for Learning Analytics	4

### Program Credit/GPA Requirements

16 total quarter hours required  
Minimum 3.000 GPA required

### Medical Devices Regulatory Affairs, Graduate Certificate

The national and regional medical device industries have continued to experience significant market growth, despite the fluctuations in the overall global economy. There are more than 7,000 medical device companies in the United States alone, and nearly 1,000 of these are based in Massachusetts. In total, the medical device sector in Massachusetts employs 36,000 workers, has a payroll of over \$1.8 billion, and annual product shipments of \$7.3 billion.

The Graduate Certificate in Medical 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.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirement

Code	Title	Hours
<b>Required Courses</b>		
RGA 6001	Introduction to Food and Drug Administration Medical Device Regulation	2
RGA 6202	Medical Device Development: A Regulatory Overview	4

### Electives

Complete the appropriate number of electives to obtain minimum quarter hours required for the program:		10-12
RGA 6002	Regulatory Compliance Culture	

RGA 6112	Biomedical Intellectual Property Management Strategy: Patents and Trade Secrets
RGA 6205	Emerging Trends and Issues in the Medical Device Industry
BTC 6210	Human Experimentation: Methodological Issues Fundamentals
RGA 6222	European Medical Device Regulations
RGA 6225	Japanese Medical Device Regulations and Registration
RGA 6226	Canadian and Australian Medical Device Regulations
RGA 6227	Emerging Medical Device Markets
RGA 6233	Application of Quality System Regulation in Medical Device Design and Manufacturing
RGA 6242	Preparing EU Medical Device Clinical Evaluations
RGA 6243	Medical Device Product Development in Canada
BTC 6260	The Business of Medicine and Biotechnology
RGA 6370	Advanced Regulatory Writing: Medical Device Submissions
RGA 6420	Global IVD Regulations and Submissions

### Program Credit/GPA Requirements

16 total quarter hours required

Minimum 3.000 GPA required

### Nonclinical Biomedical Product Regulation, Graduate Certificate

The professional practice of nonclinical regulatory affairs involves understanding, developing, and applying global compliance standards to the biomedical product commercialization process in several cross-functional areas that are separate and distinct from direct clinical patient care. This includes, but is not limited to, design and preclinical development processes, including *in vitro* and *in vivo* animal testing, *in silico* testing, small-scale/large-scale manufacturing process development and validation, development and maintenance of supply chains, as well as product handling and distribution. The Graduate Certificate in Nonclinical Biomedical Product Regulation introduces students to the practice of understanding, developing, and effectively applying global nonclinical compliance standards to new healthcare technologies. Students in the certificate program have the opportunity to:

- Differentiate between the nonclinical vs. clinical aspects of the global biomedical product commercialization process from a regulatory compliance perspective
- Explain the compliance-associated requirements needed to successfully practice professional nonclinical work within the global biomedical products industry
- Describe the nonclinical regulatory standards utilized by the United States Food and Drug Administration (FDA) and other global regulatory agencies to evaluate the safety and efficacy of new and existing biomedical products employed by healthcare practitioners in various patient settings

- Apply fundamental global nonclinical regulations to the biomedical product commercialization process, including therapy design, manufacturing process development and validation, cybersecurity, and supply chain risk management

Students that successfully complete this certificate may apply their courses toward the Master of Science in Regulatory Affairs for Drugs, Biologics, and Medical Devices.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
RGA 6405	Nonclinical Regulations in Biomedical Product Commercialization	4
RGA 6410	Fundamentals of CMC Regulations and Methods	4

### Electives

Code	Title	Hours
Complete a minimum of 8 quarter hours from the following:		8
RGA 6000	Introduction to Food and Drug Administration (FDA) Pharmaceutical Regulation	
RGA 6001	Introduction to Food and Drug Administration Medical Device Regulation	
RGA 6112	Biomedical Intellectual Property Management Strategy: Patents and Trade Secrets	
RGA 6210	Strategic Planning and Project Management for Regulatory Affairs	
RGA 6233	Application of Quality System Regulation in Medical Device Design and Manufacturing	
RGA 6234	Drug and Device Supplier Risk Management: Compliance and Processes	
RGA 6248	Global Regulatory Operations	
RGA 6310	Regulatory Documentation Processes	
RGA 6420	Global IVD Regulations and Submissions	
RGA 6460	Intellectual Property in the Life Sciences	
RGA 6463	Regulatory Strategy for Product Development and Life-Cycle Management	

### Program Credit/GPA Requirements

16 total quarter hours required

Minimum 3.000 GPA required

### Nonprofit Management, Graduate Certificate

Nonprofits today simply require a higher level of management expertise. Nonprofit managers are required to manage people and programs more efficiently and effectively. The Graduate Certificate in Nonprofit Management focuses on developing skills in organizational management,

financial management, fund-raising, grant and report writing, human resources management, and governance.

The program integrates theoretical approaches with practical application to prepare students for positions in either small or large nonprofit organizations. The program targets individuals who work in the nonprofit sector as executive directors, managers, program staff, board members, and volunteers. Students have an opportunity to participate in case studies, individual and group projects, and class discussions.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Required Courses

Code	Title	Hours
NPM 6110	Legal and Governance Issues in Nonprofit Organizations	3
NPM 6120	Financial Management for Nonprofit Organizations	3
NPM 6125	Promoting Nonprofit Organizations	3
NPM 6130	Fundraising and Development for Nonprofit Organizations	3
NPM 6140	Grant and Report Writing	3
NPM 6150	Human Resources Management in Nonprofit Organizations	3

### Program Credit/GPA Requirements

18 total quarter hours required  
Minimum 3.000 GPA required

#### Organizational Communication, Graduate Certificate

The study of organizational communication focuses on the dynamics of communication in complex organizations for the purpose of learning how individuals within such organizations can become effective communicators. Whether the context of such communication is meetings or professional presentations, communicating during a crisis, or intercultural exchanges, the message is consistent: Effective communication is a crucial factor in determining organizational success.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Required Courses

Code	Title	Hours
CMN 6010	Strategic Communication Management	3
CMN 6020	Ethical Issues in Organizational Communication	3
CMN 6910	Organizational Communication Assessment	3

#### Electives

Code	Title	Hours
Complete two of the following:		6
CMN 6061	Personal Branding	
CMN 6050	Crisis Communication	
CMN 6060	Negotiation, Mediation, and Facilitation	
Complete one of the following:		3

CMN 6080	Intercultural Communication
CMN 6090	Organizational Culture, Climate, and Communication
CMN 6100	Communication Networks and Managing Information
CMN 6110	Group Dynamics and Interpersonal Conflict: Meeting Management
CMN 6015	Introduction to the Digital Era: The Power of Social Media

### Program Credit/GPA Requirements

18 total quarter hours required  
Minimum 3.000 GPA required

#### Port Security, Graduate Certificate

The Graduate Certificate in Port Security examines U.S. and international policy, laws, and regulations for maritime and aviation security in light of current security challenges, terrorism and transnational criminal threats, and the potential U.S. and global impact of maritime and aviation security failures. Emergency response and recovery mechanisms and implementation as well as organizations and associations critical to modern U.S. maritime and aviation port security infrastructure protection will be evaluated and exercised.

The certificate offers leaders an opportunity to evaluate maritime and aviation security risks, threats, and measures to mitigate within applicable U.S. and international policy, assess and implement response and planning mechanisms for maritime transportation system security and aviation and airport security requirements, and conduct real-world actionable planning and strategy development for maritime and aviation security response and crisis management, among other essential skills for senior leaders.

This certificate is ideal for homeland security professionals and industry leaders responsible for maritime and aviation port security, incident management and response, and the planning and execution of maritime and aviation operations within today's security challenges.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Required Courses

Code	Title	Hours
HLS 6100	Maritime Port Security 1	4
HLS 6110	Maritime Port Security 2	4
HLS 6120	Aviation Security 1	4
HLS 6130	Aviation Security 2	4
HLS 6140	Port Security Capstone	4

### Program Credit/GPA Requirements

20 total quarter hours required  
Minimum 3.000 GPA required

#### Professional Sports Administration, Graduate Certificate

The revenue of the global professional sports industry has grown to \$145 billion and also projects an increase in jobs by up to 13 percent by 2020 (PwC, 2015).

The Graduate Certificate in Professional Sports Administration is designed to give students an in-depth understanding of this professional segment of the sports industry. Through the program's curriculum, students will be given the opportunity to acquire professional leadership skills and knowledge in a variety of topical areas including sports management, marketing, sponsorship, event management, risk management, and finance.

Upon completion, all credits earned in the professional sports administration certificate can also be applied directly into the Master of Sports Leadership (p. 357) program.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
LDR 6323	Event Management	3
LDR 6400	Sports Management	3
LDR 6435	Fiscal Practices in Sports	3
LDR 6440	Sports Marketing and Promotions	3
LDR 6445	Corporate Sponsorships	3
LDR 6460	Risk Management in Athletics	3

### Program Credit/GPA Requirements

18 total quarter hours required  
Minimum 3.000 GPA required

### Program and Portfolio Management, Graduate Certificate

The increasingly important role of program and portfolio managers is clear, as we see more companies orienting their work in a projectized fashion. Not only are companies seeking to projectize their workflow, but they are seeking to better align projects with the strategic direction of the company and industry. Program and portfolio managers need to be able to evidence the strategic value that projects are accomplishing and can continue to accomplish in their organizational context.

The need for organizations to coordinate their related projects into programs and to seek to understand the value of their work through the lens of a portfolio is recognized throughout all industry sectors. This has been made clear through the creation of advanced industry certifications, such as the Program Management Professional (PgMP<sup>®</sup>) and the Portfolio Management Professional (PfMP<sup>®</sup>) credential by the Project Management Institute.

Northeastern University's Graduate Certificate in Program and Portfolio Management is designed to prepare individuals with the knowledge, skills, and tools needed to effectively manage project-based programs and portfolios.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
PJM 6710	Introduction to Program and Portfolio Management	3
PJM 6715	Advanced Program Management	3
PJM 6720	Advanced Portfolio Management	3

PJM 6725	Program and Portfolio Leadership	3
PJM 6730	Program and Portfolio Evaluation	3
PJM 6735	Program and Portfolio Management Capstone	3

### Program Credit/GPA Requirements

18 total quarter hours required  
Minimum 3.000 GPA required

### Project Business Analysis, Graduate Certificate

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
PJM 6000	Project Management Practices	3
PJM 6610	Foundations of Project Business Analysis	3
PJM 6620	Project Business Analysis: Needs Assessment	3
PJM 6630	Project Business Analysis: Requirements Planning and Analysis	3
PJM 6640	Leadership Strategies for the Business Analyst	3
ALY 6000	Introduction to Analytics	3

### Program Credit/GPA Requirements

18 total quarter hours required  
Minimum 3.000 GPA required

### Project Management, Graduate Certificate

Technical and managerial employees at all levels of organizations are being asked to manage small and large projects. Many of these professionals have not been specifically trained to effectively and efficiently manage projects. The task of managing projects has its own body of knowledge. This program seeks to provide the practical and theoretical knowledge for which the Project Management Institute tests, and it is expected that individuals who successfully complete this program will be capable of fulfilling the education requirements of the Project Management Professional (PMP) certification exam.

This certificate program in project management is designed with sufficient course flexibility to accommodate professionals with various levels of project management experience. Project management principles are applicable to both manufacturing and service industries, including professionals in fields such as software engineering, construction management, and financial services.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Note: Foundations of Project Management (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:

Code	Title	Hours
PJM 5900	Foundations of Project Management	4
PJM 6000	Project Management Practices	3
PJM 6005	Project Scope Management	3
PJM 6025	Project Scheduling and Cost Planning	3
PJM 6015	Project Risk Management	3

### Project Management Electives

Code	Title	Hours
Complete two of the following. Note: Students who take PJM 5900 are required to take only one course in this section:		6
PJM 6125	Project Evaluation and Assessment	
PJM 6135	Project Quality Management	
PJM 6140	Managing Troubled Projects	
PJM 6210	Communication Skills for Project Managers	
PJM 6710	Introduction to Program and Portfolio Management	
PJM 6810	Principles of Agile Project Management	

### Program Credit/GPA Requirements

18 total quarter hours required  
Minimum 3.000 GPA required

#### Public and Media Relations, Graduate Certificate

There is growing demand for communication professionals with digital media skills and a strategic perspective on brand and reputation management. According to the Bureau of Labor Statistics, employment of public relations specialists and managers will grow by 12 percent and 13 percent, respectively. The Graduate Certificate in Public and Media Relations is designed to prepare communication professionals who focus on external stakeholders for the challenges of a rapidly changing industry. This program focuses on developing strategic communication plans, crafting compelling messages, and performing audience research, while preparing students with the latest skills in digital platforms, tools, and techniques.

The goal of this program is to equip graduates with the knowledge and skills to:

- Design and produce public and media relations campaigns using written materials, social media, audio, video, and web-based tools
- Identify and anticipate audience behavior and expectations using primary and secondary research methods
- Strategically design, implement, and evaluate campaigns that support organizational performance

The courses in this program also serve as a concentration in the Master of Science in Corporate and Organizational Communication (p. 333).

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
PBR 6100	Introduction to Public Relations	3
PBR 6135	Public Relations Strategy and Planning	3
PBR 6710	Public Relations Research: Understanding External Audiences	3

### Elective Courses

Code	Title	Hours
Complete three of the following:		9-10
PBR 6125	Community Relations and Corporate Social Responsibility	
PBR 6130	Public Relations Content Development	
PBR 6140	Advanced Public Relations Content Development	
CMN 6025	Digital Era Skills: Platforms, Tools, and Techniques	
CMN 6035	Legal, Policy, and Ethical Issues in the Digital Era	
CMN 6045	Leveraging Digital Technologies: Strategy, Assessment, and Governance	
CMN 6050	Crisis Communication	
DGM 6290	Social Media and Brand Strategy Implementation	

### Program Credit/GPA Requirements

18–19 total quarter hours required  
Minimum 3.000 GPA required

#### Quality Assurance in Biomedical Product Regulation, Graduate Certificate

Global regulatory requirements and compliance standards for development, marketing approval, and clinical utilization of new biomedical products continue to evolve rapidly in today's dynamic healthcare environment. The professional practice of quality assurance involves ensuring compliance to appropriate industry-specific regulatory standards throughout a biomedical product's life cycle. Completion of the Graduate Certificate in Quality Assurance in Biomedical Products Regulation provides students the opportunity to:

- Describe the general standards utilized by the U.S. Food and Drug Administration (FDA) and other global regulatory agencies to evaluate the safety and efficacy of existing and new biomedical products utilized by healthcare practitioners in the U.S. market
- Demonstrate proficiency in the application of compliance-associated regulations and standards for global biomedical products *throughout their life cycle*
- Differentiate between the distinct stages of the global biomedical product commercialization process from regulatory and standards-based compliance perspectives
- Detail the fundamental regulatory compliance and standards-based processes under which biomedical products must be manufactured in order to maintain the level of safety and efficacy upon which they were approved for marketing by FDA and other global regulatory agencies

Students that successfully complete this certificate may apply their courses toward the Master of Science in Regulatory Affairs for Drugs, Biologics, and Medical Devices.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
RGA 6000	Introduction to Food and Drug Administration (FDA) Pharmaceutical Regulation	2
RGA 6001	Introduction to Food and Drug Administration Medical Device Regulation	2
RGA 6002	Regulatory Compliance Culture	2
RGA 6275	Product Development and Process Validation	2

### Electives

Complete a minimum of 8 quarter hours from the following:		8
BTC 6210	Human Experimentation: Methodological Issues Fundamentals	
BTC 6211	Validation and Auditing of Clinical Trial Information	
RGA 6233	Application of Quality System Regulation in Medical Device Design and Manufacturing	
RGA 6234	Drug and Device Supplier Risk Management: Compliance and Processes	
RGA 6462	Regulatory Compliance in the Pharmaceutical Industry: A Collaborative Approach	

## Program Credit/GPA Requirements

16 total quarter hours required  
Minimum 3.000 GPA required

### Remote Sensing, Graduate Certificate

Remote sensing is the measurement of information by a recording device that is not in physical contact with the object being measured. In practice, remote sensing is the utilization at a distance (as from aircraft, space shuttle, spacecraft, satellite, or ship) of any device for gathering information about the environment. The term remote sensing is most often applied to terrestrial and weather observations but can be applied to planetary environments and astronomy. Remote sensing is applicable to many other situations, including land-use change, pollution tracking, land-use and planning, transportation systems, and military observation.

The online Graduate Certificate in Remote Sensing aims to make education and training in remote sensing available to adult and professional students. The remote sensing certificate program seeks to produce students who are well versed in remote sensing theory, who have hands-on exposure to remote sensing software and hardware, and who have learned how to extract pertinent data from remotely sensed data sets. This six-course certificate program seeks to provide students with the necessary skills and understanding to apply remote sensing knowledge competently and effectively in a variety of areas.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Courses

Code	Title	Hours
RMS 5105	Fundamentals of Remote Sensing	3
RMS 6110	Introduction to Machine Learning for Image Data	3

### Remote Sensing Electives

Code	Title	Hours
Complete four of the following:		12
GIS 6330	Building Geospatial Systems at Scale	
GIS 6345	Geospatial Programming	
ITC 6480	Amazon Web Service (AWS) Cloud Architecting	
RMS 6240	Introduction to Radar and LiDAR Remote Sensing	
RMS 6280	Automated Feature Extraction for the Geospatial Professional	
RMS 6290	Spectroscopic Image Analysis	
RMS 6293	Allied Technologies in Remote Sensing	
RMS 6983	Topics	

## Program Credit/GPA Requirements

18 total quarter hours required  
Minimum 3.000 GPA required

### Respiratory Specialty Practice, Graduate Certificate

The goal and planned outcome of the respiratory specialty practice certificate program is to meet the need for registered respiratory therapists (RRTs) to document their competency in one of four respiratory care specialist practice areas:

1. Adult critical care
2. Neonatal and pediatric intensive care
3. Asthma and COPD education/wellness coordination
4. Pulmonary function testing

The goal and expected outcome is to help students working in these areas to reach a competency level where they can become board-certified specialists in one or more of the four specialty areas.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
RPT 7400	Pulmonary Diseases and Disorders	4
RPT 7401	Cardiopulmonary Assessment and Diagnostics	4

### Electives

Code	Title	Hours
Complete two of the following:		8
RPT 7402	Adult Critical Care	



RPT 7403	Neonatal and Pediatric Care
RPT 7405	Development of Patient Management Plans

### Program Credit/GPA Requirements

16 total quarter hours required  
 Minimum 3.000 GPA required

#### Social Media and Online Communities, Graduate Certificate

Social media management and strategy development have become core skills required for communication professionals. According to WANTED Analytics, 1.6 million working professionals utilize social media skills in jobs at the manager and executive level. The Graduate Certificate in Social Media and Online Communities focuses on strategic framework and the role digital media has in supporting organizational performance. The program integrates theory and practice, including experimenting with various tools and platforms and reflecting on lessons learned from active management and experimentation.

Students completing the program will have the opportunity to obtain the knowledge and skills to:

- Take a strategic approach to the design and implementation of social media channels and online communities
- Learn how to define metrics for measuring success, develop training, and evaluate the performance of social media activities
- Manage organizational risks and learn best practices in the creation of social media policies and guidelines

Courses within the social media and online communities certificate program also serve as a concentration through the Master's in Corporate and Organizational Communication program (p. 333).

### Program Requirements Required Courses

Code	Title	Hours
<b>Required Courses</b>		
CMN 6015	Introduction to the Digital Era: The Power of Social Media <sup>1</sup>	3
CMN 6025	Digital Era Skills: Platforms, Tools, and Techniques	3
CMN 6035	Legal, Policy, and Ethical Issues in the Digital Era	3
CMN 6045	Leveraging Digital Technologies: Strategy, Assessment, and Governance	3
CMN 6065	Implementation and Management of Social Media Channels and Online Communities	3
<b>Electives</b>		
Complete one to two of the following: <sup>1</sup>		3-8
DGM 6285	Interactive Marketing Fundamentals	
DGM 6290	Social Media and Brand Strategy Implementation	
TCC 6710	Content Strategy	
CMN 6040	Consumer Behaviors in the Online Environment	

### Program Credit/GPA Requirements

19–21 total quarter hours required

Minimum 3.000 GPA required

<sup>1</sup> Students may qualify to waive CMN 6015 if they have social media experience. Please consult with your academic advisor.

#### Teaching English To Speakers Of Other Languages, Graduate Certificate

The Graduate Certificate in Teaching English to Speakers of Other Languages (TESOL) is designed to provide students with a solid foundation in the structure and use of English language. The certificate offers teaching strategies, firmly grounded in research, theory, and practice, to instruct ESL/EFL (English as a Second Language/ English as a Foreign Language) to adults in the United States or internationally. Students have an opportunity to develop learning e-portfolios as part of their course work.

Topics covered by the program include best practices in TESOL methodology through a combination of lecture, small group work, reflection, classroom observation, and a practicum that provides hands-on experience designing lessons, materials, and assessments. Whether students want to teach English abroad, work with immigrant adult populations in the United States, or teach English at the university level, this graduate certificate will provide them with an opportunity to gain a combination of theoretical and practical training to teach English to speakers of other languages in international contexts, community colleges, and within organizations devoted to adult English-language learners.

*This certificate does not lead to Massachusetts licensure.*

#### SPECIAL REQUIREMENTS:

- The TESOL certificate program may be completed in two quarters and is offered 100 percent online.
- Students have the option to complete the practicum component online or on-ground.
- The program has two start terms: fall quarter and spring quarter.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Required Courses

Code	Title	Hours
EDU 6300	Introduction to Language and Linguistics	4
EDU 6534	Bilingualism, Second Language, and Literacy Development	4
EDU 6558	Issues in Education	1-4
EDU 6302	Teaching, Learning, and Assessment: How English Is Learned and Used	4
EDU 6312	TESOL Practicum and Seminar	5

### Program Credit/GPA Requirements

18 total quarter hours required  
 Minimum 3.000 GPA required

#### Usability, Graduate Certificate

The Graduate Certificate in Usability is a practical, in-demand, career-focused graduate certificate. The certificate stresses both a broad, theory-based introduction to the field, as well as the ability to choose

from focused electives, with an emphasis on practical assignments. This certificate highlights the key skills and tools used by usability generalists, working in a broad variety of fields.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
TCC 6120	Usability and User Experience	4
or DGM 6168	Usability and Human Interaction	
TCC 6110	Information Architecture	4

### Electives

Complete 16 quarter hours.

Code	Title	Hours
DGM 6268	Usable Design for Mobile Digital Media	
DGM 6525	Research Methods for Global User Experiences	
TCC 6420	Information Design for the Web	
TCC 6470	Web Accessibility for Technical Communicators	
TCC 6490	Usability Testing for Technical Communicators	
TCC 6610	Prototyping	
TCC 6620	Collecting User Data	
TCC 6710	Content Strategy	

### Program Credit/GPA Requirements

24 total semester hours required

Minimum 3.000 GPA required

## College of Science

Website (<http://www.northeastern.edu/cos/graduate/>)

**Michael Pollastri, PhD**, Interim Dean

**Brent Nelson, PhD**, Associate Dean, Undergraduate Affairs

**Mark R. Patterson, PhD**, Associate Dean, Research and Graduate Affairs

**Frederick C. Davis, PhD**, Associate Dean, Faculty Affairs, Diversity and Inclusion

**Chris Kelly**, 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.

### Academic Policies and Procedures

- Academic Appeals Procedures (p. 379)
- Grading Policies (p. 381)
- Cooperative Education Policies (p. 381)
- Course Registration (p. 382)
- Transfer Credit (p. 382)
- Awards (p. 382)
- Satisfactory Progress (p. 382)
- Time Limitation (p. 382)
- Changes in Requirements (p. 383)
- The Doctor of Philosophy Degree (PhD) (p. 383)
- The Master's Degree Academic Requirements (p. 383)

### Academic Appeals Policies

Northeastern University affirms that it is essential to provide an appeals mechanism to students who believe that they have been erroneously, capriciously, or otherwise unfairly treated. Information about the University appeals process and procedures can be found in the Graduate

Catalog. (<http://catalog.northeastern.edu/graduate/academic-policies-procedures/appeals/>)

If a student feels that they have been the victim of harassment or of discrimination prohibited by law or by university policy, and that this constitutes a substantive basis for the appeal, they should consult with the Office for University Equity and Compliance (<https://www.northeastern.edu/ouec/about/>) as soon as they become aware of alleged prohibited harassment or discrimination, and they are not required to wait until a term grade or determination is received before seeking advice or redress. If the Office for University Equity and Compliance (<https://www.northeastern.edu/ouec/about/>) is advised of such alleged prohibited conduct as part of an academic appeal, the appeal shall first be pursued and investigated through the Office for University Equity and Compliance (<https://www.northeastern.edu/ouec/about/>). Following a resolution of the harassment/discrimination issues, any remaining academic issues will be addressed, at the request of the student, according to the academic appeals procedures.

Before invoking the appeals procedures, students are encouraged to speak informally to their instructors or academic advisors about any determination or grade about which they have questions. If students choose to pursue an appeal, the College of Science process is described in the appeals section that follows. The Graduate Curriculum Committee, which is comprised of program and department Directors, serves as the Academic Appeals Committee for the College of Science.

### Grade Appeals

If a graduate student wishes to dispute a grade in a course taught by a member of the College of Science faculty, the first step is for the student to discuss their concerns with the faculty member who taught the course to see if it is possible to reach agreement on the issue(s). If the student is not able to resolve his/her issues with the faculty member who taught the course, the student should work with the Department/Program Director to attempt a department-level resolution.

If these informal attempts to resolve the issue fail, the student can enter the formal procedure at the college level.

The student should meet with the Associate Dean for Research and Graduate Affairs who will attempt to resolve the issue by working with the instructor and the Department/Program. Contact Melissa Rubock, Associate Director for Graduate Administration, to schedule the meeting [m.rubock@northeastern.edu](mailto:m.rubock@northeastern.edu). If it is not possible for the Associate Dean to resolve the issue with the Department/Program, the Associate Dean will determine whether or not there is just cause to convene the Graduate Curriculum Committee.

The decision to convene the Graduate Curriculum Committee will be based upon the following:

- The student sincerely attempted to resolve the complaint with the professor and the Department/Program.
- The complaint is substantive in nature (adjudication could affect student's course grade and/or academic record).
- The complaint has been brought forward in a timely manner.
  - The Statement must be submitted no later than 28 calendar days from the day when the academic determination is made available to the student.

- If a student wishes to dispute a grade in his or her final term, this must be done within 28 calendar days of degree conferral date.

If the Associate Dean determines the appeal should be brought to the Graduate Curriculum Committee, the student must provide a formal written complaint to the Associate Dean within one week of the student's meeting with the Associate Dean

- The written complaint should provide a detailed timeline as well as all available evidence supporting the student's complaint
  - It is the student's responsibility to make their case. Students may submit any evidence such as emails, quizzes, examinations, etc.
- Once the Associate Dean receives a formal written complaint, the Associate Dean will provide a copy of the complaint to the faculty member and to the Department/Program Director, and convene a meeting of the Graduate Curriculum Committee
- If the student fails to provide a thoughtful and well-reasoned written summary of the case, then the matter will be considered closed at the college-level
- The Associate Dean will make a good faith effort to identify a date and time for the meeting within thirty five calendar days of the student's original submission of his or her statement.

### GRADUATE CURRICULUM COMMITTEE

- The Graduate Curriculum Committee serves as the Academic Appeals Committee for the College of Science.
- The Graduate Curriculum Committee is convened in order to determine whether a fair and due process was used to determine the student's grade.
- The role of the committee is to conduct a review when a grade appeal is filed by a student for one of the following reasons, concern that:
  - The course grading policy was not applied consistently to all students within a class and/or section.
  - The instructor's method of assigning grades differed from the method outlined in the instructor's course syllabus.
  - The instructor failed to provide a clear policy on how grades would be assigned.

### APPEALS MEETING

The student and the faculty member have the right to attend and present their case orally to the committee. The faculty member and the student aren't required to attend; however, it is usually quite helpful to make an oral presentation and answer any questions that the committee may have. If the complainant indicates that they will present their case in person and then fails to attend the scheduled hearing, the case will be dismissed. The complainant and the faculty member both have the right to testify privately and separately before the committee. Lawyers are not permitted in these proceedings. Generally, the faculty member and complainant are each given a 15-minute period to present their case.

The student usually presents their complaint to the committee first. This is followed by a brief Q&A of the student by the committee. The committee may ask the complainant any questions they have based upon either the written statement submitted by the complainant or the complainant's oral presentation. The faculty member then presents his/her case, which is followed by a brief Q&A of the faculty member. After both the complainant and faculty member have addressed the committee, the committee then reviews the evidence, summarizes the case, and makes a recommendation to the Associate Dean concerning the resolution of the complaint.

If the committee believes it cannot resolve any issues without additional information, the committee may request any information needed from either the complainant, faculty member, or Department/Program. This

information must be provided to the committee within one week of the meeting. If the requested information is not provided in the required time frame then the committee may weigh this failure in making its final determination regarding the original complaint.

### COMMITTEE PROCESS

- All decisions of the committee will be made based on a simple majority (51%) vote.
- The Associate Dean is Chair of the committee, and only votes when there is a tie.
- The student bringing the complaint to the committee carries the burden of proof based on the weight of the evidence in demonstrating that the grade is incorrect or unjustified.
- If the committee decides that the grading process was unfair, the committee can request that the instructor changes the student's grade.
  - If an acceptable agreement involves a change of grade, the instructor is responsible for submitting a change of grade to the Registrar in a timely manner following notification of the committee's decision.
- The student shall be notified within 3 business days of a decision being reached.

If the student or the faculty member is not satisfied with the committee's disposition of the matter, or if the grade appeal is not resolved within 35 calendar days after the written statement is submitted to the College, he or she may further pursue the matter by requesting in writing that the University convene an academic appeals resolution committee to review the issue. This must be submitted within ten calendar days of the notification from the college. This committee has been designated as the final authority on these matters. Students may obtain information on this process by contacting the Office of the Provost.

### Academic Dismissal Appeal

If a student wishes to dispute an academic dismissal, the first step is to consult the Graduate Director about appealing to the Department/Program. If and when all departmental appeals are exhausted, the student can enter the formal procedure at the college level.

The student will meet with the Associate Dean for Research and Graduate Affairs who will attempt to resolve the issue by working with the Department/Program. Contact Melissa Rubock, Associate Director for Graduate Administration to schedule the meeting [m.rubock@northeastern.edu](mailto:m.rubock@northeastern.edu). If it is not possible for the Associate Dean to resolve the issue with the Department/Program, the Associate Dean will determine if the complaint is substantive and there is just cause to convene the Graduate Curriculum Committee.

The student must provide a formal written complaint to the Associate Dean within one week of the student's meeting with the Associate Dean. The Statement must be submitted no later than 28 calendar days from the day when the academic determination is made available to the student. The written complaint should provide a detailed timeline as well as all available evidence supporting the student's complaint. Once the Associate Dean receives a formal written complaint, the Associate Dean will provide a copy of the complaint to the Department/Program Director and convene a meeting of the Graduate Curriculum Committee. If the student fails to provide a thoughtful and well-reasoned written summary of the case, then the matter will be considered closed at the college-level.

The Associate Dean will make a good faith effort to identify a date and time for the meeting within thirty five calendar days of the student's original submission of his or her statement.

## GRADUATE CURRICULUM COMMITTEE

- The Graduate Curriculum Committee serves as the Academic Appeals Committee for the College of Science.
- The Graduate Curriculum Committee is convened in order to determine whether a fair and due process was used.

## APPEALS MEETING

The student has the right to attend and present their case orally to the committee. The student isn't required to attend, however, it is usually quite helpful to make an oral presentation and answer any questions that the committee may have. If the complainant indicates that they will present their case in person and then fails to attend the scheduled hearing, the case will be dismissed. Lawyers are not permitted in these proceedings.

The student usually presents their complaint to the committee first. This is followed by a brief Q&A of the student by the committee. The committee may ask the complainant questions based upon either the written case submitted by the complainant or the complainant's oral presentation. The committee then reviews the evidence, summarizes the case, and makes a recommendation to the Associate Dean concerning the resolution of the complaint.

If the committee believes it cannot resolve any issues without additional information, the committee may request any information needed from either the complainant or Department/Program. This information must be provided to the committee within one week of the meeting. If the needed information is not provided in the timeframe required then the committee may weigh this failure in making its final determination regarding the original complaint.

## COMMITTEE PROCESS:

- All decisions of the committee will be made based on a simple majority (51%) vote.
- The Associate Dean is Chair of the committee, and only votes when there is a tie.
- The student bringing the complaint to the committee carries the burden of proof based on the weight of the evidence in demonstrating that the dismissal is incorrect or unjustified.
- If the committee decides that the academic dismissal should be revoked, the committee can request that the department reinstate the student immediately.

If the student is not satisfied with the Committee's disposition of the matter, or if the dismissal appeal is not resolved within 35 calendar days after the written statement is submitted to the College, he or she may further pursue the matter by requesting in writing that the University convene an academic appeals resolution committee to review the issue. This must be submitted within ten calendar days of the notification from the college. This committee has been designated as the final authority on these matters. Students may obtain information on this process by contacting the Office of the Provost.

## 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.

Students cannot elect a pass/fail grading scheme for College of Science courses, unless the course grading scheme is designated pass/fail.

## Cooperative Education Policies

The College of Science Graduate Cooperative Education Program (co-op) is one option for experiential learning and is available to students enrolled full-time at Northeastern University in a degree-granting program.

The goals of cooperative education are for students to:

- **Integrate knowledge** and skills learned in the classroom and co-op to identify and solve problems
- **Gain new knowledge** and develop new skills to successfully engage in unfamiliar activities and projects
- **Identify and leverage opportunities** to learn beyond the classroom
- **Articulate** the intellectual skills that underlie the work they engage in
- **Assess, critique, and improve** their work
- **Adapt** their behavior to different audiences they interact with (e.g., communicate, self-representation, etc.)
- **Behave professionally** in various environments (i.e., team, independent, etc.) by adhering to ethical standards and being accountable for their commitments

Master's level students must meet the eligibility requirements and follow the guidelines below. Co-op is not guaranteed and students must compete and be selected for a limited number of co-op opportunities.

## Eligibility Requirement for Co-op

- To be eligible for co-op, College of Science graduate students must:
  - Be enrolled full-time at Northeastern University. Approval is required from the Co-op Faculty for exceptions
  - Have completed a minimum of 16 Masters level academic credits prior to the start of co-op
  - Meet the 3.0 minimum GPA requirement
  - Have no incomplete grades, not be on academic probation, or have any outstanding disciplinary issues
  - Have at least two required courses remaining in their program after completing co-op (for programs that co-op isn't required)
- International students on an F1 visa must have a valid I-20 and must follow Curricular Practical Training (CPT) protocol
- Students must successfully complete the Introduction to Co-op Course. This course covers the College of Science co-op performance standards. These standards encourage professional and ethical behaviors throughout the co-op process and clarify procedures required for continued success of students and the co-op program. The standards establish professional expectations of the student throughout the co-op search process and during the co-op term, and address co-op related issues that may involve performance.
- Students must receive approval from the Co-op Faculty prior to accepting a placement.

## Guidelines

1. Students may participate in co-op activities with a single company for a four-, six-, or eight-month period. The total duration of co-op cannot exceed eight months or be shorter than eleven weeks.
2. Co-ops are aligned with academic terms (fall, spring, and full summer or summer 1 and summer 2).

3. Co-ops are required to be full-time, a minimum of 32 hours per week.
4. Course enrollment while on co-op is dependent upon academic program.
5. Students can create their own co-op placement outside of NUCareers. Approval from the Co-op Faculty and adherence to all guidelines is required.
6. Students working in industry can complete an industry project to fulfill the co-op requirement. This must be approved by the Co-op Faculty and Program Director.
7. The College of Science only allows students to utilize NUCareers Co-op placement once per degree.

### Registering for Co-op

Students are registered for the Co-op Work Experience Course based on the job placement in NUCareers. All co-op placements need to be approved by the Co-op Faculty.

### Co-op Documentation

Students who fully and successfully participate in co-op will receive a grade of Satisfactory. Those who fail to complete their co-op assignment will receive a grade of Unsatisfactory (U). These grades will appear on the student's academic transcript. Academic credit isn't awarded for the completed co-op.

### Seattle, San Francisco and Silicon Valley

Seattle, San Francisco and Silicon Valley graduate students are required to fulfill the co-op requirement and must adhere to all guidelines (Biotechnology & Bioinformatics Students ONLY).

### The College of Science Co-op Standing Committee

In the event a situation arises that requires special consideration, the College of Science students who are dismissed from or resign from a co-op job for circumstances under their control will have an opportunity to meet with the Co-op Standing Committee for a review and a decision will be made on future co-op eligibility and access to NU Careers.

### PhD Students

Please contact your department or Graduate Admissions and Student Services to inquire about guidelines for experiential learning opportunities.

### Course Registration

Students are encouraged to obtain advisor approval of course selections each semester. This approval is required for all assistantship recipients, and some departments require it for all students. Students should check with individual departments for specific guidelines.

### Transfer Credit

A student may petition to transfer up to 9 semester hours of his or her degree program using credits from another institution, provided that the credits transferred consist of a grade of B (3.000) or better in graduate-level courses, have been earned at a U.S.-accredited institution, and have not been used toward any other degree. Graduate certificate students may petition to transfer up to 4 semester hours.

*Note:* If approved by the College of Science, credits from Northeastern University's College of Professional Studies (CPS) transfer to the College of Science as external credits and count toward the maximum amount of transfer credit. As courses at other institutions may not parallel courses at Northeastern, the student's academic department will determine

the number of semester hours the external course will be worth. This calculation may result in fewer semester hours than the course was assigned at the institution at which the student completed the course. In addition, courses accepted for transfer credit must have been completed within five years of the date the student is admitted to graduate study. Grades are not transferred. Some departments may accept fewer transfer credits.

### Awards

Only those students who are registered in degree programs are eligible for awards. Award recipients will receive an official award letter from the College of Science via email. Pay attention to this letter as it is an official contract that should be read carefully. In addition, to maintain awards, students must be making satisfactory progress toward their degrees.

Receipt of financial support administered by the College of Science is contingent on satisfactory academic progress toward the degree and on meeting department-specific guidelines. The College of Science requires that all students receiving awards will generally have two semesters to reach a 3.000 grade-point average (GPA). Students whose cumulative GPA is below 3.000 will be reviewed by their departments and by the College of Science and may have their funding terminated on recommendation of their department or by decision of the College of Science in consultation with their department. Renewals of awards will depend on the student making satisfactory academic progress toward the degree, including a GPA of 3.000 or the department's minimum GPA, if it is higher than the College of Science minimum, and satisfactory performance of any duties required by the award.

### 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 (p. 29)").

### 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 research and graduate 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 associate director for graduate administration 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 director will make a recommendation to the College of Science for approval. Approval must happen prior to registration. Students must be registered for Dissertation or Dissertation Continuation during the semester in which

they take the final oral examination (including the full summer semester if that is when defense occurs). Any student who does not attend Northeastern University for a period of one year may be required to apply for readmission. A student who does not enroll for a period of three semesters, or one year, will be required to apply for readmission. Readmission is done via Apply Yourself. A student who does not enroll for a period of two semesters, or less than one year, may petition his or her department for reactivation. If the department is supportive, the student will be required to submit a written request to the departmental graduate committee. If the graduate committee feels the student is worthy of reactivation, the student's written request must be submitted to Graduate Admissions and Student Services. Please note that college admissions deadlines apply to requests for readmission and reactivation.

### Dissertation

Each doctoral student must complete a dissertation that embodies the results of extended research and makes an original contribution to the field. This work should give evidence of the candidate's ability to carry out investigation and interpret in a logical manner the results of the research. The method of approval of the dissertation is established by the committee in charge of the degree program. The chair of the dissertation committee must be a full-time member of the faculty of Northeastern University. In addition, the chair of the dissertation committee must hold a doctoral degree. Typically, only one external committee member is allowed.

### Final Oral Examination

The final oral examination will be on the subject matter of the doctoral dissertation and on important developments in the field of the dissertation. Other fields may be included if recommended by the examining committee. This examination will be taken after completion of all other degree requirements and must be held at least two weeks prior to the Commencement at which the PhD is awarded. The oral exam must take place on campus in the presence of the chair/advisor and other dissertation committee members. The dissertation defense must be publicly announced prior to the defense and the opportunity given for other students, staff, and faculty to attend.

### Interdisciplinary Doctoral Programs

Some graduate students may wish to pursue doctoral programs that involve substantial work in two or more departments. To meet this need, an interdisciplinary program may be established that corresponds in scope and depth to doctoral standards but does not agree exactly with the individual departmental regulations. Consult this graduate catalog for policies and guidelines pertaining to this doctoral option.

## 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. All students must be registered in the last semester of their program. A student who does not enroll for a period of three semesters, or one year, will be required to apply for readmission.

Readmission is done via Apply Yourself. A student who does not enroll for a period of two semesters, or less than one year, may petition his or her department for reactivation. If the department is supportive, the student will be required to submit a written request to the departmental graduate committee. If the graduate committee feels the student is worthy of reactivation, the student's written request must be submitted to Graduate Admissions and Student Services. Please note that college admissions deadlines apply to requests for readmission and reactivation.

## Biology

Website (<http://www.northeastern.edu/biology/>)

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The PhD program in biology emphasizes close interaction between graduate students and faculty in developing the intellectual and experimental skills required for creative independent research. Rigorous courses in a core biology curriculum, as well as advanced courses in particular research interests, are complemented by intensive research culminating in completion of a dissertation under faculty supervision. Students have an opportunity to declare a concentration in either cell and molecular biology or molecular microbiology.

The Department of Biology oversees the bioinformatics Master of Science program. The interdisciplinary program provides cross-disciplinary training in biology, computer science, and informational technology preparing students for cutting-edge jobs in the biotechnology and pharmaceutical industries. The program consists of four parts: fundamental courses, core courses, co-op, and electives.

The Graduate Certificate in Bioinformatics offers professionals working in the research, healthcare, and pharmaceutical industries the ability to employ bioinformatics algorithms and techniques to biological problems in their current practice. It also gives people looking to switch careers the

data and genomic analysis skills needed to be more competitive in the biological and pharmaceutical industries.

## Programs

### Doctor of Philosophy (PhD)

- Biology (p. 384)
- Biology—Advanced Entry (p. 385)

### Master of Science (MS)

- Bioinformatics (p. 385)

### Graduate Certificate

- Bioinformatics (p. 387)

## Biology, PhD

The biology PhD program seeks to provide a broad background knowledge base in conjunction with in-depth study of a specialized area of biology. Two optional concentrations are available: cell and molecular biology and molecular microbiology. The program emphasizes close interaction between graduate students and faculty members in developing the intellectual and experimental skills required for creative, independent research.

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.

## Program Requirements

### Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

Qualifying examination

Annual review

Dissertation committee

Dissertation proposal

Colloquia (minimum of three)

First-author publication

Dissertation defense

### Core Requirements

Code	Title	Hours
<b>Research Ethics</b>		
Complete one of the following courses:		4
BIOL 7399	Research Problem Solving, Ethics, and Communication Skills	
BIOL 5599	Principles of Data Management and Peer Review in Biology	
<b>Colloquium</b>		
Complete the following (repeatable) course twice:		2
BIOL 5100	Biology Colloquium	

### BIOLOGY PHD WITHOUT CONCENTRATION

Code	Title	Hours
<b>Required Course Work</b>		
Complete 8 semester hours from the following:		8



BIOL 6303	Neurobiology and Behavior	
BIOL 6399	Dynamics of Microbial Ecology	
BIOL 6401	Research Methods and Critical Analysis in Molecular Cell Biology	
BIOL 6405	Prokaryotic Cell and Molecular Biology	
BIOL 6407	Biochemistry for Molecular Biologists	
<b>Electives</b>		
Complete 16 semester hours from the following:		16
BIOL 5103 to BIOL 8674		

**Concentrations**

- Cell and Molecular Biology (p. )
- Molecular Microbiology (p. 385)

**CELL AND MOLECULAR BIOLOGY CONCENTRATION**

Code	Title	Hours
<b>Required Course Work</b>		
BIOL 6401	Research Methods and Critical Analysis in Molecular Cell Biology	4
BIOL 6407	Biochemistry for Molecular Biologists	4
<b>Electives</b>		
In consultation with faculty advisor, complete 16 semester hours from the topic of cell and molecular biology:		16
BIOL 5103 to BIOL 8674		

**MOLECULAR MICROBIOLOGY CONCENTRATION**

Code	Title	Hours
<b>Required Course Work</b>		
Complete 8 semester hours from the following:		8
BIOL 6399	Dynamics of Microbial Ecology	
BIOL 6405	Prokaryotic Cell and Molecular Biology	
BIOL 6407	Biochemistry for Molecular Biologists	
<b>Electives</b>		
In consultation with faculty advisor, complete 16 semester hours from the topic of molecular microbiology:		16
BIOL 5103 to BIOL 8674		

**Dissertation**

Code	Title	Hours
Complete the following (repeatable) course twice:		
BIOL 9990	Dissertation	

**Program Credit/GPA Requirements**

30 total semester hours required  
 Minimum 3.000 GPA required

**Biology, PhD—Advanced Entry**

The biology PhD program seeks to provide a broad background knowledge base in conjunction with in-depth study of a specialized area of biology. The program emphasizes close interaction between graduate students and faculty members in developing the intellectual and experimental skills required for creative, independent research.

Students entering the PhD program with a related Master of Science degree typically have significantly reduced course loads. An individualized course of study is designed by the biology graduate curriculum committee in consultation with the student and the student’s advisor. The student can then focus on intensive research and

completion of a dissertation under faculty supervision. Faculty research includes biochemistry, microbiology, cell and molecular biology, genetics, neurobiology, regenerative biology, and the biology of reproduction. Financial support (teaching assistantships or research assistantships) is normally provided for PhD students who are making satisfactory progress toward completion of their degree.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Milestones**

- Qualifying examination
- Annual review
- Dissertation committee
- Dissertation proposal
- Colloquia (minimum of three)
- First-author publication
- Dissertation defense

**Core Requirements**

**APPROVED COURSE WORK**

Consult your faculty advisor for acceptable courses.

**APPROVED ELECTIVES**

Consult your faculty advisor for acceptable electives.

**Dissertation**

Code	Title	Hours
Complete the following (repeatable) course twice:		
BIOL 9990	Dissertation	

**Program Credit/GPA Requirements**

Variable total semester hours required  
 Minimum 3.000 GPA required

**Bioinformatics, MS**

The Master of Science (MS) in Bioinformatics seeks to provide students with core knowledge in bioinformatics programming, integrating knowledge from the biological, computational, and mathematical disciplines. Upon completion, students are equipped to apply bioinformatics and computational methods to biological problems. Students in the MS program have the opportunity to gain professional work experience via an optional co-op.

The program consists of core course work in computational methods, programming, and statistics, enhanced by electives in molecular biology, biochemistry, molecular modeling, web development, database design and management, data mining, and other related topics.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Core Requirements**

Code	Title	Hours
<b>Computational Methods</b>		
BINF 6308	Bioinformatics Computational Methods 1	4
BINF 6309	Bioinformatics Computational Methods 2	4

Research and Seminar		
BIOL 6381	Ethics in Biological Research	2
BIOT 5219	The Biotechnology Enterprise	2
Statistics and Programming		
BINF 6200	Bioinformatics Programming	4
MATH 7340	Statistics for Bioinformatics	4

### Concentrations

- Bioinformatics and Chemoinformatics
- Bioinformatics Enterprise
- Biotechnology
- Data Analytics (p. )
- Omics

#### BIOINFORMATICS AND CHEMOINFORMATICS CONCENTRATION

Code	Title	Hours
BINF 6400	Genomics in Bioinformatics	4
BIOL 6299	Molecular Cell Biology for Biotechnology	3
CHEM 6500	Cheminformatics	3
Elective		2

#### BIOINFORMATICS ENTERPRISE CONCENTRATION

Code	Title	Hours
BIOT 5225	Managing and Leading a Biotechnology Company	3
BIOT 5226	Biotechnology Entrepreneurship	3
BIOT 5227	Economics and Marketing for Biotechnology Managers	3
Electives		3

#### BIOTECHNOLOGY CONCENTRATION

Code	Title	Hours
BIOT 5120	Introduction to Biotechnology	3
BIOT 5631	Cell Culture Processes for Biopharmaceutical Production	3
BIOL 6299	Molecular Cell Biology for Biotechnology (Electives)	3
Elective		3

#### DATA ANALYTICS CONCENTRATION

Code	Title	Hours
DA 5020	Collecting, Storing, and Retrieving Data	4
INSH 5302	Information Design and Visual Analytics	4
DA 5030	Introduction to Data Mining/Machine Learning	4
or Elective		

#### OMICS CONCENTRATION

Code	Title	Hours
BINF 6400	Genomics in Bioinformatics	4
BINF 6410	Proteomics in Bioinformatics	4
BINF 6420	Omics in Bioinformatics	4
or Elective		

#### Course Work Option

Code	Title	Hours
Complete 12 semester hours from the approved elective list.		

### Electives

Code	Title	Hours
Complete 12 semester hours from the following. Electives outside this list may be chosen in consultation with faculty advisor.		

BIOE 5100	Medical Physiology	
BIOE 5235	Biomedical Imaging	
BIOE 5420	Cellular Engineering	
BIOL 5100	Biology Colloquium	
BIOL 5499	Plant Biotechnology	
BIOL 5543	Stem Cells and Regeneration	
BIOL 5549	Inventions in Microbial Biotechnology	
BIOL 5569	Advanced Microbiology	
BIOL 5573	Medical Microbiology	
BIOL 5581	Biological Imaging	
BIOL 5583	Immunology	
BIOL 5585	Evolution	
BIOL 5587	Comparative Neurobiology	
BIOL 5591	Advanced Genomics	
BIOL 5593	Cell and Molecular Biology of Aging	
BIOL 5597	Immunotherapies of Cancer and Infectious Disease	
BIOL 6299	Molecular Cell Biology for Biotechnology	
BIOL 6300	Biochemistry	
BIOL 6301	Molecular Cell Biology	
BIOL 6303	Neurobiology and Behavior	
BIOL 6399	Dynamics of Microbial Ecology	
BIOL 6407	Biochemistry for Molecular Biologists	
BIOT 5120	Introduction to Biotechnology	
BIOT 5145	Basic Biotechnology Lab Skills	
BIOT 5219	The Biotechnology Enterprise	
BIOT 5225	Managing and Leading a Biotechnology Company	
BIOT 5226	Biotechnology Entrepreneurship	
BIOT 5227	Economics and Marketing for Biotechnology Managers	
BIOT 5560	Bioprocess Fundamentals	
BIOT 5631	Cell Culture Processes for Biopharmaceutical Production	
BIOT 5635	Downstream Processes for Biopharmaceutical Production	
BIOT 5640	Drug Product Processes for Biopharmaceuticals	
BIOT 5700	Molecular Interactions of Proteins in Biopharmaceutical Formulations	
BIOT 5810	Cutting-Edge Applications in Molecular Biotechnology	
BIOT 5850	Higher-Order Structure Analytics	
BIOT 7245	Biotechnology Applications Laboratory	
CHEM 5550	Introduction to Glycobiology and Glycoprotein Analysis	
CHEM 5616	Protein Mass Spectrometry	

CHEM 5617	Protein Mass Spectrometry Laboratory
CHEM 5620	Protein Chemistry
CHEM 5638	Molecular Modeling
CHEM 5660	Analytical Biochemistry
CHEM 7317	Analytical Biotechnology
CS 5010	Programming Design Paradigm
CS 5100	Foundations of Artificial Intelligence
CS 5200	Database Management Systems
CS 5400	Principles of Programming Language
CS 5500	Foundations of Software Engineering
CS 5600	Computer Systems
CS 5610	Web Development
CS 5700	Fundamentals of Computer Networking
CS 5800	Algorithms
CS 6140	Machine Learning
CS 6200	Information Retrieval
CS 6220	Data Mining Techniques
DA 5020	Collecting, Storing, and Retrieving Data
DA 5030	Introduction to Data Mining/Machine Learning
INSH 5301	Introduction to Computational Statistics
INSH 5302	Information Design and Visual Analytics
EEMB 5130 and EEMB 5131	Ecological Dynamics and Lab for EEMB 5130
MATH 5131	Introduction to Mathematical Methods and Modeling
MATH 7203	Numerical Analysis 1
MATH 7205	Numerical Analysis 2
MATH 7233	Graph Theory
MATH 7241	Probability 1
MATH 7341	Probability 2
MATH 7342	Mathematical Statistics
MATH 7344	Regression, ANOVA, and Design
MATH 7345	Nonparametric Methods in Statistics
PHSC 6214	Experimental Design and Biostatistics
PHYS 5116	Complex Networks and Applications
PHYS 7331	Network Science Data
PHYS 7332	Network Science Data 2

### Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

#### Bioinformatics, Graduate Certificate

The Graduate Certificate in Bioinformatics seeks to provide students with core knowledge in bioinformatics programming, integrating knowledge from the biological, computational, and mathematical disciplines. Students gain the data and genomic analysis skills needed to employ bioinformatics techniques to biological problems. The graduate certificate consists of four courses, three bioinformatics courses and one elective, totaling 15–16 semester hours.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirements

Code	Title	Hours
BINF 6200	Bioinformatics Programming	4
BINF 6308	Bioinformatics Computational Methods 1	4
BINF 6309	Bioinformatics Computational Methods 2	4

#### Elective

Code	Title	Hours
Complete one of the following. Electives outside this list may be chosen in consultation with faculty advisor.		
BIOE 5100	Medical Physiology	
BIOE 5235	Biomedical Imaging	
BIOE 5420	Cellular Engineering	
BIOL 5100	Biology Colloquium	
BIOL 5499	Plant Biotechnology	
BIOL 5543	Stem Cells and Regeneration	
BIOL 5549	Inventions in Microbial Biotechnology	
BIOL 5569	Advanced Microbiology	
BIOL 5573	Medical Microbiology	
BIOL 5581	Biological Imaging	
BIOL 5583	Immunology	
BIOL 5585	Evolution	
BIOL 5587	Comparative Neurobiology	
BIOL 5591	Advanced Genomics	
BIOL 5593	Cell and Molecular Biology of Aging	
BIOL 5597	Immunotherapies of Cancer and Infectious Disease	
BIOL 6299	Molecular Cell Biology for Biotechnology	
BIOL 6300	Biochemistry	
BIOL 6301	Molecular Cell Biology	
BIOL 6303	Neurobiology and Behavior	
BIOL 6399	Dynamics of Microbial Ecology	
BIOL 6407	Biochemistry for Molecular Biologists	
BIOT 5120	Introduction to Biotechnology	
BIOT 5130	Team Skills in Biotechnology	
BIOT 5145	Basic Biotechnology Lab Skills	
BIOT 5219	The Biotechnology Enterprise	
BIOT 5225	Managing and Leading a Biotechnology Company	
BIOT 5226	Biotechnology Entrepreneurship	
BIOT 5227	Economics and Marketing for Biotechnology Managers	
BIOT 5560	Bioprocess Fundamentals	
BIOT 5631	Cell Culture Processes for Biopharmaceutical Production	
BIOT 5635	Downstream Processes for Biopharmaceutical Production	
BIOT 5640	Drug Product Processes for Biopharmaceuticals	

BIOT 5700	Molecular Interactions of Proteins in Biopharmaceutical Formulations
BIOT 5810	Cutting-Edge Applications in Molecular Biotechnology
BIOT 5850	Higher-Order Structure Analytics
BIOT 7245	Biotechnology Applications Laboratory
CHEM 5550	Introduction to Glycobiology and Glycoprotein Analysis
CHEM 5616	Protein Mass Spectrometry
CHEM 5617	Protein Mass Spectrometry Laboratory
CHEM 5620	Protein Chemistry
CHEM 5660	Analytical Biochemistry
CHEM 7317	Analytical Biotechnology
CS 5010	Programming Design Paradigm
CS 5100	Foundations of Artificial Intelligence
CS 5200	Database Management Systems
CS 5400	Principles of Programming Language
CS 5500	Foundations of Software Engineering
CS 5600	Computer Systems
CS 5610	Web Development
CS 5700	Fundamentals of Computer Networking
CS 5800	Algorithms
CS 6140	Machine Learning
CS 6200	Information Retrieval
CS 6220	Data Mining Techniques
DA 5020	Collecting, Storing, and Retrieving Data
DA 5030	Introduction to Data Mining/Machine Learning
INSH 5301	Introduction to Computational Statistics
INSH 5302	Information Design and Visual Analytics
MATH 5131	Introduction to Mathematical Methods and Modeling
MATH 7203	Numerical Analysis 1
MATH 7205	Numerical Analysis 2
MATH 7233	Graph Theory
MATH 7241	Probability 1
MATH 7341	Probability 2
MATH 7342	Mathematical Statistics
MATH 7344	Regression, ANOVA, and Design
MATH 7345	Nonparametric Methods in Statistics
PHSC 6214	Experimental Design and Biostatistics
PHYS 5116	Complex Networks and Applications
PHYS 7331	Network Science Data
PHYS 7332	Network Science Data 2

Note: International students are required to select a 4-credit elective to maintain a full-time status, 8SH.

### Program Credit/GPA Requirements

15–16 total semester hours required  
Minimum 3.000 GPA required

## Chemistry and Chemical Biology

Website (<http://www.northeastern.edu/chemistry/>)

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The PhD program in chemistry provides research and professional opportunities for students that are based on fundamental chemical principles with translational applications to the real world. The program is built on academic rigor and research impact, based on the creativity and strengths of an increasingly diverse faculty and student body. We have harnessed our extensive connections in industry to create and maintain a thriving industry entry PhD program and provide our regular PhD students with internship opportunities in industry, government laboratories, and other venues that may lead to nontraditional careers. Students in our program leave with flexible skills that can be applied in creative and meaningful ways in academics, industry, and beyond. We are aligned in our core values with the mission of Northeastern University to “educate students for a life of fulfillment and accomplishments and create and translate knowledge to meet global and societal needs.” This mission is at the core of the curriculum, research, mentoring strategies, and professional development opportunities offered to our students. It is implemented in a highly multidisciplinary and transparent environment where students have a voice and take real ownership and responsibility for their professional success. Within this context, PhD students work with chemistry and chemical biology faculty in interdisciplinary areas that include biochemistry and chemical biology, synthetic chemistry, medicinal chemistry, polymer and materials chemistry, computational chemistry, and bioanalytical chemistry.

The Master of Science in Chemistry is a part-time program designed to allow practicing chemical professionals in the greater Boston area who have an earned bachelor's degree in chemistry to pursue a master's part-time in chemistry by completing a course work program during the evening weekday hours. The department offers a diverse range of courses that mirror the faculty's research interests in biochemistry, chemical biology, synthetic chemistry, medicinal chemistry, polymer and materials chemistry, computational chemistry, and bioanalytical chemistry.

The Department of Chemistry and Chemical Biology oversees the biotechnology graduate programs. The Master of Science in Biotechnology, a professional science master's degree program, is an innovative, nonthesis graduate degree. It combines advanced interdisciplinary training in biotechnology, biology, chemistry, and

pharmaceutical sciences with the development of high-value business skills critical to success in today's dynamic workplace. Students are offered the opportunity to gain hands-on experience during the program through Northeastern's established co-op program.

The biotechnology program also offers several graduate certificates in the areas of biopharmaceutical analytical sciences, biotechnology, biotechnology enterprise, experimental biotechnology, molecular biotechnology, pharmaceutical technologies, process science, and regulatory science.

## Programs

### Doctor of Philosophy (PhD)

- Chemistry (p. 389)
- Chemistry—Advanced Entry (p. 389)

### Master of Science (MS)

- Biotechnology (p. 390)
- Chemistry (p. 392)

### Graduate Certificate

- Biopharmaceutical Analytical Sciences (p. 244)
- Biotechnology (p. 393)
- Biotechnology Enterprise (p. 393)
- Experimental Biotechnology (p. 394)
- Manufacturing and Quality Operations in Biotechnology (p. 394)
- Molecular Biotechnology (p. 394)
- Pharmaceutical Technologies (p. 394)
- Process Science (p. 395)
- Regulatory Science (p. 395)

## Chemistry, PhD

The PhD program in chemistry is designed for students who have earned a bachelor's or a master's degree in chemistry or related areas and who wish to earn a doctorate in chemistry. Research spans a wide range of multidisciplinary fields, with strengths in clean energy, polymers, materials, medicinal chemistry, bioanalytical chemistry, and chemical biology. Our research programs draw from a strong foundation in analytical, organic, physical, and biological chemistry in a collaborative and diverse environment. Our student-focused approach to mentoring, a strong graduate student association, and faculty deeply rooted both in academics and industry provide a flexible platform for student development toward a large diversity of career paths.

Students typically take courses their first year while supported on teaching assistantships and achieve PhD candidacy the first or second half of year two. The primary emphasis of the program is on the completion of an original research project, its articulation in a well-written thesis, and its subsequent defense before the thesis committee through an open seminar followed by oral examination by the committee members.

## Program Requirements

### Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

Three qualifying examinations  
Annual review

Candidacy  
Dissertation committee  
Minimum of two seminars  
Dissertation defense

## Core Requirements

Code	Title	Hours
<b>Required Core</b>		
Complete the following (repeatable) course three times:		3
CHEM 5501	Chemical Safety in the Research Laboratory	
CHEM 5600	Research Skills and Ethics in Chemistry	3
CHEM 7710	Laboratory Rotations in Chemistry and Chemical Biology	0
CHEM 7750	Advanced Problem Solving	3
<b>Seminar</b>		
At least one seminar must be taken for a letter grade.		
CHEM 8504	Graduate Seminar	1
<b>Research</b>		
CHEM 8984	Research	1-6
<b>Chemistry</b>		
Complete 18 semester hours from the following:		18
CHEM 5550 or within the range of CHEM 5610 to CHEM 7320		

## Dissertation

Code	Title	Hours
Complete the following (repeatable) course twice:		
CHEM 9990	Dissertation	0

## Program Credit/GPA Requirements

32 total semester hours required  
Minimum 3.000 GPA required

## Chemistry, PhD—Advanced Entry

Advanced entry into the PhD program requires a master's degree in chemistry or a related area. Graduate courses taken during acquisition of the Master of Science degree allow completion of the PhD program with fewer course credits. Other than the course requirements, which are specified separately, see the PhD program requirements for details.

## Industry Entry PhD

This program is strictly for students who already have a master's degree in chemistry or related area and have full-time employment at a company. The company must commit to all financial responsibilities accrued in obtaining the degree and allow time for the student to work on a PhD thesis in collaborative research with a company supervisor and one of our faculty members. Graduate courses in the Department of Chemistry and Chemical Biology are taught in the evenings to accommodate the fact that our students work in industry during the day.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

Three qualifying examinations  
Annual review

Candidacy  
 Minimum of two seminars  
 Dissertation committee  
 Dissertation proposal  
 Dissertation defense

### Core Requirements

Code	Title	Hours
<b>Required Core</b>		
CHEM 5600	Research Skills and Ethics in Chemistry	3
CHEM 7750	Advanced Problem Solving	3
<b>Seminar</b>		
CHEM 8504	Graduate Seminar	1

### Dissertation

Code	Title	Hours
Complete the following (repeatable) course twice:		
CHEM 9990	Dissertation	

### Program Credit/GPA Requirements

7 total semester hours required  
 Minimum 3.000 GPA required

## Biotechnology, MS

### Overview

Northeastern's Master of Science in Biotechnology is a professional master's program, an innovative, nonthesis graduate degree. It combines advanced interdisciplinary training in biotechnology, biology, chemistry, and pharmaceutical sciences with the development of high-value business skills critical to success in today's dynamic workplace. Successful graduates are prepared to innovate, collaborate, and lead as research, managerial, or technical professionals in a wide range of biotechnology specialties.

### Molecular Biotechnology Concentration

The molecular biotechnology concentration provides students with didactic and practical knowledge in molecular biotechnology, protein expression, and structural biology. Successful students learn how to generate and optimize molecular forms used to express recombinant proteins to be used as biopharmaceuticals. Particular attention is paid to cutting-edge technologies such as RNAi and CRISPR/CAS9. In addition, the students have an opportunity to learn how to purify biopharmaceuticals and analyze aggregation and how to prevent it.

### Process Sciences Concentration

The process sciences concentration focuses on the production of drug substance of biopharmaceuticals from cell culture process to purification of the biologic molecules. Successful students learn the principles of development and implementation of biological manufacturing processes through the integration of concepts and fundamentals of engineering and life sciences. The concentration addresses biochemical engineering, mammalian cell culture process development, and protein purification. The learning of the students is reinforced by both lecture courses and project-driven laboratory experience that provides hands-on learning of cell culture and protein separation.

### Manufacturing and Quality Operations Concentration

The manufacturing and quality operations concentration has been designed in response to a need in the biotechnology industry for individuals with an advanced knowledge of the principles and practices

of state-of-the-art biopharmaceutical manufacturing and quality operations. In particular, the focus of this concentration is training the workforce to ensure quality medicines are produced. Successful individuals, particularly those who are working in the various sectors of biotechnology including basic research of biological systems, discovery, development, and manufacturing of biopharmaceuticals, will improve their competency and learn new practical skills, which enables them to increase productivity and further contribute to their professions.

### 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. Successful students learn the diversity of molecular forms derived from the biological products through various biological and chemical mechanisms and the impact of these structural changes on the safety and efficacy of these biopharmaceuticals. The students have an opportunity to learn the science and practice applied in the biotechnology industry to analyze and characterize these molecular forms. This is accomplished through both lecture courses of the analytical sciences and project-driven laboratory experience that utilizes analytical techniques such as mass spectrometry and molecular separations.

### Pharmaceutical Technologies Concentration

The pharmaceutical technologies concentration focuses on the conversion of purified proteins to biopharmaceutical drug products that are compatible for clinical use. This concentration addresses the design of the product formulation and the development and implementation of the drug product manufacturing processes. Successful students learn the sciences of the interactions of the biologic molecules in the process conditions and the relevant process technology, such as aseptic operations and freeze-drying, needed for drug product manufacturing. This is accomplished through both lecture courses and project-driven laboratory experience that offers hands-on learning of formulation design and drug product process development.

### Scientific Information Management Concentration

The scientific information management concentration focuses on the collection, analysis, and visualization of scientific data. This concentration addresses the issues surrounding *big data* that face industry today. Students have an opportunity to learn how to manage, store, visualize, and provide overall analysis of large scientific data sets. This is accomplished through both lecture courses and project-driven laboratory experience that provide hands-on learning of the impacts of data on the scientific process.

### Regulatory Science Concentration

The regulatory science concentration focuses on the science behind good regulatory practice today. This concentration addresses the issues surrounding current and innovative science practices that influence regulatory decisions. Students have an opportunity to learn the science behind compliance. This is accomplished through both lecture courses and project-driven laboratory experience that provides hands-on learning of the science behind dossier analysis.

### Biotechnology Enterprise Concentration

The biotechnology enterprise concentration integrates business and management skills with the science of biotechnology. Successful students learn the fundamental concepts of leadership, entrepreneurship, and innovation, financial decision making, and marketing. They gain teamwork, management, and business development skills in the process and graduate prepared to become scientist-managers.

**GORDON INSTITUTE OF ENGINEERING LEADERSHIP****Master's Degree in Biotechnology with Graduate Certificate in Engineering Leadership**

Students may complete a Master of Science in Biotechnology in addition to earning a Graduate Certificate in Engineering Leadership. Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The certificate program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 42-semester-hour master's degree and certificate requires 26 hours of biotechnology course work.

Engineering Leadership (p. 225)

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Core Requirements**

Code	Title	Hours
<b>Required Core</b>		
BIOT 5120	Introduction to Biotechnology	3
BIOT 5219	The Biotechnology Enterprise	2
BIOT 5631	Cell Culture Processes for Biopharmaceutical Production	3
BIOT 6214	Experimental Design and Biostatistics	2
BIOL 6299	Molecular Cell Biology for Biotechnology	3
CHEM 5620	Protein Chemistry	3
CHEM 7317	Analytical Biotechnology	3
<b>Co-op</b>		
BIOT 6500	Professional Development for Co-op	0
BIOT 6964	Co-op Work Experience	0

**Concentrations**

Complete one of the following eight concentrations:

- Biopharmaceutical Analytical Sciences Concentration (p. 391)
- Biotechnology Enterprise Concentration (p. 391)
- Manufacturing and Quality Operations Concentration (p. 391)
- Molecular Biotechnology Concentration (p. 391)
- Pharmaceutical Technologies Concentration (p. )
- Process Sciences Concentration (p. )
- Regulatory (p. ) Science Concentration (p. )
- Scientific Information Management Concentration (p. )

**BIOPHARMACEUTICAL ANALYTICAL SCIENCES CONCENTRATION**

Code	Title	Hours
BIOT 5145	Basic Biotechnology Lab Skills	1
BIOT 7245	Biotechnology Applications Laboratory	3
CHEM 5550	Introduction to Glycobiology and Glycoprotein Analysis	3
CHEM 5616	Protein Mass Spectrometry	3
Electives (p. 392)		5

**BIOTECHNOLOGY ENTERPRISE CONCENTRATION**

Code	Title	Hours
BIOT 5225	Managing and Leading a Biotechnology Company	3
BIOT 5226	Biotechnology Entrepreneurship	3
BIOT 5227	Economics and Marketing for Biotechnology Managers	3
Electives (p. 392)		6

**MANUFACTURING AND QUALITY OPERATIONS CONCENTRATION**

Code	Title	Hours
BIOT 5145	Basic Biotechnology Lab Skills	1
BIOT 6300	Pharmaceutical Microbiology	3
BIOT 6310	CGMP Statutes and Regulation	3
or BIOT 6330	Plant Design and Facilities	
BIOT 6320	Quality Management Systems and Validation	3
BIOT 6340	Sterile Manufacturing Operations	3
BIOT 7245	Biotechnology Applications Laboratory	3

**MOLECULAR BIOTECHNOLOGY CONCENTRATION**

Code	Title	Hours
BIOT 5145	Basic Biotechnology Lab Skills	1
BIOT 5810	Cutting-Edge Applications in Molecular Biotechnology	3
BIOT 5850	Higher-Order Structure Analytics	3
BIOT 7245	Biotechnology Applications Laboratory	3
Electives (p. 392)		5

**PHARMACEUTICAL TECHNOLOGIES CONCENTRATION**

Code	Title	Hours
BIOT 5145	Basic Biotechnology Lab Skills	1
BIOT 5640	Drug Product Processes for Biopharmaceuticals	3
BIOT 5700	Molecular Interactions of Proteins in Biopharmaceutical Formulations	3
BIOT 7245	Biotechnology Applications Laboratory	3
Electives (p. 392)		5

**PROCESS SCIENCES CONCENTRATION**

Code	Title	Hours
BIOT 5145	Basic Biotechnology Lab Skills	1
BIOT 5560	Bioprocess Fundamentals	3
BIOT 5635	Downstream Processes for Biopharmaceutical Production	3
BIOT 7245	Biotechnology Applications Laboratory	3
Electives (p. 392)		5

**REGULATORY SCIENCE CONCENTRATION**

Code	Title	Hours
BIOT 5330	Drug Safety and Immunogenicity	3
BIOT 5340	Introduction to Biotherapeutic Approvals	3
BIOT 5500	Introduction to Regulatory Science	3
BIOT 7245	Biotechnology Applications Laboratory	3
Electives (p. 392)		3

**SCIENTIFIC INFORMATION MANAGEMENT CONCENTRATION**

Code	Title	Hours
BIOT 5145	Basic Biotechnology Lab Skills	1
BIOT 5400	Scientific Information Management for Biotechnology Managers	3
BIOT 7245	Biotechnology Applications Laboratory	3
DA 5020 or DA 5030	Collecting, Storing, and Retrieving Data Introduction to Data Mining/Machine Learning	4
INSH 5301	Introduction to Computational Statistics	4

**Elective List**

Code	Title	Hours
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Choose electives from the list and/or one-credit BUSN graduate-level courses. Electives not on this list may be chosen with faculty advisor approval.

BINF 6308	Bioinformatics Computational Methods 1	
BIOL 5307	Biological Electron Microscopy	
BIOL 5499	Plant Biotechnology	
BIOL 5543	Stem Cells and Regeneration	
BIOL 5549	Inventions in Microbial Biotechnology	
BIOL 5569	Advanced Microbiology	
BIOL 5573	Medical Microbiology	
BIOL 5581	Biological Imaging	
BIOL 5583	Immunology	
BIOL 6381	Ethics in Biological Research	
BIOL 6399	Dynamics of Microbial Ecology	
BIOT 5220	The Role of Patents in the Biotechnology Industry, Past and Future	
BIOT 5225	Managing and Leading a Biotechnology Company	
BIOT 5226	Biotechnology Entrepreneurship	
BIOT 5227	Economics and Marketing for Biotechnology Managers	
BIOT 5330	Drug Safety and Immunogenicity	
BIOT 5340	Introduction to Biotherapeutic Approvals	
BIOT 5400	Scientific Information Management for Biotechnology Managers	
BIOT 5500	Introduction to Regulatory Science	
BIOT 5560	Bioprocess Fundamentals	
BIOT 5635	Downstream Processes for Biopharmaceutical Production	
BIOT 5640	Drug Product Processes for Biopharmaceuticals	
BIOT 5700	Molecular Interactions of Proteins in Biopharmaceutical Formulations	
BIOT 5810	Cutting-Edge Applications in Molecular Biotechnology	
BIOT 5850	Higher-Order Structure Analytics	
BIOT 6300	Pharmaceutical Microbiology	
BIOT 6310	CGMP Statutes and Regulation	
BIOT 6320	Quality Management Systems and Validation	
BIOT 6330	Plant Design and Facilities	

BIOT 6340	Sterile Manufacturing Operations
CHEM 5550	Introduction to Glycobiology and Glycoprotein Analysis
CHEM 5616	Protein Mass Spectrometry
CHEM 5617	Protein Mass Spectrometry Laboratory
CHEM 5621	Principles of Chemical Biology for Chemists
CHEM 5625	Chemistry and Design of Protein Pharmaceuticals
CHEM 5638	Molecular Modeling
CHEM 7247	Advances in Nanomaterials
CHME 7340	Chemical Engineering Kinetics
DA 5020	Collecting, Storing, and Retrieving Data
DA 5030	Introduction to Data Mining/Machine Learning
ENTR 6200	Enterprise Growth and Innovation
ENTR 6210	Managing Operations in Early Stage Ventures
ENTR 6211	Entrepreneurship: Services and Retail Business Creation
ENTR 6212	Business Planning for New Ventures
HINF 5105	The American Healthcare System
HINF 6201	Organizational Behavior, Work Flow Design, and Change Management
INSH 5301	Introduction to Computational Statistics
MGMT 6210	Law for Managers and Entrepreneurs
MGSC 6200	Information Analysis
NNMD 5270	Introduction to Nanomedicine
NNMD 5470	Nano/Biomedical Commercialization: Concept to Market
PHSC 6218	Biomedical Chemical Analysis
PHSC 6224	Behavioral Pharmacology and Drug Discovery
PHSC 6290	Biophysical Methods in Drug Discovery
PHSC 7010	Pharmaceutical Sciences Laboratory
TECE 6230	Entrepreneurial Marketing and Selling
TECE 6250	Lean Design and Development

**Program Credit/GPA Requirements**

34 total semester hours required

Minimum 3.000 GPA required

**Chemistry, MS****Part-time Master's**

The Department of Chemistry and Chemical Biology offers a part-time, course-based master's degree. Classes are offered in the evenings to accommodate students who have full-time jobs. A research thesis is not a requirement for the degree.

**Master's**

The department does not accept applications for the thesis-based master's degree from students who are not already at Northeastern.



## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Options

Complete one of the following options:

#### COURSE WORK OPTION

Code	Title	Hours
Complete 30 semester hours from the following courses:		30
CHEM 5550–CHEM 7750		

#### THESIS OPTION

Code	Title	Hours
Complete 18 semester hours from the following:		18
CHEM 5550, or within the range of CHEM 5610 to CHEM 7320		

#### Graduate Seminar

At least one seminar must be taken for a letter grade.

CHEM 5904	Seminar (taken twice)	2
or CHEM 8504	Graduate Seminar	

#### Laboratory

Complete the following (repeatable) course twice:		2
CHEM 5501	Chemical Safety in the Research Laboratory	

#### Research

CHEM 5984	Research	4-6
or CHEM 8984	Research	

#### Thesis

CHEM 7990	Thesis	4
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## Program Credit/GPA Requirements

30 total semester hours required  
Minimum 3.000 GPA required

### Biopharmaceutical Analytical Sciences, Graduate Certificate

The Graduate Certificate in Biopharmaceutical Analytical Sciences has been designed in response to a need in the biotechnology industry for individuals with an advanced knowledge of the principles and practices of state-of-the-art analyses of protein with focus on the characterization of innovator and biosimilars. Individuals, particularly those who are working in the various sectors of biotechnology including basic research of biological systems, discovery, development, and manufacturing of biopharmaceuticals, have an opportunity to improve their competency and learn new practical skills that enable them to increase productivity and further contribute to their professions. In addition, the certificate was designed for both individuals with and without experience in biopharmaceuticals and their analysis.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
CHEM 5616	Protein Mass Spectrometry	3
CHEM 5617	Protein Mass Spectrometry Laboratory	3

CHEM 5550	Introduction to Glycobiology and Glycoprotein Analysis	3
CHEM 5660	Analytical Biochemistry	3

## Program Credit/GPA Requirements

12 total semester hours required  
Minimum 3.000 GPA required

### Biotechnology, Graduate Certificate

The Graduate Certificate in Biotechnology has been designed in response to a need in the biotechnology industry for individuals without a biotechnology background to obtain a strong foundation in basic biotechnology concepts and skills. Individuals, particularly those who are working in fields other than biotechnology, will acquire competency and learn new practical skills enabling them to increase productivity and allow for transitions into more biotechnology-related fields.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

A grade of C– or higher is required in all courses.

Code	Title	Hours
BIOT 5120	Introduction to Biotechnology	3
BIOT 5631	Cell Culture Processes for Biopharmaceutical Production	3
BIOL 6299	Molecular Cell Biology for Biotechnology	3
CHEM 5620	Protein Chemistry	3

## Program Credit/GPA Requirements

12 total semester hours required  
Minimum 3.000 GPA required

### Biotechnology Enterprise, Graduate Certificate

The graduate certificate in biotechnology enterprise has been designed in response to a need in the biotechnology industry for individuals with a biotechnology background to obtain a strong foundation in the business aspects of biotechnology. Individuals, particularly those who are working in the field of biotechnology, will improve their business competency enabling them to better manage a team or move into a more business-orientated roll.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
BIOT 5225	Managing and Leading a Biotechnology Company	3
BIOT 5226	Biotechnology Entrepreneurship	3
BIOT 5227	Economics and Marketing for Biotechnology Managers	3
CHEM 7317	Analytical Biotechnology	3

**Program Credit/GPA Requirements**

12 total semester hours required  
Minimum 3.000 GPA required

**Experimental Biotechnology, Graduate Certificate**

The graduate certificate in experimental biotechnology has been designed in response to a need in the biotechnology industry for individuals without a biotechnology background to obtain a strong foundation in lab-based, hands-on, biotechnology skills. Individuals, particularly those who are working in fields other than biotechnology, will acquire competency and learn new practical lab skills enabling them to increase productivity and transition into more biotechnology-related fields.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Core Requirements**

Code	Title	Hours
BIOT 5145	Basic Biotechnology Lab Skills	1
BIOT 5219	The Biotechnology Enterprise	2
BIOL 5549	Inventions in Microbial Biotechnology	4
BIOT 6214	Experimental Design and Biostatistics	2
BIOT 7245	Biotechnology Applications Laboratory	3

**Program Credit/GPA Requirements**

12 total semester hours required  
Minimum 3.000 GPA required

**Manufacturing and Quality Operations in Biotechnology, Graduate Certificate**

The graduate certificate in manufacturing and quality operations has been designed in response to a need in the biotechnology industry for individuals with an advanced knowledge of the principles and practices of state-of-the-art biopharmaceutical manufacturing and quality operations. In particular, the focus of this certificate is training the workforce to ensure quality medicines are produced. Individuals, particularly those who are working in the various sectors of biotechnology including basic research of biological systems, discovery, development, and manufacturing of biopharmaceuticals, have an opportunity to improve their competency and learn new practical skills, which enables them to increase productivity and further contribute to their professions.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Core Requirements**

A grade of C- or higher is required in all courses.

Code	Title	Hours
BIOT 6300	Pharmaceutical Microbiology	3
BIOT 6310 or BIOT 6330	CGMP Statutes and Regulation Plant Design and Facilities	3

BIOT 6320	Quality Management Systems and Validation	3
BIOT 6340	Sterile Manufacturing Operations	3

**Program Credit/GPA Requirements**

12 total semester hours required  
Minimum 3.000 GPA required

**Molecular Biotechnology, Graduate Certificate**

The graduate certificate in molecular biotechnology has been designed in response to a need in the biotechnology industry for individuals with an advanced knowledge of the principles and practices of state-of-the-art molecular biology techniques and advanced protein structure analysis. Individuals, particularly those who are working in the various sectors of biotechnology including basic research of biological systems, discovery, development and manufacturing of biopharmaceuticals, will improve their competency and learn new practical skills enabling them to increase productivity and further contribute to their professions.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Core Requirements**

Code	Title	Hours
BIOT 5700	Molecular Interactions of Proteins in Biopharmaceutical Formulations	3
BIOT 5810	Cutting-Edge Applications in Molecular Biotechnology	3
BIOT 5850	Higher-Order Structure Analytics	3
CHEM 7317	Analytical Biotechnology	3

**Program Credit/GPA Requirements**

12 total semester hours required  
Minimum 3.000 GPA required

**Pharmaceutical Technologies, Graduate Certificate**

The Graduate Certificate in Pharmaceutical Technology has been designed in response to a need in the biotechnology industry for individuals with an advanced knowledge of the principles and practices of the stages of drug development, biopharmaceutical development. Individuals, particularly those who are working in the various sectors of biotechnology including basic research of biological systems, discovery, development, and manufacturing of biopharmaceuticals, will improve their competency and learn new practical skills enabling them to increase productivity and further contribute to their professions.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Core Requirements**

Code	Title	Hours
BIOT 5640	Drug Product Processes for Biopharmaceuticals	3
BIOT 5700	Molecular Interactions of Proteins in Biopharmaceutical Formulations	3

CHEM 5550	Introduction to Glycobiology and Glycoprotein Analysis	3
CHEM 7317	Analytical Biotechnology	3

### Program Credit/GPA Requirements

12 total semester hours required  
Minimum 3.000 GPA required

#### Process Science, Graduate Certificate

The graduate certificate in process sciences has been designed in response to a need in the biotechnology industry for individuals with an advanced knowledge of the principles and practices of process development of biopharmaceuticals. Individuals, particularly those who are working in the various sectors of biotechnology including basic research of biological systems, discovery, development and manufacturing of biopharmaceuticals, will improve their competency and learn new practical skills enabling them to increase productivity and further contribute to their professions.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirements

Code	Title	Hours
BIOT 5560	Bioprocess Fundamentals	3
BIOT 5635	Downstream Processes for Biopharmaceutical Production	3
BIOT 5640	Drug Product Processes for Biopharmaceuticals	3
CHEM 7317	Analytical Biotechnology	3

### Program Credit/GPA Requirements

12 total semester hours required  
Minimum 3.000 GPA required

#### Regulatory Science, Graduate Certificate

This certificate was designed in response to a need in the biotechnology industry for individuals, in particular regulators, to obtain a strong foundation in the science behind good regulatory practice today, specifically in relation to biopharmaceuticals.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirements

Code	Title	Hours
BIOT 5330	Drug Safety and Immunogenicity	3
BIOT 5500	Introduction to Regulatory Science	3
CHEM 5620	Protein Chemistry	3

#### Elective

Code	Title	Hours
Complete 3 semester hours from the following:		3
BIOT		

BINF 6308	Bioinformatics Computational Methods 1
BIOL 5307	Biological Electron Microscopy
BIOL 5499	Plant Biotechnology
BIOL 5543	Stem Cells and Regeneration
BIOL 5549	Inventions in Microbial Biotechnology
BIOL 5569	Advanced Microbiology
BIOL 5573	Medical Microbiology
BIOL 5581	Biological Imaging
BIOL 5583	Immunology
BIOL 6381	Ethics in Biological Research
BIOL 6399	Dynamics of Microbial Ecology
BIOT 5040	Fundamentals of Biochemistry for Biotechnology
BIOT 5050	Organic Chemistry for Biotechnology
BIOT 5120	Introduction to Biotechnology
BIOT 5130	Team Skills in Biotechnology
BIOT 5145	Basic Biotechnology Lab Skills
BIOT 5219	The Biotechnology Enterprise
BIOT 5220	The Role of Patents in the Biotechnology Industry, Past and Future
BIOT 5225	Managing and Leading a Biotechnology Company
BIOT 5226	Biotechnology Entrepreneurship
BIOT 5227	Economics and Marketing for Biotechnology Managers
BIOT 5340	Introduction to Biotherapeutic Approvals
BIOT 5360	Drug Stability
BIOT 5400	Scientific Information Management for Biotechnology Managers
BIOT 5500	Introduction to Regulatory Science
BIOT 5560	Bioprocess Fundamentals
BIOT 5631	Cell Culture Processes for Biopharmaceutical Production
BIOT 5635	Downstream Processes for Biopharmaceutical Production
BIOT 5640	Drug Product Processes for Biopharmaceuticals
BIOT 5700	Molecular Interactions of Proteins in Biopharmaceutical Formulations
BIOT 5810	Cutting-Edge Applications in Molecular Biotechnology
BIOT 5820	Cellular Therapies
BIOT 5821	Introduction to Biopharmaceutical Technologies
BIOT 5850	Higher-Order Structure Analytics
BIOT 5976	Directed Study
BIOT 6214	Experimental Design and Biostatistics
BIOT 6400	Pre-co-op Experience
BIOT 6500	Professional Development for Co-op
BIOT 6962	Elective
BIOT 6964	Co-op Work Experience
BIOT 7245	Biotechnology Applications Laboratory
CHEM 5550	Introduction to Glycobiology and Glycoprotein Analysis

CHEM 5616	Protein Mass Spectrometry
CHEM 5617	Protein Mass Spectrometry Laboratory
CHEM 5621	Principles of Chemical Biology for Chemists
CHEM 5625	Chemistry and Design of Protein Pharmaceuticals
CHEM 5638	Molecular Modeling
CHEM 7247	Advances in Nanomaterials
CHME 7340	Chemical Engineering Kinetics
ENTR 6200	Enterprise Growth and Innovation
ENTR 6210	Managing Operations in Early Stage Ventures
ENTR 6211	Entrepreneurship: Services and Retail Business Creation
ENTR 6212	Business Planning for New Ventures
HINF 5105	The American Healthcare System
HINF 6201	Organizational Behavior, Work Flow Design, and Change Management
MGMT 6210	Law for Managers and Entrepreneurs
MGSC 6200	Information Analysis
NNMD 5270	Introduction to Nanomedicine
NNMD 5470	Nano/Biomedical Commercialization: Concept to Market
PHSC 6218	Biomedical Chemical Analysis
PHSC 6224	Behavioral Pharmacology and Drug Discovery
PHSC 6290	Biophysical Methods in Drug Discovery
PHSC 7010	Pharmaceutical Sciences Laboratory
TECE 6230	Entrepreneurial Marketing and Selling
TECE 6250	Lean Design and Development

### Program Credit/GPA Requirements

12 total semester hours required  
Minimum 3.000 GPA required

## Marine and Environmental Sciences

Website (<http://www.northeastern.edu/mes/>)

### Geoffrey C. Trussell, PhD

Professor and Chair

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The PhD program in marine and environmental sciences is designed to train high-caliber and independent scientists whose research addresses fundamental and applied ecological and evolutionary questions at local, regional, national, and global scales.

This training will include both general and specialized course work in ecology and evolution, geoscience, sustainability, and marine sciences, with curricular programs providing specialized options tailored to each student's research interests. Students benefit from top-notch research facilities at the Marine Science Center in Nahant and on the main campus in Boston. Graduates of the program are prepared for careers in academia, government agencies, and the private sector.

The Master of Science in Marine Biology, also known as the Three Seas Program, gives students an opportunity to learn in three world-renowned research facilities in New England, the Caribbean, and the Pacific Northwest. In addition to rigorous course work, the program offers the opportunity for students to formulate research questions, design and conduct critical experiments, and interpret and present results. The 15-month program culminates with an internship in the field and independent research project.

The Master of Science in Environmental Science and Policy is a joint program between the College of Science and the College of Social Sciences and Humanities' School of Public Policy and Urban Affairs. The interdisciplinary program aims to prepare the next generation of environmental professionals for dynamic opportunities focused on the science and policy of sustainability and resilience.

## Programs

### Doctor of Philosophy (PhD)

- Marine and Environmental Sciences (p. 396)
- Marine and Environmental Sciences—Advanced Entry (p. 398)

### Master of Science (MS)

- Environmental Science and Policy (p. 399)
- Marine Biology—Three Seas Program (p. 401)

## Marine and Environmental Sciences, PhD

The PhD in Marine and Environmental Sciences (MES) program provides students with advanced course work and training in the concentration areas of marine sciences, geosciences, sustainability sciences, and ecology and evolutionary biology.

Students must pass three examinations during the course of their graduate studies:

1. An oral examination by the student's dissertation committee.
2. A proposal defense presented to the student's dissertation committee that explains the research areas that the student proposes to work in.
3. A defense of the student's written dissertation consisting of a public seminar, public question-and-answer period, and private defense of their work to their dissertation committee. Dissertation committees consist of at least four Northeastern faculty and one external faculty member.

A cumulative GPA of 3.000 is required for graduation. All PhD students are required to have at least two first-authored publications submitted to or accepted in a peer-reviewed journal prior to their defense. The PhD will be awarded following submission of a dissertation, approved by the candidate's dissertation committee, to the College of Science.

## Program Requirements

### Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

Annual review  
Dissertation committee  
Qualifying examination  
Dissertation proposal  
Candidacy  
First-author publication  
Dissertation defense

### Core Requirements

Code	Title	Hours
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#### Statistics

Complete one of the following: 4

ENVR 6500 and ENVR 6501	Biostatistics and Lab for ENVR 6500	
EEMB 5522 and EEMB 5523	Experimental Design Marine Ecology and Lab for EEMB 5522	

Alternative statistics course as approved by graduate committee

#### Research

Complete the following (repeatable) course twice: 8

EEMB 8984	Research	
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### Concentration

Complete one of the following concentrations:

- Ecology and Evolutionary Biology (p. 397)
- Sustainability Sciences (p. 397)
- Geosciences (p. 398)
- Marine Sciences (p. 398)

### ECOLOGY AND EVOLUTIONARY BIOLOGY

Code	Title	Hours
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#### Seminars

EEMB 7102	Seminar in Ecology and Evolutionary Biology	2
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Complete one of the following: 2

EEMB 7101	Seminar in Marine and Environmental Sciences	
EEMB 7103	Seminar in Sustainability Sciences	
EEMB 7104	Seminar in Geosciences	

#### Readings

EEMB 8102	Readings in Ecology and Evolutionary Biology	2
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#### Concentration-Specific Electives

Complete 12 semester hours from the following: 12

ENVR 5210	Environmental Planning	
ENVR 5242 and ENVR 5243	Ancient Marine Life and Lab for ENVR 5242	
ENVR 5260	Geographical Information Systems	
EEMB 5130 and EEMB 5131	Ecological Dynamics and Lab for EEMB 5130	
EEMB 5504	Biology of Corals	

EEMB 5506	Biology and Ecology of Fishes	
EEMB 5508 and EEMB 5509	Marine Birds and Mammals and Lab for EEMB 5508	
EEMB 5512	Tropical Terrestrial Ecology	
EEMB 5516 and EEMB 5517	Oceanography and Lab for EEMB 5516	
EEMB 5518	Ocean and Coastal Processes	
EEMB 5520	Coral Reef Ecology	
EEMB 5528	Marine Conservation Biology	
EEMB 5532	Physiological and Molecular Marine Ecology	
EEMB 5534 and EEMB 5535	Marine Invertebrate Zoology and Botany and Lab for EEMB 5534	
EEMB 5536	Ocean and Coastal Sustainability	

Substitutions may be made with approval of graduate committee.

### SUSTAINABILITY SCIENCES

Code	Title	Hours
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#### Seminars

EEMB 7103	Seminar in Sustainability Sciences	2
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Complete one of the following: 2

EEMB 7101	Seminar in Marine and Environmental Sciences	
EEMB 7102	Seminar in Ecology and Evolutionary Biology	
EEMB 7104	Seminar in Geosciences	

#### Readings

EEMB 8103	Readings in Sustainability Sciences	2
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#### Concentration-Specific Electives

Complete 12 semester hours from the following: 12

ENVR 5115	Advanced Topics in Environmental Geology	
ENVR 5260	Geographical Information Systems	
EEMB 5130 and EEMB 5131	Ecological Dynamics and Lab for EEMB 5130	
EEMB 5506	Biology and Ecology of Fishes	
EEMB 5516 and EEMB 5517	Oceanography and Lab for EEMB 5516	
EEMB 5518	Ocean and Coastal Processes	
EEMB 5528	Marine Conservation Biology	
EEMB 5536	Ocean and Coastal Sustainability	
INSH 5301	Introduction to Computational Statistics	
INSH 5302	Information Design and Visual Analytics	
INSH 6406	Analyzing Complex Digitized Data	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 7346	Resilient Cities	
POLS 7202	Quantitative Techniques	
POLS 7334	Social Networks	

Substitutions may be made with approval of graduate committee.

**GEOSCIENCES**

Code	Title	Hours
<b>Seminars</b>		
EEMB 7104	Seminar in Geosciences	2
Complete one of the following:		2
EEMB 7101	Seminar in Marine and Environmental Sciences	
EEMB 7102	Seminar in Ecology and Evolutionary Biology	
EEMB 7103	Seminar in Sustainability Sciences	
<b>Readings</b>		
EEMB 8104	Readings in Geosciences	2
<b>Concentration-Specific Electives</b>		
Complete 12 semester hours from the following:		12
ENVR 5115	Advanced Topics in Environmental Geology	
ENVR 5190	Soil Science	
ENVR 5210	Environmental Planning	
ENVR 5240 and ENVR 5241	Sedimentary Basin Analysis and Lab for ENVR 5240	
ENVR 5242 and ENVR 5243	Ancient Marine Life and Lab for ENVR 5242	
ENVR 5260	Geographical Information Systems	
ENVR 5270 and ENVR 5271	Glacial and Quaternary History and Lab for ENVR 5270	
EEMB 5518	Ocean and Coastal Processes	
EEMB 5536	Ocean and Coastal Sustainability	
Substitutions may be made with approval of graduate committee.		

**MARINE SCIENCES**

Code	Title	Hours
<b>Seminars</b>		
EEMB 7101	Seminar in Marine and Environmental Sciences	2
Complete one of the following:		2
EEMB 7102	Seminar in Ecology and Evolutionary Biology	
EEMB 7103	Seminar in Sustainability Sciences	
EEMB 7104	Seminar in Geosciences	
<b>Readings</b>		
EEMB 8101	Readings in Marine Sciences	2
<b>Concentration-Specific Electives</b>		
Complete 12 semester hours from the following:		12
ENVR 5242 and ENVR 5243	Ancient Marine Life and Lab for ENVR 5242	
ENVR 5260	Geographical Information Systems	
ENVR 5270 and ENVR 5271	Glacial and Quaternary History and Lab for ENVR 5270	
EEMB 5130 and EEMB 5131	Ecological Dynamics and Lab for EEMB 5130	
EEMB 5504	Biology of Corals	
EEMB 5506	Biology and Ecology of Fishes	
EEMB 5508 and EEMB 5509	Marine Birds and Mammals and Lab for EEMB 5508	
EEMB 5516 and EEMB 5517	Oceanography and Lab for EEMB 5516	

EEMB 5518	Ocean and Coastal Processes
EEMB 5520	Coral Reef Ecology
EEMB 5528	Marine Conservation Biology
EEMB 5534 and EEMB 5535	Marine Invertebrate Zoology and Botany and Lab for EEMB 5534
EEMB 5536	Ocean and Coastal Sustainability
Substitutions may be made with approval of graduate committee.	

**Dissertation**

Code	Title	Hours
Complete the following (repeatable) course twice:		
EEMB 9990	Dissertation	

**Program Credit/GPA Requirements**

30 total semester hours required  
Minimum 3.000 GPA required

**Marine and Environmental Sciences, PhD—Advanced Entry**

The PhD in Marine and Environmental Sciences (MES) program provides students with advanced course work and training in the concentration areas of marine science, geoscience, sustainability, and ecology and evolution.

Students must pass three examinations during the course of their graduate studies:

1. An oral examination by the student's dissertation committee.
2. A proposal defense presented to the student's dissertation committee that explains the research areas that the student proposes to work in.
3. A defense of the student's written dissertation consisting of a public seminar, public question-and-answer period, and private defense of their work to their dissertation committee. Dissertation committees consist of at least four Northeastern faculty and one external faculty member.

A cumulative GPA of 3.000 is required for graduation. All PhD students are required to have at least two first-authored publications submitted to or accepted in a peer-reviewed journal prior to their defense. The PhD will be awarded following submission of a dissertation, approved by the candidate's dissertation committee, to the College of Science.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Milestones**

Annual review  
Dissertation committee  
Qualifying examination  
Dissertation proposal  
Candidacy  
First-author publication  
Dissertation defense

### Core Requirements

Code	Title	Hours
<b>Statistics</b>		
Complete one of the following:		4
ENVR 6500 and ENVR 6501	Biostatistics and Lab for ENVR 6500	
EEMB 5522 and EEMB 5523	Experimental Design Marine Ecology and Lab for EEMB 5522	

Alternative statistics course as approved by graduate committee

### Concentration

Complete one of the following concentrations:

- Ecology and Evolutionary Biology (p. 399)
- Sustainability Sciences (p. 399)
- Geosciences (p. 399)
- Marine Sciences (p. 399)

### ECOLOGY AND EVOLUTIONARY BIOLOGY

Code	Title	Hours
<b>Seminars</b>		
EEMB 7102	Seminar in Ecology and Evolutionary Biology	2
Complete one of the following:		2
EEMB 7101	Seminar in Marine and Environmental Sciences	
EEMB 7103	Seminar in Sustainability Sciences	
EEMB 7104	Seminar in Geosciences	
<b>Readings</b>		
EEMB 8102	Readings in Ecology and Evolutionary Biology	2

### SUSTAINABILITY SCIENCES

Code	Title	Hours
<b>Seminars</b>		
EEMB 7103	Seminar in Sustainability Sciences	2
Complete one of the following:		2
EEMB 7101	Seminar in Marine and Environmental Sciences	
EEMB 7102	Seminar in Ecology and Evolutionary Biology	
EEMB 7104	Seminar in Geosciences	
<b>Readings</b>		
EEMB 8103	Readings in Sustainability Sciences	2

### GEOSCIENCES

Code	Title	Hours
<b>Seminars</b>		
EEMB 7104	Seminar in Geosciences	2
Complete one of the following:		2
EEMB 7101	Seminar in Marine and Environmental Sciences	
EEMB 7102	Seminar in Ecology and Evolutionary Biology	
EEMB 7103	Seminar in Sustainability Sciences	

### Readings

EEMB 8104	Readings in Geosciences	2
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### MARINE SCIENCES

Code	Title	Hours
<b>Seminars</b>		
EEMB 7101	Seminar in Marine and Environmental Sciences	2
Complete one of the following:		2
EEMB 7102	Seminar in Ecology and Evolutionary Biology	
EEMB 7103	Seminar in Sustainability Sciences	
EEMB 7104	Seminar in Geosciences	

### Readings

EEMB 8101	Readings in Marine Sciences	2
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### Dissertation

Code	Title	Hours
Complete the following (repeatable) course twice:		
EEMB 9990	Dissertation	

### Program Credit/GPA Requirements

10 total semester hours required  
 Minimum 3.000 GPA required

## Environmental Science and Policy, MS

The Master of Science in Environmental Science and Policy program emphasizes a broadly interdisciplinary and synthetic approach that integrates knowledge in the environmental sciences (conservation biology, climate change, fisheries science, ecosystem function, biodiversity, restoration ecology) with the social sciences (policy, economics, sociology, political science, and development) and humanities (environmental history, philosophy, and ethics). The goal of the program is to equip professionals with substantive breadth in knowledge and skills at the intersection of environmental science and policy. The program focuses on training students to think critically about the underlying causes of environmental problems and understanding the reciprocal relationships between coupled human-natural ecosystems and the interconnections between social and technological innovations. The program explores practical approaches and potential solutions that decision makers need to evaluate in policy debates related to promoting environmental sustainability.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
<b>Seminars</b>		
PPUA 6101	Environmental Science and Policy Seminar 1	4
ENVR 6102	Environmental Science and Policy Seminar 2	4

### Skills Courses

Complete 2 courses from the following. At least one course needs to be taken from the College of Science Skills Course List and one course from the College of Social Sciences and Humanities Skills Course List.

**College of Science Skills Course List**

EEMB 5130	Ecological Dynamics
EEMB 5522	Experimental Design Marine Ecology
ENVR 5210	Environmental Planning
ENVR 5260	Geographical Information Systems
ENVR 6500	Biostatistics

**College of Social Sciences and Humanities Skills Course List**

INSH 5301	Introduction to Computational Statistics
LPSC 6313	Economic Analysis for Law, Policy, and Planning
LPSC 7215	Advanced Quantitative Techniques
LPSC 7305	Research and Statistical Methods
LPSC 7311	Strategizing Public Policy
POLS 7201	Research Design
PPUA 5260	Ecological Economics
PPUA 5261	Dynamic Modeling for Environmental Decision Making
PPUA 5263	Geographic Information Systems for Urban and Regional Policy
PPUA 6205	Research Design and Methodology in Urban and Regional Policy
PPUA 6210	Research Toolkit for Urban and Regional Policy: Cost/Benefit Analysis
PPUA 6212	Research Toolkit for Urban and Regional Policy: Project Management
PPUA 6213	Research Toolkit for Urban and Regional Policy: Data Visualization
PPUA 6216	Research Toolkit for Urban and Regional Policy: Grant Writing
PPUA 6502	Economic Analysis for Policy and Planning
PPUA 6506	Techniques of Policy Analysis
PPUA 6509	Techniques of Program Evaluation
PPUA 6525	Institutions and Public Policy
PPUA 7237	Advanced Spatial Analysis of Urban Systems

**Electives**

Complete 5 courses from the following list. At least two courses must be taken from the College of Science Elective Course List and two courses from the College of Social Sciences and Humanities Elective Course List. Any skills course not taken to fulfill the skills courses requirement can be taken as an elective. Students may petition to enroll in other relevant graduate courses offered by other schools at Northeastern University.

**COLLEGE OF SCIENCE ELECTIVE LIST**

Code	Title	Hours
EEMB 5536	Ocean and Coastal Sustainability	
EEMB 6465	Ecological and Conservation Genomics	
EEMB 6470	Coastal Ecology and Sustainability	
ENVR 5210	Environmental Planning	
ENVR 5984	Research	

ENVR 6150	Food Security and Sustainability
ENVR 6900	Topics: Networks and Biology

**COLLEGE OF SOCIAL SCIENCES AND HUMANITIES ELECTIVE LIST**

Code	Title	Hours
INSH 5302	Information Design and Visual Analytics	
LPSC 7311	Strategizing Public Policy	
LPSC 7312	Cities, Sustainability, and Climate Change	
PHTH 5214	Environmental Health	
PPUA 5225	The Open Classroom: Public Debates on Public Policy	
PHTH 5230	Global Health	
PHTH 5440	Community-Based Participatory Research: Environmental Health	
PPUA 5260	Ecological Economics	
PPUA 5262	Big Data for Cities	
PPUA 5264	Energy Transitions and Climate Resilience: Technology, Policy, and Social Change	
PPUA 5266	Urban Theory and Science	
PPUA 5270	Food Systems and Public Policy	
PPUA 5390	Special Topics in Public Policy and Urban Affairs	
PPUA 6201	The 21st-Century City: Urban Opportunities and Challenges in a Global Context	
PPUA 6204	Urban Development and Politics	
PPUA 6505	Public Budgeting and Financial Management	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6522	Administrative Ethics and Public Management	
PPUA 6551	Nonprofit Organizations and Social Change	
PPUA 6552	The Nonprofit Sector in Civil Society and Public Affairs	
PPUA 6553	Nonprofit Financial Resource Development	
PPUA 6862	Internship with Research	
PPUA 6966	Practicum	
PPUA 7230	Housing Policy	
PPUA 7231	Transportation Policy	
PPUA 7234	Land Use and Urban Growth Policy	
PPUA 7239	Problems in Metropolitan Policymaking	
PPUA 7249	Urban Coastal Sustainability	
PPUA 7346	Resilient Cities	
PPUA 7673	Capstone in Public Policy and Urban Affairs	
SOCL 7235	Urban Sociology	
SOCL 7243	Sociology of Health and Illness	
SOCL 7257	Contemporary Issues in Sociology	
SOCL 7267	Environment, Health, and Society	
SOCL 7287	Social Movements in Health	



## Program Credit/GPA Requirements

36 total semester hours required  
Minimum 3.000 GPA required

### Marine Biology, MS—Three Seas Program

The MS in Marine Biology—Three Seas Program provides students the opportunity to study marine biology in three distinct environments at three world-renowned research facilities in New England, the Caribbean, and the Pacific Northwest. An internship in the field and independent research project provide the capstone to the fifteen-month graduate program.

Much more than course work in a classroom, the MS in Marine Biology—Three Seas Program delivers inquiry-based curriculum in marine science during which our students formulate research questions, design and conduct critical experiments, and interpret and present results. You will have an opportunity not only learn science, you have an opportunity to learn how to do science and become a marine scientist.

This program is for students eager to broaden their knowledge of marine biology or who want to further refine their interests.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Students register for International Study—Three Seas Program (ABRS 5120) for the fall and spring terms of year 1.

Code	Title	Hours
<b>Seminar</b>		
EEMB 5303	Marine Biology Careers Seminar	1
<b>Biology</b>		
EEMB 5504	Biology of Corals	3
EEMB 5506	Biology and Ecology of Fishes	3
EEMB 5508 and EEMB 5509	Marine Birds and Mammals and Lab for EEMB 5508	3
EEMB 5518	Ocean and Coastal Processes	2
EEMB 5534 and EEMB 5535	Marine Invertebrate Zoology and Botany and Lab for EEMB 5534	5
<b>Sustainability</b>		
EEMB 5516 and EEMB 5517	Oceanography and Lab for EEMB 5516	5
EEMB 5528	Marine Conservation Biology	3
EEMB 5536	Ocean and Coastal Sustainability	3
<b>Ecology</b>		
EEMB 5512	Tropical Terrestrial Ecology	1
EEMB 5520	Coral Reef Ecology	2
EEMB 5522 and EEMB 5523	Experimental Design Marine Ecology and Lab for EEMB 5522	5
EEMB 5532	Physiological and Molecular Marine Ecology	3
<b>Research</b>		
EEMB 5589	Diving Research Methods	2
Take the following (repeatable) course twice:		
EEMB 7674	Marine Biology Research Project	2

## Program Credit/GPA Requirements

43 total semester hours required  
Minimum 3.000 GPA required

## Plan of Study

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
EEMB 5303	1	EEMB 5504	3	EEMB 7674	1
EEMB 5516 and EEMB 5517	5	EEMB 5506	3		
EEMB 5522 and EEMB 5523	5	EEMB 5508 and EEMB 5509	3		
EEMB 5534 and EEMB 5535	5	EEMB 5512	1		
EEMB 5536	3	EEMB 5518	2		
EEMB 5589	2	EEMB 5520	2		
		EEMB 5528	3		
		EEMB 5532	3		
	21		20		1
Year 2					
Fall	Hours				
EEMB 7674	1				
	1				

Total Hours: 43

## Mathematics

Website (<http://www.northeastern.edu/cos/mathematics/>)

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### Oana Sambeteanu

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Mathematics is of ever-increasing importance to our society and everyday life. It has long been the language of science and technology and provides a rich source of methods for analyzing and solving problems encountered in the physical world. Today, mathematics is essential in virtually all fields of human endeavor, including business, the arts, and the social sciences.

PhD students work with internationally recognized faculty in research programs in both pure and applied mathematics. The program

is designed to provide students with a broad overview of current mathematics and a strong command of areas of specialization.

The Department of Mathematics also offers Master of Science degrees in mathematics, applied mathematics, and operations research. These programs prepare students for careers in business, industry, or government. Students pursuing degrees in applied math and operations research take part in Northeastern's signature co-op program.

In addition to the numerous seminars and colloquia at Northeastern, there are ample opportunities for students in the Boston area to learn about important recent advances in the field.

## Programs

### Doctor of Philosophy (PhD)

- Mathematics (p. 402)
- Mathematics—Advanced Entry (p. 404)

### Master of Science (MS)

- Applied Mathematics (p. 406)
- Mathematics (p. 407)

### Master of Science in Operations Research (MSOR)

- Operations Research (p. 407)

## Mathematics, PhD

### Course Requirements

Students entering with a bachelor's degree are required to take 64 semester hours of course work divided between foundational and advanced offerings. Students entering the program will be allowed to place out of some (possibly all) of the eight basic-level courses; the graduate coordinator together with the first-year graduate advisor will determine the allowable course substitutions and will advise the student which foundational courses to take. Students may satisfy requirements for Algebra 1 (MATH 5111) and Analysis 1: Functions of One Variable (MATH 5101) by taking qualifying exams in algebra 1 and in analysis 1 at the start of the program. Students may satisfy foundational course requirements if they demonstrate proficiency by passing an assessment exam in the course at the beginning of the semester or by demonstrating that they have taken a similar course and have adequate knowledge of the course material (syllabus and transcript are required; a brief oral examination is also required in that case). Academic advising will happen just before the start of each term and during the add/drop period in order to plan a student's course registration for the term. A complete listing of foundational and advanced courses is available from the Department of Mathematics and the graduate dean's office. Students are not permitted to register for more than two "readings" courses and three "topics" courses for credit toward the degree without explicit permission from the graduate dean. A minimum grade-point average (GPA) of 3.000 is required for degree conferral.

### Teaching Requirement

Some teaching experience is required while in the program. Students must attend university-led TA training at the start of the program; attend a one-semester TA training course conducted by faculty from the Department of Mathematics teaching committee; spend one semester shadowing faculty in the undergraduate classroom; and perform recitations and grading for the undergraduate course they are shadowing.

### Qualifying Exams

Qualifying exam sessions are given once in spring and once in fall. Students will be required to pass four qualifying exams: algebra 1, analysis 1, and two other exams. The possible additional topics for qualifying exams are algebra 2, analysis 2, combinatorics, geometry, ordinary differential equations, partial differential equations, probability, statistics, topology, and algebraic geometry. A qualifying exam may be taken twice by any student. Additional attempts may be allowed at the discretion of the graduate committee with permission from the graduate dean in the College of Science. Two qualifying exams should be passed no later than the end of the second year and all four by the end of the third year.

### Doctoral Candidacy

PhD candidacy is reached when all of the following conditions are met:

- Completion of eight advanced courses
- Identification of an unsolved research problem
- Successful passing of four qualifying exams
- Assignment of PhD supervisor and creation of a 1-page initial plan
- Completion of a 3-page plan of research
- Completion of a 10-page progress report and a one-hour defense of proposal, presented to supervisor and three faculty members of graduate committee

### Dissertation Requirement

Each candidate must complete a dissertation that embodies the results of extended research and makes an original contribution to the field. This work should give evidence of the candidate's ability to carry out independent investigation and interpret, in a logical manner, the results of the research. There are two stages to this process:

- **Stage 1:** Students in the PhD program must have a dissertation supervisor within two years after joining the PhD program. The department views the failure of a student to find a supervisor within two years of joining the PhD program with concern and considers this sufficient cause to review the student's status in the PhD program. The process of obtaining a dissertation supervisor always involves two choices—the student chooses the supervisor, and the supervisor chooses the student. For this reason, the department does not guarantee a dissertation supervisor for every student, but the department recognizes its responsibility to help the student find a satisfactory match. This aid is usually provided by the student's graduate advisor, who should be familiar with the student's progress in finding a dissertation supervisor. The dissertation supervisor guides the student's further education as well as directs the student's dissertation. The dissertation itself must represent an original solution of a problem in the chosen area of mathematics that makes a significant contribution to the mathematical knowledge in that area. Students must enroll in Dissertation or Dissertation Continuation while fulfilling the dissertation requirements.
- **Stage 2 (dissertation defense):** The final oral examination on the dissertation is held in accordance with university regulations and given by a dissertation committee of four faculty members (three from the university, including the supervisor, and one from outside Northeastern University). The dissertation supervisor should propose this dissertation committee to the graduate committee for its approval at least one month before the PhD dissertation defense.

## Program Requirements Bachelor's Degree Entry

Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

- Four qualifying examinations
- Annual review
- Teaching requirement
- Doctoral candidacy
- Dissertation committee
- Dissertation proposal
- Progress report and presentation
- Dissertation defense

### Prerequisites

Code	Title	Hours
<b>Algebra and Analysis</b>		
MATH 5101	Analysis 1: Functions of One Variable	4
MATH 5111	Algebra 1	4

### Tracks

Complete one of the following three tracks:

- Pure Track (p. 403)
- Discrete Track (p. 403)
- Probability and Statistics Track (p. 403)

### PURE TRACK

Code	Title	Hours
<b>Analysis</b>		
MATH 5102	Analysis 2: Functions of Several Variables	4
<b>Algebra</b>		
MATH 5112	Algebra 2	4
<b>Foundational Courses</b>		
Complete up to 16 semester hours from the following:		16
MATH 7202	Partial Differential Equations 1	
MATH 7203	Numerical Analysis 1	
MATH 7205	Numerical Analysis 2	
MATH 7221	Topology 2	
MATH 7233	Graph Theory	
MATH 7241	Probability 1	
MATH 7341	Probability 2	
MATH 7342	Mathematical Statistics	
MATH 7343	Applied Statistics	
<b>Advanced Course Work</b>		
Complete 32 semester hours from the advanced course work list. Only two readings and three topics courses are allowed. (p. 403)		32

### DISCRETE TRACK

Code	Title	Hours
<b>Algebra</b>		
MATH 5112	Algebra 2	4
<b>Probability</b>		
MATH 7241	Probability 1	4
<b>Foundational Courses</b>		

Complete up to 16 semester hours from the following:		16
MATH 5102	Analysis 2: Functions of Several Variables	
MATH 5111	Algebra 1	
MATH 5112	Algebra 2	
MATH 7202	Partial Differential Equations 1	
MATH 7203	Numerical Analysis 1	
MATH 7205	Numerical Analysis 2	
MATH 7221	Topology 2	
MATH 7233	Graph Theory	
MATH 7341	Probability 2	
MATH 7342	Mathematical Statistics	
MATH 7343	Applied Statistics	

### Advanced Course Work

Complete 32 semester hours from the advanced course work list. Only two readings and three topics courses are allowed. (p. 403)		32
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### PROBABILITY AND STATISTICS TRACK

Code	Title	Hours
<b>Analysis</b>		
Complete 4 semester hours from the following:		4
MATH 5102	Analysis 2: Functions of Several Variables	
MATH 7203	Numerical Analysis 1	
<b>Probability</b>		
MATH 7241	Probability 1	4
or MATH 7342	Mathematical Statistics	
<b>Foundational Courses</b>		
Complete up to 16 semester hours from the following:		16
MATH 5102	Analysis 2: Functions of Several Variables	
MATH 5112	Algebra 2	
MATH 7202	Partial Differential Equations 1	
MATH 7203	Numerical Analysis 1	
MATH 7205	Numerical Analysis 2	
MATH 7221	Topology 2	
MATH 7233	Graph Theory	
MATH 7241	Probability 1	
MATH 7341	Probability 2	
MATH 7342	Mathematical Statistics	
MATH 7343	Applied Statistics	

### Advanced Course Work

Complete 32 semester hours from the advanced course work list. Only two readings and three topics courses are allowed. (p. 403)		32
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### Advanced Course Work List

Code	Title	Hours
MATH 7206	Inverse Problems: Radon Transform, X-Ray Transform, and Applications	
MATH 7234	Optimization and Complexity	
MATH 7301	Functional Analysis	
MATH 7303	Complex Manifolds	
MATH 7312	Lie Theory	
MATH 7315	Algebraic Number Theory	

MATH 7316	Lie Algebras
MATH 7317	Modern Representation Theory
MATH 7320	Modern Algebraic Geometry
MATH 7344	Regression, ANOVA, and Design
MATH 7345	Nonparametric Methods in Statistics
MATH 7346 to MATH 7361	
MATH 7371	Morse Theory
MATH 7374	Riemannian Geometry and General Relativity
MATH 7976 to MATH 8986	
MATH 8460	Graduate Seminar in Geometry and Representation Theory
MATH 9948	Modern Mathematical Research
MATH 9984	Research

**Topics**

Only three topics courses are allowed.

MATH 7362	Topics in Algebra
MATH 7364	Topics in Representation Theory
MATH 7376	Topics in Differential Geometry
MATH 7381	Topics in Combinatorics
MATH 7382	Topics in Probability
MATH 7392	Topics in Geometry

**Readings**

Only two readings courses are allowed.

MATH 7721	Readings in Topology
MATH 7732	Readings in Combinatorial Geometry
MATH 7733	Readings in Graph Theory
MATH 7734	Readings in Algebra
MATH 7735	Readings in Algebraic Geometry
MATH 7741	Readings in Probability and Statistics
MATH 7751	Readings: Analysis
MATH 7754	Readings in Ordinary Differential Equations
MATH 7771	Readings in Geometry

**Dissertation**

Code	Title	Hours
Complete the following (repeatable) course twice:		
MATH 9990	Dissertation	

**Program Credit/GPA Requirements**

64 total semester hours required

Minimum 3.000 GPA required

**Mathematics, PhD—Advanced Entry****Course Requirements**

Advanced students who enter the PhD program with a master's degree (or equivalent) will be allowed to place out of some (possibly all) of the eight basic-level courses; the graduate coordinator together with the first-year graduate advisor will determine the allowable course substitutions and will advise the student which foundational courses to take. Students may satisfy requirements for Algebra 1 (Algebra 1 (MATH 5111) and Analysis 1: Functions of One Variable (MATH 5101)) by taking qualifying exams in algebra 1 and in analysis 1 at the start of the program. Students may satisfy foundational course requirements if they

demonstrate proficiency by passing an assessment exam in the course at the beginning of the semester or by demonstrating that they have taken a similar course and have adequate knowledge of the course material (syllabus and transcript are required; a brief oral examination is also required in that case). Academic advising will happen just before the start of each term and during the add/drop period in order to plan a student's course registration for the term. A complete listing of foundational and advanced courses is available from the Department of Mathematics and the graduate dean's office. Students are not permitted to register for more than two "readings" courses and three "topics" courses for credit toward the degree without explicit permission from the graduate dean. A minimum grade-point average (GPA) of 3.000 is required for degree conferral.

**Teaching Requirement**

Some teaching experience is required while in the program. Students must attend university-led TA training at the start of the program; attend a one-semester TA training course conducted by faculty from the Department of Mathematics teaching committee; spend one semester shadowing faculty in the undergraduate classroom; and perform recitations and grading for the undergraduate course they are shadowing.

**Qualifying Exams**

Qualifying exam sessions are given once in spring and once in fall. Students will be required to pass four qualifying exams: algebra 1, analysis 1, and two other exams. The possible additional topics for qualifying exams are algebra 2, analysis 2, combinatorics, geometry, ordinary differential equations, partial differential equations, probability, statistics, topology, and algebraic geometry. A qualifying exam may be taken twice by any student. Additional attempts may be allowed at the discretion of the graduate committee with permission from the graduate dean in the College of Science. Two qualifying exams should be passed no later than the end of the second year and all four by the end of the third year.

**Doctoral Candidacy**

PhD candidacy is reached when all of the following conditions are met:

- Completion of eight advanced courses
- Identification of an unsolved research problem
- Successful passing of four qualifying exams
- Assignment of PhD supervisor and creation of a 1-page initial plan
- Completion of a 3-page plan of research
- Completion of a 10-page progress report and a one-hour defense of proposal, presented to supervisor and three faculty members of graduate committee

**Dissertation Requirement**

Each candidate must complete a dissertation that embodies the results of extended research and makes an original contribution to the field. This work should give evidence of the candidate's ability to carry out independent investigation and interpret, in a logical manner, the results of the research. There are two stages to this process:

- **Stage 1:** Students in the PhD program must have a dissertation supervisor within two years after joining the PhD program. The department views the failure of a student to find a supervisor within two years of joining the PhD program with concern and considers this sufficient cause to review the student's status in the PhD program. The process of obtaining a dissertation supervisor always involves two choices—the student chooses the supervisor, and the supervisor chooses the student. For this reason, the department does not guarantee a dissertation supervisor for every student, but

the department recognizes its responsibility to help the student find a satisfactory match. This aid is usually provided by the student's graduate advisor, who should be familiar with the student's progress in finding a dissertation supervisor. The dissertation supervisor guides the student's further education as well as directs the student's dissertation. The dissertation itself must represent an original solution of a problem in the chosen area of mathematics that makes a significant contribution to the mathematical knowledge in that area. Students must enroll in Dissertation or Dissertation Continuation while fulfilling the dissertation requirements.

- **Stage 2 (dissertation defense):** The final oral examination on the dissertation is held in accordance with university regulations and given by a dissertation committee of four faculty members (three from the university, including the supervisor, and one from outside Northeastern University). The dissertation supervisor should propose this dissertation committee to the graduate committee for its approval at least one month before the PhD dissertation defense.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

- Four qualifying examinations
- Annual review
- Dissertation committee
- Teaching requirement
- Doctoral candidacy
- Dissertation committee
- Dissertation proposal
- Progress report and presentation
- Dissertation defense

Code	Title	Hours
Complete 0–16 semester hours of the following courses:		
MATH 5101	Analysis 1: Functions of One Variable	4
MATH 5102	Analysis 2: Functions of Several Variables	4
MATH 5111	Algebra 1	4
MATH 5112	Algebra 2	4

### Tracks

Complete one of the following three tracks:

- Pure Track (p. 405)
- Discrete Track (p. 405)
- Probability and Statistics Track (p. 405)

### PURE TRACK

Code	Title	Hours
<b>Foundational Courses</b>		
Complete 0–16 semester hours from the following: 0-16		
MATH 7202	Partial Differential Equations 1	
MATH 7203	Numerical Analysis 1	
MATH 7205	Numerical Analysis 2	
MATH 7221	Topology 2	
MATH 7233	Graph Theory	
MATH 7241	Probability 1	
MATH 7341	Probability 2	
MATH 7342	Mathematical Statistics	

MATH 7343	Applied Statistics	
<b>Advanced Course Work</b>		
Complete 32 semester hours from the advanced course work list. Only two readings and three topics courses are allowed. (p. 405)		32

### DISCRETE TRACK

Code	Title	Hours
<b>Foundational Courses</b>		
Complete 0–16 semester hours from the following:		0 - 16
MATH 5102	Analysis 2: Functions of Several Variables	
MATH 5111	Algebra 1	
MATH 5112	Algebra 2	
MATH 7202	Partial Differential Equations 1	
MATH 7203	Numerical Analysis 1	
MATH 7205	Numerical Analysis 2	
MATH 7221	Topology 2	
MATH 7233	Graph Theory	
MATH 7341	Probability 2	
MATH 7342	Mathematical Statistics	
MATH 7343	Applied Statistics	

<b>Advanced Course Work</b>		
Complete 32 semester hours from the advanced course work list. Only two readings and three topics courses are allowed. (p. 405)		32

### PROBABILITY AND STATISTICS TRACK

Code	Title	Hours
<b>Foundational Courses</b>		
Complete 0–16 semester hours from the following:		0 - 16
MATH 5102	Analysis 2: Functions of Several Variables	
MATH 5112	Algebra 2	
MATH 7202	Partial Differential Equations 1	
MATH 7203	Numerical Analysis 1	
MATH 7205	Numerical Analysis 2	
MATH 7221	Topology 2	
MATH 7233	Graph Theory	
MATH 7241	Probability 1	
MATH 7341	Probability 2	
MATH 7342	Mathematical Statistics	
MATH 7343	Applied Statistics	

<b>Advanced Course Work</b>		
Complete 32 semester hours from the advanced course work list. Only two readings and three topics courses are allowed. (p. 405)		32

### Advanced Course Work List

Code	Title	Hours
MATH 7206	Inverse Problems: Radon Transform, X-Ray Transform, and Applications	
MATH 7234	Optimization and Complexity	
MATH 7301	Functional Analysis	
MATH 7303	Complex Manifolds	
MATH 7312	Lie Theory	

MATH 7315	Algebraic Number Theory
MATH 7316	Lie Algebras
MATH 7317	Modern Representation Theory
MATH 7320	Modern Algebraic Geometry
MATH 7344	Regression, ANOVA, and Design
MATH 7345	Nonparametric Methods in Statistics
MATH 7346 to MATH 7361	
MATH 7371	Morse Theory
MATH 7374	Riemannian Geometry and General Relativity
MATH 7976 to MATH 8986	
MATH 8460	Graduate Seminar in Geometry and Representation Theory
MATH 9948	Modern Mathematical Research
MATH 9984	Research

**Topics**

Only three topics courses are allowed.

MATH 7362	Topics in Algebra
MATH 7364	Topics in Representation Theory
MATH 7376	Topics in Differential Geometry
MATH 7381	Topics in Combinatorics
MATH 7382	Topics in Probability
MATH 7392	Topics in Geometry

**Readings**

Only two readings courses are allowed.

MATH 7721	Readings in Topology
MATH 7732	Readings in Combinatorial Geometry
MATH 7733	Readings in Graph Theory
MATH 7734	Readings in Algebra
MATH 7735	Readings in Algebraic Geometry
MATH 7741	Readings in Probability and Statistics
MATH 7751	Readings: Analysis
MATH 7754	Readings in Ordinary Differential Equations
MATH 7771	Readings in Geometry

**Dissertation**

Code	Title	Hours
MATH 9990	Dissertation	

**Program Credit/GPA Requirements**

32–64 total semester hours required

Minimum 3.000 GPA required

**Applied Mathematics, MS**

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.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Core Requirements**

Code	Title	Hours
<b>Methods and Modeling</b>		
MATH 5131	Introduction to Mathematical Methods and Modeling	4
<b>Algebra and Analysis</b>		
Complete one of the following:		4
MATH 5101	Analysis 1: Functions of One Variable	
MATH 5111	Algebra 1	
MATH 7241	Probability 1	
<b>Statistics</b>		
MATH 7342	Mathematical Statistics	4
or MATH 7343	Applied Statistics	

**Tracks**

Complete one of the following two tracks:

- Data Science Track (p. )
- Course Work Track (p. )

**DATA SCIENCE TRACK**

Code	Title	Hours
<b>Data Science Courses</b>		
Choose two from the following:		8
CS 6140	Machine Learning	
CS 6220	Data Mining Techniques	
DA 5020	Collecting, Storing, and Retrieving Data	
DA 5030	Introduction to Data Mining/Machine Learning	
DS 5220	Supervised Machine Learning and Learning Theory	
DS 5230	Unsupervised Machine Learning and Data Mining	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
INFO 6210	Data Management and Database Design	
MATH 7243	Machine Learning 1: Statistical Learning Theory and Algorithms	

Students may take other courses not on the list above from the College of Computer and Information Science in consultation with their faculty advisor.

**COURSE WORK TRACK**

Code	Title	Hours
<b>Course Work</b>		
Complete 8 semester hours. These courses may be chosen from outside the Department of Mathematics with faculty approval.		8

**Electives**

Code	Title	Hours
Complete 12 semester hours in the following subject area:		12
MATH		

## Program Credit/GPA Requirements

32 total semester hours required  
Minimum 3.000 GPA required

### Mathematics, MS

A total of 32 semester hours, this program offers students with a bachelor's degree in mathematics or a related field an opportunity to broaden their knowledge in the several fields of mathematics and its applications. The program is designed to prepare graduates for careers in business, industry, or government. Previous course work will be evaluated to determine proficiency in certain content areas and degree plan may be tailored accordingly. In some cases, a student may be required to take an assessment exam to determine content and knowledge proficiency. No course can be used to satisfy both a requirement and an elective. To qualify for degree conferral, students must obtain a minimum cumulative average of 3.000, equivalent to a grade of B.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirements

Code	Title	Hours
<b>Algebra 1 and Analysis 1</b>		
MATH 5101	Analysis 1: Functions of One Variable	4
or MATH 5102	Analysis 2: Functions of Several Variables	
MATH 5111	Algebra 1	4
or MATH 5112	Algebra 2	
<b>Algebra 2 and Analysis 2</b>		
MATH 5102	Analysis 2: Functions of Several Variables	4
Complete 4 semester hours from the following:		4
MATH 5112	Algebra 2	
Elective chosen from the list below		

#### Electives

Code	Title	Hours
Complete 16 semester hours from the following:		16
MATH 7202	Partial Differential Equations 1	
MATH 7203	Numerical Analysis 1	
MATH 7205	Numerical Analysis 2	
MATH 7221	Topology 2	
MATH 7233	Graph Theory	
MATH 7234	Optimization and Complexity	
MATH 7241	Probability 1	
MATH 7301	Functional Analysis	
MATH 7341	Probability 2	
MATH 7342	Mathematical Statistics	
MATH 7343	Applied Statistics	
MATH 7344	Regression, ANOVA, and Design	
MATH 7349	Stochastic Calculus and Introduction to No-Arbitrage Finance	

## Program Credit/GPA Requirements

32 total semester hours required  
Minimum 3.000 GPA required

## Operations Research, MSOR

This program seeks to train students in the basic techniques and theory of operations research and their applications to real-world problems. Graduates should have developed their analytical skills to attack complex, large-scale optimization problems of both a deterministic and stochastic nature. Eight 4-semester-hour graduate courses are required for this degree. Previous course work will be evaluated to determine proficiency in certain content areas and degree plan may be tailored accordingly. In some cases, a student may be required to take an assessment exam to determine content and knowledge proficiency. No course can be used to satisfy both a requirement and an elective. To qualify for degree conferral, a minimum cumulative grade-point average of 3.000, equivalent to a grade of B, must be obtained. Some courses listed for this program are offered in the College of Engineering or the College of Computer and Information Systems.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirements

Code	Title	Hours
<b>Probability</b>		
Complete 4 semester hours from the following:		4
MATH 7241	Probability 1	
MATH 7341	Probability 2	
OR 7230	Probabilistic Operation Research	
<b>Statistics</b>		
MATH 7342	Mathematical Statistics	4
or MATH 7343	Applied Statistics	
<b>Operations Research</b>		
OR 6205	Deterministic Operations Research	4
<b>Optimization and Complexity</b>		
MATH 7234	Optimization and Complexity	4

#### Electives

Code	Title	Hours
Complete 16 semester hours from the following:		16
CS 5800	Algorithms	
CS 6140	Machine Learning	
CS 7805	Theory of Computation	
CSYE 6200	Concepts of Object-Oriented Design	
CSYE 6205	Concepts of Object-Oriented Design with C++	
EMGT 5220	Engineering Project Management	
EMGT 6225	Economic Decision Making	
EMGT 6305	Financial Management for Engineers	
GE 5010	Customer-Driven Technical Innovation for Engineers	
GE 5100	Product Development for Engineers	
IE 5400	Healthcare Systems Modeling and Analysis	
IE 5500	Systems Engineering in Public Programs	
IE 5617	Lean Concepts and Applications	

IE 5630	Biosensor and Human Behavior Measurement
IE 6300	Manufacturing Methods and Processes
IE 7200	Supply Chain Engineering
IE 7215	Simulation Analysis
IE 7275	Data Mining in Engineering
IE 7280	Statistical Methods in Engineering
IE 7285	Statistical Quality Control
IE 7290	Reliability Analysis and Risk Assessment
IE 7315	Human Factors Engineering
MATH 7233	Graph Theory
MATH 7346	Time Series
MATH 7349	Stochastic Calculus and Introduction to No-Arbitrage Finance
OR 7235	Inventory Theory
OR 7240	Integer and Nonlinear Optimization
OR 7310	Logistics, Warehousing, and Scheduling

### Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

## Physics

Website (<http://www.northeastern.edu/physics/>)

### Mark Williams, PhD

Professor and Chair

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### Meni Wanunu, PhD

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([ma.williams@northeastern.edu](mailto:ma.williams@northeastern.edu))

### Nancy Wong

Program Coordinator

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[n.wong@northeastern.edu](mailto:n.wong@northeastern.edu)

Physics PhD and Master of Science students at Northeastern University have the opportunity to explore, discover, and apply the fundamental principles that run the universe. The program specializes in several subfields that reflect the forefront research activities of the department.

These specializations include biological physics, condensed matter physics, elementary particle physics, nanomedicine, nanophysics, and network science.

The Department of Physics also offers a Graduate Certificate in Nanomedicine. The certificate is designed for students, engineers, and physicians to develop competency and practical skills in the application of nanotechnology to problems in medicine. This program is appropriate for those working in or seeking careers in biotechnology, pharmaceutical, biomedical, or clinical fields.

## Programs

### Doctor of Philosophy (PhD)

- Physics (p. 408)
- Physics—Advanced Entry (p. 411)

### Master of Science (MS)

- Physics (p. 413)

### Graduate Certificate

- Nanomedicine (p. 414)

## Physics, PhD

The Department of Physics offers a Doctor of Philosophy in Physics with specializations in different subfields that reflect the forefront research activities of the department, including biological physics, condensed matter physics, elementary particle physics, nanomedicine, and network science. The program for the PhD degree consists of the required course work, a qualifying examination, a preliminary research seminar, the completion of a dissertation based upon original research performed by the student, and a dissertation defense upon completion of the dissertation. Based on these measures, students are expected to obtain a graduate-level understanding of basic physics concepts and demonstrate the ability to formulate a research plan, communicate orally a research plan, and conduct and present independent research.

### 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.

### Grade Requirements

The minimum grade required for the successful completion of the Part 1 courses is a B (3.000) average. Students will only be allowed to take the qualifying exam if they fulfill this requirement. The minimum grade required for the successful completion of Part 2 (excluding advanced research) is at least a B (3.000) average for the Part 2 courses. The Part 2 courses, including any makeup of grade-point-average deficiencies (see following), must be completed within two calendar years of passing the qualifying exam. The department expects students to complete the bulk of these courses in the first year after the qualifying exam. The cumulative average will be calculated each semester. No more than two courses or 8 semester hours of credit, whichever is greater, may be repeated in order to satisfy the requirement for the PhD degree. A student who does not maintain a 3.000 cumulative average for two consecutive semesters, or is otherwise not making satisfactory progress toward the PhD degree requirements, may be recommended for termination at the discretion of the graduate committee. Within the above limitations, a required course for which a grade of F is received must be repeated with a grade of C or better and may be repeated only once. In calculating the overall cumulative average, all graduate-level course work completed at the time of clearance for graduation will be counted.

### Qualifying Exam Requirement

A student who fails to achieve the required B average for the Part 1 courses must petition the graduate committee in order to remain in the graduate program and be eligible to take the qualifying exam. A student who fails to achieve the required B average for the Part 2 courses



must petition the graduate committee in order to remain in the graduate program. All students registered in the PhD program are required to pass a qualifying exam unless they are granted an exemption (see below). The qualifying exam may include both written and oral parts.

The qualifying exam consists of two parts:

- **Part 1:** Classical physics (based on classical mechanics and mathematical methods), electromagnetic theory, and statistical physics.
- **Part 2:** Quantum physics (based on quantum mechanics and its applications) and statistical physics. The content of the qualifying exam will be based on the content of the first-year courses, excluding Principles of Experimental Physics (PHYS 5318). A syllabus is available and on request will be distributed by the graduate coordinator to any student prior to the exam.

The qualifying exam is given twice yearly: once prior to the start of the fall semester and again within the first two weeks of the start of the spring semester. The exam will consist of one day each on Part 1 (classical physics/mathematical methods, electromagnetism, and statistical physics) and Part 2 (quantum physics and statistical physics).

All students enrolled in the PhD program must take the fall qualifying exam after completing their first-year course of study with the required grade-point average unless they are granted an exemption. Students taking the exam for the first time must take both Part 1 and Part 2. A student who does not pass the exam on his or her first attempt must pass the exam the next time it is given in order to continue in the PhD program. However, a student who passes one part of the first attempt is not required to repeat that part.

Any PhD student will be exempt from taking the quantum part of the qualifying exam if they receive both a grade of B+ or higher in Quantum Theory 1 (PHYS 7315), Quantum Theory 2 (PHYS 7316), and Statistical Physics (PHYS 7305) and have a GPA of 3.670 or higher in those three courses. To meet this standard, they must take all the above courses. Any PhD student will be exempt from taking the classical part of the qualifying exam if they receive both a grade of B+ or higher in Classical Mechanics/Math Methods (PHYS 7301), Electromagnetic Theory (PHYS 7302), and Statistical Physics (PHYS 7305) and have a GPA of 3.670 or higher in these three courses. To meet this standard, they must take all three of these courses.

A student who fails the written exam by less than 5 percent of the total possible score on the second attempt for that part will be automatically given an oral exam. A student who fails the written exam by more than 10 percent is excluded from taking an oral exam. These provisions apply separately to Parts 1 and 2 of the exam.

## PhD Candidacy

Degree candidacy is established when the student has passed the qualifying examination and completed both the Part 1 and Part 2 course requirements. PhD candidacy may be achieved before completion of the advanced elective if the elective in the student's specialization is not offered in a given year. The elective must be taken at the next opportunity. PhD degree candidacy is certified by the college. A maximum of five years after the establishment of doctoral degree candidacy is allowed for the completion of degree requirements.

## PhD Dissertation Requirement

All PhD students are required to complete a dissertation based upon new and original research in one of the three following options:

- In one of the current theoretical or experimental research programs in the department, under direct supervision of an advisor from the Department of Physics. A dissertation committee will be formed consisting of the advisor, two full-time members of the department, and an additional member, either from within the department or from an outside department or institution.
- In a recognized interdisciplinary field involving another research area of the university, under the direct supervision of a faculty member in that field. In this case, an interdisciplinary committee is formed under the approval of the graduate committee, consisting of the direct supervisor, a departmental advisor, one other member of the department, and an additional member of either the department or the external department.
- In an area of applied research in one of the industrial or high-technology laboratories associated with the department's industrial PhD program. The direct supervisor is associated with the institution where the research is performed. In this case, a dissertation advisory committee is established by the graduate committee, consisting of the direct supervisor, the departmental advisor, and two other members of the department.

PhD students must select their departmental advisor no later than the end of the spring semester of their second year or their second semester after having passed the qualifying examination, whichever comes first. This process should start as soon as the student has identified a field of research or has passed the qualifying exam.

## PhD Dissertation Committee, Preliminary Thesis Proposal, and Preliminary Research Seminar

By the end of the spring semester of the third year or the second semester in which the student is enrolled for PhD dissertation, whichever comes first, each PhD student must have an approved dissertation committee and thesis proposal.

The student (with the aid and approval of his or her thesis advisor) will submit a PhD thesis proposal to the graduate committee clearly outlining a plan to carry out new and original research in the context of previously published research in the scientific literature and also describe the methodologies to be employed. The thesis proposal is limited to 15 pages or less, including references. A proposed makeup of the dissertation committee will be submitted at the same time.

The graduate committee will evaluate the merit of the proposal and make recommendations for improvements when necessary, including any changes to the composition of the dissertation committee. No more than two submissions for a particular proposal may be made. In the case where a revised proposal does not meet a minimum academic standard that provides a basis for making such improvements, the graduate committee may instruct the student to select a different thesis topic or advisor.

After approval by the graduate committee, the proposal is circulated to the general faculty for comments. If the graduate coordinator receives any objections, the proposal will be referred back to the graduate committee for final resolution.

After the proposal and dissertation committee have been approved, the student will make a public presentation of the material in the preliminary research seminar before the dissertation committee in a format open to the full department and advertised one week in advance. The dissertation committee will then meet in closed session to evaluate the seminar. The preliminary research seminar must take place no later than the semester after the thesis proposal is approved and, normally, in the same semester.

In the event that the dissertation advisor is changed, a new committee must be formed, with the approval of the graduate committee, and a new preliminary research seminar given.

### PhD Dissertation Defense

The dissertation defense consists of a public presentation, followed by a question period conducted by the dissertation committee and limited to them and the department faculty. The date of the dissertation presentation must be publicized and a copy of the thesis deposited with the graduate program coordinator at least one week prior to the defense. If during this posting period or in the two business days following the defense a written objection to the thesis is lodged with the department chair by a member of the faculty, the chair may appoint an ad hoc postdefense review committee to provide advice on the scientific issues raised by the objection. Students should note that they must be registered for Dissertation or Dissertation Continuation during the semester in which they defend their dissertation and that they should schedule their defenses well in advance of the end of the semester in order to accommodate the review/waiting period and the time required to deposit the thesis.

The final dissertation defense is held in accordance with the College of Science regulations.

### PhD Specialization Options

Students choose a specialization in biological physics; particle physics; condensed matter physics; or, with preapproval of a faculty member, in the following areas: nanomedicine or network science.

Multiple specializations are allowed if the individual requirements for each specialization are met.

Note that the specialization will not appear on the degree diploma or on the official transcript but can be listed as the field of study on CVs and grant proposals.

### Transfer Credit

Students must petition in writing through the graduate committee to the director of graduate student services for all transfer credit. A copy of an official transcript must be attached to the Request for Transfer Credit form. A maximum of 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.

### Program Requirements

#### Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

#### Milestones

Two qualifying examinations  
Annual review  
Candidacy  
Preliminary research seminar proposal with proposed dissertation committee  
Preliminary research seminar talk  
Dissertation defense

#### Core Requirements<sup>1</sup>

Code	Title	Hours
<b>Principles</b>		
PHYS 5318	Principles of Experimental Physics	4
<b>Computational</b>		
PHYS 7301	Classical Mechanics/Math Methods	4
PHYS 7305	Statistical Physics	4
PHYS 7321	Computational Physics	4
<b>Theory</b>		
PHYS 7302	Electromagnetic Theory	4
PHYS 7315	Quantum Theory 1	4
PHYS 7316	Quantum Theory 2	4
<b>Research</b>		
PHYS 7210	Introduction to Research in Physics (Take this repeatable course twice)	0
PHYS 9984	Advanced Research	1-8

#### Electives

Code	Title	Hours
Complete 8 semester hours from the following:		8
If preapproved to specialize in nanomedicine or network science, consult program director.		
PHYS 7323	Elementary Particle Physics	
PHYS 7324	Condensed Matter Physics	
PHYS 7325	Quantum Field Theory 1	
PHYS 7731	Biological Physics 1	

#### Specialization Elective

Choose 4 semester hours from your specialization below: 4

### PhD Specialization Options

A specialization is required.<sup>2</sup>

*Note:* Specialization in nanomedicine or network science requires prior approval.

Code	Title	Hours
<b>Biological Physics<sup>3</sup></b>		
PHYS 7731	Biological Physics 1	4

PHYS 7741	Biological Physics 2	4
<b>Particle Physics</b> <sup>4</sup>		
PHYS 7323	Elementary Particle Physics	4
PHYS 7326	Quantum Field Theory 2	4
or PHYS 7733	Topics: Elementary Particle Physics and Cosmology	

<b>Condensed Matter Physics</b>		
PHYS 7324	Condensed Matter Physics	4
PHYS 7734	Topics: Condensed Matter Physics	4

<b>Nanomedicine</b>		
NNMD 5270	Introduction to Nanomedicine	3
NNMD 5370	Nanomedicine Research Techniques	4

<b>Network Science</b>		
PHYS 5116	Complex Networks and Applications	4
PHYS 7331	Network Science Data	4

### Dissertation

Code	Title	Hours
Taken third year and beyond.		
Complete the following (repeatable) course twice:		
PHYS 9990	Dissertation	
Complete the following (repeatable) course until graduation:		
PHYS 9996	Dissertation Continuation	

### Program Credit/GPA Requirements

42 total semester hours required  
 Minimum 3.000 GPA required

- <sup>1</sup> Methods for Teaching in the Introductory Physics Laboratory (PHYS 7220) is required for students awarded a Teaching Assistantship.
- <sup>2</sup> 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.
- <sup>3</sup> By approval of the graduate committee, biological physics students may substitute graduate courses in biology, physics, or chemistry from the following list instead of PHYS 7741: Biochemistry (BIOL 6300), Molecular Cell Biology (BIOL 6301), Optical Methods of Analysis (CHEM 5613), Molecular Modeling (CHEM 5638). Additional appropriate courses may also be substituted by approval of the physics graduate committee.
- <sup>4</sup> Elementary Particle Physics (PHYS 7323) is required for a specialization in particle physics. The advanced elective may be Topics: Elementary Particle Physics and Cosmology (PHYS 7733) OR Quantum Field Theory 2 (PHYS 7326).

### Plan of Study

Year 1			
Fall	Hours	Spring	Hours
PHYS 7210	0	PHYS 5318	4
PHYS 7301	4	PHYS 7210	0
PHYS 7302	4	PHYS 7305	4
PHYS 7315	4	PHYS 7316	4
		12	12
Year 2			
Fall	Hours	Spring	Hours
PHYS 7321	4	PHYS 9984	1-8

Electives	8	Advanced elective	4
		12	5-12
<b>Year 3</b>			
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>
PHYS 9990	0	PHYS 9990	0
		0	0

Total Hours: 41-48

### Physics, PhD—Advanced Entry

The Department of Physics offers a Doctor of Philosophy in Physics with specializations in different subfields that reflect the forefront research activities of the department, including biological physics, condensed matter physics, elementary particle physics, nanomedicine, and network science. The program for the PhD degree consists of the required course work, a qualifying examination, a preliminary research seminar, the completion of a dissertation based upon original research performed by the student, and a dissertation defense upon completion of the dissertation. Based on these measures, students are expected to obtain a graduate-level understanding of basic physics concepts and demonstrate the ability to formulate a research plan, communicate orally a research plan, and conduct and present independent research.

### Course Work

Students entering with an approved MS degree from a U.S. institution will be required to take 10 semester hours of courses. The courses required will be determined by the graduate coordinator based on the student's transcripts.

### Grade Requirements

The minimum grade required is a B (3.000) average. A student who does not maintain a 3.000 cumulative average for two consecutive semesters, or is otherwise not making satisfactory progress toward the PhD degree requirements, may be recommended for termination at the discretion of the graduate committee.

### Qualifying Exam Requirement

All students registered in the PhD program are required to pass a qualifying exam unless they are granted an exemption. The qualifying exam may include both written and oral parts. Students who enter with a Masters degree from a US institution may take either the classical or the quantum exam, or both, at the first opportunity upon entering the program in the fall. In this case, the exam will count as a first attempt only if the student submits the exam to the examiner.

The qualifying exam consists of two parts:

- **Part 1:** Classical physics (based on classical mechanics and mathematical methods), electromagnetic theory, and statistical physics.
- **Part 2:** Quantum physics (based on quantum mechanics and its applications) and statistical physics. A syllabus is available and on request will be distributed by the graduate coordinator to any student prior to the exam.

The qualifying exam is given twice yearly: once prior to the start of the fall semester and again within the first two weeks of the start of the spring semester. The exam will consist of one day each on Part 1 (classical physics/mathematical methods, electromagnetism, and statistical physics) and Part 2 (quantum physics and statistical physics).

All students enrolled in the PhD program must take the fall qualifying exam after completing their first-year course of study with the required grade-point average. Students taking the exam for the first time must take both Part 1 and Part 2. A student who does not pass the exam on his or her first attempt must pass the exam the next time it is given in order to continue in the PhD program. However, a student who passes one part of the first attempt is not required to repeat that part.

A student who fails the written exam by less than 5 percent of the total possible score on the second attempt for that part will be automatically given an oral exam. A student who fails the written exam by more than 10 percent is excluded from taking an oral exam. These provisions apply separately to Parts 1 and 2 of the exam.

## PhD Candidacy

Degree candidacy is established when the student has passed the qualifying examination and completed 10 semester hours of courses. PhD degree candidacy is certified by the college. A maximum of five years after the establishment of doctoral degree candidacy is allowed for the completion of degree requirements.

## PhD Dissertation Requirement

All PhD students are required to complete a dissertation based upon new and original research in one of the three following options:

- In one of the current theoretical or experimental research programs in the department, under direct supervision of an advisor from the Department of Physics. A dissertation committee will be formed consisting of the advisor, two full-time members of the department, and an additional member, either from within the department or from an outside department or institution.
- In a recognized interdisciplinary field involving another research area of the university, under the direct supervision of a faculty member in that field. In this case, an interdisciplinary committee is formed under the approval of the graduate committee, consisting of the direct supervisor, a departmental advisor, one other member of the department, and an additional member of either the department or the external department.
- In an area of applied research in one of the industrial or high-technology laboratories associated with the department's industrial PhD program. The direct supervisor is associated with the institution where the research is performed. In this case, a dissertation advisory committee is established by the graduate committee, consisting of the direct supervisor, the departmental advisor, and two other members of the department.

PhD students must select their departmental advisor no later than the end of the spring semester of their second year or their second semester after having passed the qualifying examination, whichever comes first. This process should start as soon as the student has identified a field of research or has passed the qualifying exam.

## PhD Dissertation Committee, Preliminary Thesis Proposal, and Preliminary Research Seminar

By the end of the spring semester of the third year or the second semester in which the student is enrolled for PhD dissertation, whichever comes first, each PhD student must have an approved dissertation committee and thesis proposal.

The student (with the aid and approval of his or her thesis advisor) will submit a PhD thesis proposal to the graduate committee clearly outlining a plan to carry out new and original research in the context of previously published research in the scientific literature and also describe the methodologies to be employed. The thesis proposal is limited to 15 pages

or less, including references. A proposed makeup of the dissertation committee will be submitted at the same time.

The graduate committee will evaluate the merit of the proposal and make recommendations for improvements when necessary, including any changes to the composition of the dissertation committee. No more than two submissions for a particular proposal may be made. In the case where a revised proposal does not meet a minimum academic standard that provides a basis for making such improvements, the graduate committee may instruct the student to select a different thesis topic or advisor.

After approval by the graduate committee, the proposal is circulated to the general faculty for comments. If the graduate coordinator receives any objections, the proposal will be referred back to the graduate committee for final resolution.

After the proposal and dissertation committee have been approved, the student will make a public presentation of the material in the preliminary research seminar before the dissertation committee in a format open to the full department and advertised one week in advance. The dissertation committee will then meet in closed session to evaluate the seminar. The preliminary research seminar must take place no later than the semester after the thesis proposal is approved and, normally, in the same semester.

In the event that the dissertation advisor is changed, a new committee must be formed, with the approval of the graduate committee, and a new preliminary research seminar given.

## PhD Dissertation Defense

The dissertation defense consists of a public presentation, followed by a question period conducted by the dissertation committee and limited to them and the department faculty. The date of the dissertation presentation must be publicized and a copy of the thesis deposited with the graduate program coordinator at least one week prior to the defense. If during this posting period or in the two business days following the defense a written objection to the thesis is lodged with the department chair by a member of the faculty, the chair may appoint an ad hoc postdefense review committee to provide advice on the scientific issues raised by the objection. Students should note that they must be registered for Dissertation or Dissertation Continuation during the semester in which they defend their dissertation and that they should schedule their defenses well in advance of the end of the semester in order to accommodate the review/waiting period and the time required to deposit the thesis.

The final dissertation defense is held in accordance with the College of Science regulations.

## Residence Requirement

The residence requirement is satisfied by at least one year of full-time graduate work (i.e., enrollment in PhD Dissertation, for two consecutive semesters). Students must be continually enrolled throughout the pursuit of the dissertation.

## Internship Option

A PhD candidate may spend one year in a participating high-technology, industrial, or government laboratory immediately after passing the PhD qualifying examination. In this program, the student is expected to remain in touch with the university by taking one course per semester at the university and by frequent contact with a faculty advisor. After the one-year paid internship, the student returns to the university to do the dissertation. Eligibility for this program is contingent on acceptance both by the department and by the external laboratory.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

Two qualifying examinations  
Annual review  
Candidacy  
Preliminary research seminar proposal with proposed dissertation committee  
Preliminary research seminar talk  
Dissertation defense

### Core Requirements

Code	Title	Hours
<b>Course Work</b>		
	Students entering with an approved MS degree from a U.S. institution will be required to take 10 semester hours of courses. The courses required will be determined by the graduate program director based on the student's transcripts.	10

### Dissertation

Code	Title	Hours
Complete the following (repeatable) course twice:		
PHYS 9990	Dissertation	
Complete the following (repeatable) course until graduation:		
PHYS 9996	Dissertation Continuation	

### Program Credit/GPA Requirements

10 total semester hours required  
Minimum 3.000 GPA required

<sup>1</sup> Methods for Teaching in the Introductory Physics Laboratory (PHYS 7220) is required for students awarded a Teaching Assistantship.

## Physics, MS

The Department of Physics offers Master of Science degrees with several options. The standard physics MS can be obtained by taking a specified set of courses without an MS thesis. Alternatively, an MS thesis may substitute for 8 credit hours of course work. Both of these options may be pursued either full time or part time. Upon completion of the MS degree in physics, students should be able to apply graduate-level knowledge and solve problems in the areas of electrodynamics, quantum mechanics, classical mechanics, statistical mechanics, and advanced mathematical methods.

### Grade Requirements

To qualify for the MS degree, a cumulative average of 3.000, equivalent to a grade of B, must be obtained. No more than two courses or 6 semester hours of credit, whichever is greater, may be repeated in order to satisfy the requirements for the MS degree. A student who does not maintain a 3.000 cumulative average for two consecutive semesters, or is otherwise not making satisfactory progress toward the MS degree requirements, may be recommended for termination at the discretion of the graduate committee.

Within the above limitations, a required course for which a grade of F is received must be repeated with a grade of C or better and may be

repeated only once. Elective courses in which an F has been received may be repeated once to obtain a C or better.

### Transfer Credit

Students must petition, in writing, through the graduate committee to the director of graduate student services for all transfer credit. An official transcript must be attached to the Request for Transfer Credit form. A maximum of 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.

### Course Work

There is a total of 32 semester hours of course work required as a minimum. There are two options for the MS degree:

Option 1 is the standard physics MS with or without an MS thesis. Up to 8 semester hours of courses can be substituted with an MS thesis.

Option 2 is the MS with a specialization (up to 23 semester hours of courses) in applied physics, engineering physics, biophysics, chemical physics, material physics, mathematical physics, and computational physics.

Graduate students desiring the MS with thesis option should arrange a thesis with a faculty advisor. The student may choose a field of research from three possible areas as outlined under the PhD dissertation section. The thesis must demonstrate the individual's capacity to execute independent work based on original material. The thesis must be approved by the graduate committee. The thesis may be completed in one semester (e.g., summer semester) or in consecutive semesters. Students who have not completed their thesis after the required number of thesis credits (12 semester hours) must register for MS Thesis with the appropriate course number each subsequent semester until the thesis is approved by the graduate school and submitted electronically to Proquest.

Both options require a minimum of 32 semester hours of graduate credit. The 32 semester hours may include up to 8 semester hours of transfer credit as approved by the physics department's graduate committee and the graduate school.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
<b>Computational Course Work</b>		
PHYS 7301	Classical Mechanics/Math Methods	4
PHYS 7305	Statistical Physics	4
PHYS 7321	Computational Physics	4

**Theory Course Work**

PHYS 7302	Electromagnetic Theory	4
PHYS 7315	Quantum Theory 1	4
PHYS 7316	Quantum Theory 2	4

**Options**

- Course work (p. )
- Thesis (p. 414)
- Thesis with specialization (p. 414)<sup>1</sup>

**COURSE WORK OPTION**

Note: In consultation with your faculty advisor you may choose an area of specialization from physics, engineering, chemistry, biology, mathematics, psychology, or computer science. Additional elective courses are listed in the PhD program.

Code	Title	Hours
<b>Electives</b>		
Complete 8 semester hours from the following:		8
PHYS 5111	Astrophysics and Cosmology	
PHYS 5113	Introduction to Particle and Nuclear Physics	
PHYS 5115	Quantum Mechanics	
PHYS 5116	Complex Networks and Applications	
PHYS 5260	Introduction to Nanoscience and Nanotechnology	
PHYS 5318	Principles of Experimental Physics	
PHYS 7323	Elementary Particle Physics	
PHYS 7324	Condensed Matter Physics	
PHYS 7731	Biological Physics 1	

**THESIS**

Code	Title	Hours
<b>Thesis</b>		
PHYS 7990	Thesis	1-4

**Elective**

Complete 4 semester hours from the following:		4
PHYS 5111	Astrophysics and Cosmology	
PHYS 5113	Introduction to Particle and Nuclear Physics	
PHYS 5115	Quantum Mechanics	

**THESIS WITH SPECIALIZATION<sup>1</sup>**

Applied physics, engineering physics, biophysics, chemical physics, materials physics, mathematical physics, or computational physics.

Code	Title	Hours
<b>Thesis</b>		
PHYS 7990	Thesis	1-4
<b>Specialization</b>		
Complete course work in consultation with faculty advisor.		8-12

**Program Credit/GPA Requirements**

32 total semester hours required  
Minimum 3.000 GPA required

<sup>1</sup> Note that the specialization will not appear on the degree diploma or on the official transcript but can be listed as the field of study on CVs and grant proposals.

**Plan of Study**

<b>Year 1</b>			
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>
PHYS 7301	4	PHYS 7305	4
PHYS 7302	4	PHYS 7316	4
PHYS 7315	4	PHYS 7321	4
		12	12
<b>Year 2</b>			
<b>Fall</b>	<b>Hours</b>		
Elective or thesis	4		
Additional elective	4		
		8	
Total Hours: 32			

**Nanomedicine, Graduate Certificate**

The Graduate Certificate in Nanomedicine is designed for scientists, engineers, and physicians to develop competency and practical skills in the application of nanotechnology to problems in medicine. This program is appropriate for those working in or seeking careers in biotechnology, pharmaceutical, biomedical, or clinical fields. Program participants receive advanced training in the fundamental and applied aspects of nanomedicine, as well as nanomedicine commercialization from bench to bedside. The curriculum includes a variety of activities for scientific and professional development, including lectures, case studies, journal readings, term projects, and close interactions with distinguished faculty and experts drawn from academia, hospitals, industry, and government.

The certificate consists of five nanomedicine (NNMD) courses, totaling 12 semester-hour credits. This is a part-time, 12-credit graduate program that can be completed in as little as two semesters.

**Program Requirements**

Complete all requirements listed below unless otherwise indicated.

**Core Requirements**

Code	Title	Hours
NNMD 5270	Introduction to Nanomedicine	3
NNMD 5272	Nanomedicine Seminar 1	1
NNMD 5274	Nanomedicine Seminar 2	1
NNMD 5370	Nanomedicine Research Techniques	4
NNMD 5470	Nano/Biomedical Commercialization: Concept to Market	3

**Electives**

Code	Title	Hours
Students may apply 4 semester hours of elective credit to substitute for NNMD 5370:		
BIOE 5100	Medical Physiology	
BIOL 5307	Biological Electron Microscopy	
BIOL 6381	Ethics in Biological Research	
BIOT 5145	Basic Biotechnology Lab Skills	
BIOT 5225	Managing and Leading a Biotechnology Company	
BIOT 5227	Economics and Marketing for Biotechnology Managers	

BIOT 5700	Molecular Interactions of Proteins in Biopharmaceutical Formulations
BIOT 7245	Biotechnology Applications Laboratory
CHEM 7247	Advances in Nanomaterials
CHME 7350	Transport Phenomena
PHSC 6210	Drug Design, Evaluation, and Development
PHSC 6212	Research Skills and Ethics
PHSC 6216	Human Physiology and Pathophysiology
PHSC 6290	Biophysical Methods in Drug Discovery
PHYS 5260	Introduction to Nanoscience and Nanotechnology
PHYS 7731	Biological Physics 1
PMST 6252	Pharmacokinetics and Drug Metabolism
PMST 6254	Advanced Drug Delivery System
POLS 7333	Science, Technology, and Public Policy

## Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

## Psychology

Website (<http://www.northeastern.edu/psychology/>)

### Joanne L. Miller, PhD

Matthews Distinguished University Professor and Chair

125 Nightingale Hall

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### Judith Hall, PhD

University Distinguished Professor and Director of Graduate Studies,  
j.hall@northeastern.edu (e.cram@northeastern.edu)

Kelsy Smith, Staff Assistant, kel.smith@northeastern.edu  
(%20kel.smith@northeastern.edu)

The Department of Psychology PhD program gives students a research-intensive environment within a close-knit community of faculty and students. There are four main areas of specialization—behavioral neuroscience, cognition, perception, and personality/social—with crosscutting themes in health, affective science, and life span development.

The students are apprentices in faculty laboratories as they work to become experts in psychological science. During the time in the program, the responsibility for collaboration in research shifts from faculty member to student, culminating in the student's dissertation.

In addition to the apprenticeship relationship, there are required courses, advanced seminars, a colloquium series, assignments as teaching assistants, and work leading up to the dissertation.

## Programs

### Doctor of Philosophy (PhD)

- Psychology (p. 415)
- Psychology—Advanced Entry (p. 416)

## Psychology, PhD

The PhD program in the Department of Psychology covers a wide spectrum of contemporary behavioral science within a close-knit community of faculty and students. The program offers four 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, twelve-months-per-year program.

The dissertation committee must include at least three tenured or tenure-track faculty members from within the psychology department—two from the student's interest area and one from another area. The oral defense committee consists of the dissertation committee plus additional tenured and tenure-track faculty members from the psychology department.

## Program Requirements

### Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

- First-year paper
- Master's proposal
- Master's paper
- Master's presentation
- Annual review
- Dissertation committee
- Dissertation proposal
- Dissertation
- Dissertation defense
- At least two assigned courses as teaching assistant

## Core Requirements

All graduate courses within the Department of Psychology are graded S/ U. A grade of S is required in each psychology department course.

Code	Title	Hours
<b>Proseminar</b>		
Complete 12 semester hours from the following:		12
PSYC 5100	Proseminar in Psycholinguistics	
PSYC 5110	Proseminar in Cognition	
PSYC 5120	Proseminar in Sensation	
PSYC 5130	Proseminar in Perception	
PSYC 5140	Proseminar in Biology of Behavior	
PSYC 5150	Proseminar in Clinical Neuroscience	

PSYC 5160	Proseminar in Personality	
PSYC 5170	Proseminar in Social Psychology	
<b>Quantitative Methods</b>		
PSYC 5180	Quantitative Methods 1	3
PSYC 5181	Quantitative Methods 2	3
<b>Ethics</b>		
PSYC 7302	Ethics and Professional Issues	3
<b>Research</b>		
PSYC 7301	Research Methodologies Psychology	3
<b>Project</b>		
Take the following (repeatable) course three times:		9
PSYC 8401	Research Project	
<b>Thesis</b>		
Take the following (repeatable) course twice:		6
PSYC 7990	Thesis	

**Electives**

Code	Title	Hours
Complete 11 semester hours from the following:		11
Note: Proseminars not taken to fulfill core requirements and courses outside the department may be taken if approved by faculty advisor and Director of Graduate Studies.		
PSYC 7200 to PSYC 7300		
PSYC 5100	Proseminar in Psycholinguistics	
PSYC 5110	Proseminar in Cognition	
PSYC 5120	Proseminar in Sensation	
PSYC 5130	Proseminar in Perception	
PSYC 5140	Proseminar in Biology of Behavior	
PSYC 5150	Proseminar in Clinical Neuroscience	
PSYC 5160	Proseminar in Personality	
PSYC 5170	Proseminar in Social Psychology	

**Dissertation**

Code	Title	Hours
Complete the following (repeatable) course twice:		
PSYC 9990	Dissertation	
Complete the following (repeatable) course until graduation:		
PSYC 9996	Dissertation Continuation	

**Program Credit/GPA Requirements**

50 total semester hours required  
 Minimum 3.000 GPA required

**Plan of Study**

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
Complete 6 semester hours of the following:	6	Complete 6 semester hours of the following:	6	PSYC 8401	3
PSYC 5100		PSYC 5100		Elective	6
PSYC 5110		PSYC 5110			
PSYC 5120		PSYC 5120			
PSYC 5130		PSYC 5130			
PSYC 5140		PSYC 5140			

Year 2					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PSYC 5150		PSYC 5150			
PSYC 5160		PSYC 5160			
PSYC 5170		PSYC 5170			
Complete the following:	6	Complete the following:	6		
PSYC 5180		PSYC 5181			
PSYC 8401		PSYC 8401			
	12		12		9
Year 3					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PSYC 7990	3	Complete one of the following:	3	PSYC 7996	0
Elective	5	PSYC 7301			
		PSYC 7302			
		Complete the following:	3		
		PSYC 7990			
	8		6		0
Year 4					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PSYC 9990	0	Complete one of the following:	3	PSYC 9996	0
		PSYC 7301			
		PSYC 7302			
		Complete the following:	0		
		PSYC 9990			
	0		3		0
Year 5					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PSYC 9996	0	PSYC 9996	0	PSYC 9996	0
	0		0		0
Total Hours: 50					

**Psychology, PhD—Advanced Entry**

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-months-per-year program.

For students who enter the program with a suitable master's degree, degree candidacy is established through completion of a set of requirements determined on an individual basis. An additional 20 semester hours beyond the master's degree are required for the PhD degree. The dissertation committee must include at least three tenured or tenure-track faculty members from within the psychology department—two from the student's interest area and one from another area. The oral defense committee consists of the dissertation committee plus additional tenured and tenure-track faculty members from the psychology department.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated. Individual programs of study will be tailored to acknowledge students' previous course work.

## Milestones

Master's presentation  
 Annual review  
 Dissertation committee  
 Dissertation proposal  
 Dissertation  
 Dissertation defense  
 At least two assigned courses as teaching assistant

## Core Requirements

A grade of S is required in each psychology department course.

Code	Title	Hours
	Consult your faculty advisor and director of graduate studies for acceptable course work.	10

## Electives

Code	Title	Hours
	Consult your faculty advisor and graduate coordinator for acceptable electives.	10

## Dissertation

Code	Title	Hours
Complete the following (repeatable) course twice:		
PSYC 9990	Dissertation	

## Program Credit/GPA Requirements

20 total semester hours required  
 Minimum 3.000 GPA required

*Note:* The number of semester hours to complete this program may be more than 20. The number of semester hours and the specific required

courses will be determined by a review of previous course work by the graduate coordinator and faculty advisor.

## Interdisciplinary

### Programs

#### Doctor of Philosophy (PhD)

- Network Science (p. 227)

#### Master of Science (MS)

- Applied Physics and Engineering (p. 156)
- Environmental Science and Policy (p. 399)

## Network Science, PhD

Website (<http://www.networkscienceinstitute.org>)

### David Lazer, PhD

Distinguished Professor  
 College of Social Sciences and Humanities and College of Computer and Information Science

Network Science Program  
 177 Huntington Avenue, 10th Floor  
 617.373.8856  
 617.373.5884 (fax)  
[networkscience@northeastern.edu](mailto:networkscience@northeastern.edu)

The PhD program in network science aims to enhance our understanding of networks arising from the interplay of human behavior, sociotechnical infrastructures, information diffusion, and biological agents. This is an intrinsically multidisciplinary activity, with members of the network science community representing a wide range of fields including computer science, information science, complexity, physics, sociology, communication, organizational behavior, political science, and epidemiology. This is an interdisciplinary doctoral program focused on training students in network science across several colleges—including the College of Science, the Khoury College of Computer Sciences, 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 research and subject to prior approval by their faculty advisor. Required course work includes the following: three foundational courses in network science—Complex Networks and Applications (PHYS 5116); Network Science Data (PHYS 7331); and Social Networks (POLS 7334)—at least one supplemental course in network science—Network Science Data 2 (PHYS 7332); Social Networks (POLS 7334); or Data Mining Techniques (CS 6220)—12 semester hours of elective course work defined by their area of research; 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 are expected to maintain a cumulative GPA of 3.000 or better in all course work. Students are not allowed to retake courses. A student who does not maintain the 3.000 GPA, or is not making satisfactory

progress on their dissertation research, may be recommended for termination by the graduate program committee.

Each student will have one primary research advisor from the network science doctoral program faculty.

Students will be expected to select their research advisor by the end of the spring semester of their second year in the program.

The dissertation committee consists of at least four members: the dissertation advisor, one additional network science doctoral program faculty member, one member expert in the specific topic of research (can be from outside the university), and one additional tenured/tenure-track faculty member from the concentration department/conferring college. The dissertation advisor must be a full-time tenured or tenure-track member of the Northeastern University faculty. Students may repeat the comprehensive examination once if they are unsuccessful.

### Degree Candidacy

A student is considered a PhD candidate upon completion of all required course work with a minimum cumulative GPA of 3.000, satisfactory completion of the qualification exam, and satisfactory completion of the comprehensive exam.

### Qualifying Examination

The qualification exam will be an oral examination of the material during the students' course work. The exam will be an hour in length and consist of questions selected by network science faculty who comprise the qualifying examination and dissertation committee. Students will receive 50 to 80 potential questions, which they must be prepared to answer, one month before the exam. The exam will consist of a subset of these questions. The qualifying exam will be offered twice annually, in the fall and spring term. All students are required to initially sit for the exam in the fall, typically in their third year of the PhD program. Students who do not pass the qualifying exam on their first attempt are expected to retake the exam in the spring term. Students may sit for the qualifying exam no more than twice.

Students who fail to complete the qualifying examination but who have completed all the PhD program's required 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.

### Comprehensive Examination

Students must submit a written dissertation proposal to the qualifying examination and dissertation committee. The proposal should identify relevant literature, 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.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

Annual review

Qualifying exam  
Dissertation committee  
Dissertation proposal  
Dissertation defense

### Core Requirements

Code	Title	Hours
<b>Networks</b>		
PHYS 5116	Complex Networks and Applications	4
PHYS 7331	Network Science Data	4
PHYS 7335	Dynamical Processes in Complex Networks	4
Choose one of the following:		4
PHYS 7332	Network Science Data 2	
CS 6220	Data Mining Techniques	
POLS 7334	Social Networks	
<b>Research</b>		
Complete the following (repeatable) course twice:		
NETS 8984	Research	1-4

### Specializations

Choose one of the following specializations or 12 semester hours of elective course work from the electives course list:

- Computer Science (p. )
- Political Science (p. )
- Epidemiology (p. 228)
- Physics (p. 228)
- Math (p. 228)
- Electives (p. 228)

### COMPUTER SCIENCE

Code	Title	Hours
Choose three from the following:		12
CS 6140	Machine Learning	
CS 6220	Data Mining Techniques	
CS 6240	Large-Scale Parallel Data Processing	
CS 7800	Advanced Algorithms	

### POLITICAL SCIENCE

Code	Title	Hours
POLS 7200	Perspectives on Social Science Inquiry	4
POLS 7201	Research Design	4
POLS 7202	Quantitative Techniques	4

### EPIDEMIOLOGY

Code	Title	Hours
PHTH 5202	Introduction to Epidemiology	3
PHTH 6224	Social Epidemiology	3
Electives: Choose two from the elective course list below.		6-8

### PHYSICS

Code	Title	Hours
Choose three from the following:		12
PHYS 5318	Principles of Experimental Physics	
PHYS 7305	Statistical Physics	
PHYS 7731	Biological Physics 1	
PHYS 7321	Computational Physics	

**MATH**

Code	Title	Hours
MATH 7241	Probability 1	4
MATH 7233	Graph Theory	4
MATH 7733	Readings in Graph Theory	4

**ELECTIVES**

Complete a minimum of 12 semester hours of elective course work related to your area of research. Common electives include the following:

Code	Title	Hours
NETS 7341	Network Economics	4
NETS 7350	Bayesian and Network Statistics	4
NETS 7983	Topics	4
NETS 8941	Network Science Literature Review Seminar	2
MATH 7233	Graph Theory	4
CS 5800	Algorithms	4
CS 6140	Machine Learning	4
CS 7180	Special Topics in Artificial Intelligence	4
CS 7295	Special Topics in Data Visualization	4
INSH 5301	Introduction to Computational Statistics	4
PHYS 7337	Statistical Physics of Complex Networks	4

**Dissertation**

Code	Title	Hours
Complete the following (repeatable) course twice:		
NETS 9990	Dissertation	

**Program Credit/GPA Requirements**

32 total semester hours required  
Minimum 3.000 GPA required

**Applied Physics and Engineering, MS**

The combined MS program in applied physics and engineering allows graduate students to receive training in one of three concentrations of the electrical and computer engineering department while also receiving fundamental graduate-level physics training that is relevant to that area.

**Thesis Option**

A student may complete an additional 8 semester hours of thesis. Students may register for an additional two semesters of thesis work, Thesis (EECE 7990) (4 semester hours) or Thesis (PHYS 7990) (4 semester hours), depending on the affiliation of the thesis advisor. A thesis committee is composed of an advisor and two faculty members from physics or electrical engineering.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Concentrations**

Complete one of the following concentrations:

- Microsystems, Materials, and Devices (p. 156)
- Electromagnetics, Plasma, and Optics (p. 156)
- Analysis, Modeling, and Computation (p. 157)

**MICROSYSTEMS, MATERIALS, AND DEVICES**

Code	Title	Hours
<b>Core Courses</b>		
EECE 7201	Solid State Devices	4
PHYS 7324	Condensed Matter Physics	4
<b>Engineering Course Work</b>		
Complete 12 semester hours from the following:		12
EECE 5606	Micro- and Nanofabrication	
EECE 5680	Electric Drives	
EECE 7204	Applied Probability and Stochastic Processes	
EECE 7240	Analog Integrated Circuit Design	
EECE 7242	Integrated Circuits for Mixed Signals and Data Communication	
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)	
EECE 7245	Microwave Circuit Design for Wireless Communication	
EECE 7353	VLSI Design	
EECE 7398	Special Topics	

**Physics Course Work**

Complete 12 semester hours from the following:		12
PHYS 5318	Principles of Experimental Physics	
PHYS 7301	Classical Mechanics/Math Methods	
PHYS 7302	Electromagnetic Theory	
PHYS 7305	Statistical Physics	
PHYS 7315	Quantum Theory 1	
PHYS 7316	Quantum Theory 2	
PHYS 7321	Computational Physics	
PHYS 7331	Network Science Data	
PHYS 7734	Topics: Condensed Matter Physics	

**ELECTROMAGNETICS, PLASMA, AND OPTICS**

Code	Title	Hours
<b>Core Courses</b>		
EECE 7203	Complex Variable Theory and Differential Equations	4
PHYS 7302	Electromagnetic Theory	4
<b>Engineering Course Work</b>		
Complete 12 semester hours from the following:		12
EECE 5698	Special Topics in Electrical and Computer Engineering (Subsurface Imaging)	
EECE 7105	Optics for Engineers	
EECE 7202	Electromagnetic Theory 1	
EECE 7245	Microwave Circuit Design for Wireless Communication	
EECE 7270	Electromagnetic Theory 2	
EECE 7271	Computational Methods in Electromagnetics	
EECE 7275	Antennas and Radiation	
EECE 7293	Modern Imaging	

**Physics Course Work**

Complete 12 semester hours from the following:	12
PHYS 5318	Principles of Experimental Physics
PHYS 7305	Statistical Physics
PHYS 7315	Quantum Theory 1
PHYS 7316	Quantum Theory 2
PHYS 7321	Computational Physics
PHYS 7324	Condensed Matter Physics
PHYS 7731	Biological Physics 1

**ANALYSIS, MODELING, AND COMPUTATION**

Code	Title	Hours
<b>Core Courses</b>		
EECE 7205	Fundamentals of Computer Engineering	4
PHYS 7321	Computational Physics	4

**Engineering Course Work**

Complete 12 semester hours from the following:	12
EECE 5639	Computer Vision
EECE 5640	High-Performance Computing
EECE 5642	Data Visualization
EECE 5643	Simulation and Performance Evaluation
EECE 5644	Introduction to Machine Learning and Pattern Recognition
EECE 7205	Fundamentals of Computer Engineering
EECE 7271	Computational Methods in Electromagnetics
EECE 7352	Computer Architecture
EECE 7353	VLSI Design
EECE 7374	Fundamentals of Computer Networks
EECE 7376	Operating Systems: Interface and Implementation

**Physics Course Work**

Complete 12 semester hours from the following:	12
PHYS 5116	Complex Networks and Applications
PHYS 5318	Principles of Experimental Physics
PHYS 7301	Classical Mechanics/Math Methods
PHYS 7305	Statistical Physics
PHYS 7331	Network Science Data
PHYS 7335	Dynamical Processes in Complex Networks

**Thesis Option**

Students may register for an additional two semesters of thesis work, Thesis (EECE 7990) or Thesis (PHYS 7990), depending on the affiliation of the thesis advisor. Thesis credits cannot be substituted for any of the course work listed above. This option requires a total of 40 semester hours for the master's degree.

**Program Credit/GPA Requirements**

32–40 total semester hours required  
Minimum 3.000 GPA required

**Graduate Certificate Programs**

The College of Science is pleased to offer several graduate certificate programs for working professionals as well as post-baccalaureate students who want to build their knowledge in growing fields. Graduate

certificates are offered in in biotechnology, bioinformatics, and nanomedicine. These programs are ideal for people already in the field who want to enhance their career, or people who are looking to make a change.

- **Graduate Certificate in Bioinformatics:** This certificate program offers professionals working in the research, healthcare, and pharmaceutical industries the ability to employ bioinformatics algorithms and techniques to biological problems in their current practice.
- **Graduate Certificate in Biotechnology:** Designed in response to a need in the biotechnology industry for individuals without a biotechnology background to obtain a strong foundation in basic biotechnology concepts and skills.
- **Graduate Certificate in Experimental Biotechnology:** Study the necessary skills used in biotherapeutic development through lab courses and traditional classroom learning.
- **Graduate Certificate in Molecular Biotechnology:** Become more knowledgeable about state-of-the-art molecular biology techniques and advanced protein structure analysis. Students will have an opportunity to learn to generate and optimize molecular forms used to express recombinant proteins to be used as biopharmaceuticals.
- **Graduate Certificate in Process Sciences:** Students will have the opportunity to learn the sciences of interactions of the biological molecules in the process conditions and the relevant process technology, such as, freeze drying, needed for drug product manufacturing.
- **Graduate Certificate in Biopharmaceutical Analytical Sciences:** In this certificate program students will study 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.
- **Graduate Certificate in Pharmaceutical Technologies:** The focus of this certificate is on the conversion of purified proteins to biopharmaceutical drug products that are compatible for clinical use.
- **Graduate Certificate in Regulatory Science:** Designed in response to a need in the biotechnology industry for individuals, in particular regulators, to obtain a strong foundation in the science behind good regulatory practice today, specifically in relation to biopharmaceuticals.
- **Graduate Certificate in Biotechnology Enterprise:** Students will have an opportunity to learn the fundamental concepts of leadership, entrepreneurship and innovation, financial decision making, and marketing.
- **Graduate Certificate in Nanomedicine:** This certificate is designed for scientists, engineers, and physicians to develop competency and practical skills in the application of nanotechnology to problems in medicine.

**Program Requirements  
Biology**

- Bioinformatics (p. 387)

**Chemistry and Chemical Biology**

- Biopharmaceutical Analytical Sciences (p. 244)
- Biotechnology (p. 393)
- Biotechnology Enterprise (p. 393)
- Experimental Biotechnology (p. 394)
- Molecular Biotechnology (p. 394)
- Pharmaceutical Technologies (p. 394)

- Process Science (p. 395)
- Regulatory Science (p. 395)

## **Physics**

- Nanomedicine (p. 414)

# College of Social Sciences and Humanities

Graduate Admissions and Student Services (<http://www.northeastern.edu/cssh/graduate/programs/>)

**Uta G. Poiger, PhD**, Dean

**Natasha A. Frost, PhD**, Associate Dean, Graduate Studies

**Swapna Nair, MS, MBA**, Assistant Dean, Graduate Recruitment and Enrollment Management

**Louis DaRos, MS**, Associate Director, Graduate Data Management and Student Financial Services

**Amber Crowe Connolly, MS**, Graduate Programs Data Administrator

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CSSH Graduate Programs General Regulations ([http://www.northeastern.edu/cssh/graduate/current\\_students/](http://www.northeastern.edu/cssh/graduate/current_students/))

## Our Mission

The departments and programs of the College of Social Sciences and Humanities (CSSH)—with disciplines ranging from economics and history to English and international affairs, just to name a few—form an interdisciplinary collaborative of scholars with global perspectives. The CSSH mission is:

- To contribute to the experiential liberal arts education of all Northeastern students
- To produce cutting-edge knowledge about and solutions to the political and social problems of our contemporary world
- To foster ethical reasoning and critical thought, with attention to the enduring significance of history, literature, and culture

This mission, along with a strong international focus, gives CSSH a central role in fulfilling Northeastern's ambition of educating global citizens.

## Graduate Programs in the College of Social Sciences and Humanities

Graduate education at Northeastern integrates the highest level of scholarship across disciplinary boundaries with significant research and experiential learning opportunities. This multidimensional learning environment offers students an opportunity to develop critical thinking and creative problem-solving skills while introducing them to new perspectives in their fields. CSSH offers 13 master's programs, 7 doctoral programs, and 9 graduate certificate programs. Some courses and degree programs are offered in an online or hybrid format that is well suited for distance learners. Graduate programs in CSSH provide fertile ground and resources for advanced study and research. CSSH faculty members' cutting-edge interdisciplinary work inspires the development of new programs, research fellowship opportunities, and mentoring relationships.

All CSSH master's programs offer an optional cooperative education experience (co-op) to eligible students. Cooperative education is central to both the Northeastern experience and to the CSSH experiential liberal arts framework. Northeastern's signature co-op ecosystem provides qualified master's students with six-month work experiences in businesses, nonprofits, and government agencies in Boston and across

the United States. Through the co-op experience and integrative co-curricular course work, graduate students apply what they've learned across contexts, bringing knowledge and skills gained in community learning spaces back to our campus learning spaces.

Our doctoral, master's, and professional degree programs produce graduates who are well prepared for the diverse demands of careers in academia, industry, and the professions. Please visit the College of Social Sciences and Humanities (<http://www.northeastern.edu/cssh/graduate/>) website for additional information, including latest news and upcoming events.

## School of Criminology and Criminal Justice

Website (<http://www.northeastern.edu/cssh/sccj/>)

**Anthony Braga, PhD**

Distinguished Professor and Director

**Amy Farrell, PhD**

Associate Professor and Associate Director

**Gregory Zimmerman, PhD**

Associate Professor and Graduate Program Director

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Graduate Programs Contact

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CSSH Graduate Programs General Regulations ([http://www.northeastern.edu/cssh/graduate/current\\_students/](http://www.northeastern.edu/cssh/graduate/current_students/))

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. In addition, the school offers a JD/MS in criminology and criminal justice program and a JD/PhD in criminology and justice policy in conjunction with the School of Law.

## Programs

### Doctor of Philosophy (PhD)

- Criminology and Justice Policy (p. 423)
- Criminology and Justice Policy—Advanced Entry (p. 423)

### Master of Science (MS)

- Criminology and Criminal Justice (p. 424)

## Dual Degrees

- Law, Criminology and Justice Policy, JD/PhD (p. 425)
- Law, Criminology and Justice Policy, JD/PhD—Advanced Entry (p. 426)
- Law, Criminology and Criminal Justice, JD/MS (p. 427)

## Criminology and Justice Policy, PhD

The doctoral program in criminology and justice policy at the School of Criminology and Criminal Justice at Northeastern University seeks to prepare students for professional and research careers in criminal justice, criminology, and related fields by applying multidisciplinary and comparative social science to understand, predict, and explain crime and contribute to the development of public policy within urban communities. Using an active-learning approach, the school seeks to develop its students intellectually and ethically, while providing them with a keen appreciation for the complexities of crime and public and private efforts to make communities safer and to ensure justice.

The program is full time and is small and student centered. Students may enter the program with either a bachelor's degree or a master's degree. It is expected that students will be able to complete the program in four to five years, and students entering with a master's degree will be able to complete the program in three to five years.

Year one in the doctoral program offers students an opportunity to obtain a broad foundational knowledge in the discipline: two semesters of criminological theory, two semesters of statistics, one semester of criminal justice process, and one semester of advanced research methods. To ensure that all students have mastered the foundational material emphasized across the required courses for the PhD program and can successfully integrate theory, research, and policy, all PhD students take a "foundations" qualifying examination at the end of their first year in the doctoral program.

After demonstrating mastery of the foundational knowledge in year one, students devote themselves to a more specific area of research in year two. Students demonstrate this commitment through a second qualifying examination, which consists of two stages: an area exam and a publishable paper. The two stages of this exam are required and should be related.

Following successful completion of the first and second qualifying examinations, and required and elective course work (totaling 54 semester hours), the students proceed to a formal dissertation proposal defense.

## Doctoral Degree Candidacy

A student achieves candidacy when he or she has successfully completed all course work (54 semester hours for students entering with a bachelor's degree), passed both the foundations qualifying examination and the area qualifying examination, and deposited the final version of their dissertation proposal (approved by their full committee) with the school's graduate program office. Candidacy is certified, in writing, by the college.

## Program Requirements

### Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

Annual review  
Two qualifying examinations—foundations exam and area exam/  
publishable paper  
PhD candidacy  
Dissertation committee  
Dissertation proposal  
Dissertation defense

## Core Requirements

A cumulative 3.000 GPA is required for the core requirements.

Code	Title	Hours
<b>Criminal Justice Process</b>		
CRIM 7202	The Criminal Justice Process	4
<b>Policy</b>		
CRIM 7710	Criminology and Public Policy 1	4
CRIM 7711	Criminology and Public Policy 2	4
<b>Analysis &amp; Methods</b>		
CRIM 7713	Advanced Research and Evaluation Methods	4
INSH 7400	Quantitative Analysis	4
INSH 7500	Advanced Quantitative Analysis	4
<b>Practicum</b>		
CRIM 7706	Practicum in Writing and Publishing	2
CRIM 7700	Practicum in Teaching	0

## Electives

Code	Title	Hours
Complete 28 semester hours in the following range:		28
CRIM 7200 to CRIM 7989		

## Dissertation

Code	Title	Hours
<b>Exam Preparation</b>		
CRIM 8960	Exam Preparation—Doctoral	
<b>Dissertation</b>		
Complete the following (repeatable) course twice:		
CRIM 9990	Dissertation	
<b>Dissertation Continuation</b>		
Following completion of two semesters of CRIM 9990, registration in the following class is required in each semester (including the summer if the dissertation is submitted in summer) until the dissertation is completed:		
CRIM 9996	Dissertation Continuation	

## Program Credit/GPA Requirements

54 total semester hours required  
Minimum 3.000 GPA required

## Criminology and Justice Policy, PhD—Advanced Entry

The doctoral program in criminology and justice policy at the School of Criminology and Criminal Justice at Northeastern University seeks to prepare students for professional and research careers in criminal justice, criminology, and related fields by applying multidisciplinary and comparative social science to understand, predict, and explain crime and contribute to the development of public policy within urban communities.

Using an active-learning approach, the school seeks to develop its students intellectually and ethically, while providing them with a keen appreciation for the complexities of crime and public and private efforts to make communities safer and to ensure justice.

The program is full time and is small and student centered. Students may enter the program with either a bachelor's degree or a master's degree. It is expected that students entering will be able to complete the program in three to five years.

Year one in the doctoral program offers students an opportunity to obtain a broad foundational knowledge in the discipline: two semesters of criminological theory, two semesters of statistics, and one semester of advanced research methods. To ensure that all students have mastered the foundational material emphasized across the required courses for the PhD program and can successfully integrate theory, research, and policy, all PhD students take a "foundations" qualifying examination at the end of their first year in the doctoral program.

After demonstrating mastery of the foundational knowledge in year one, students devote themselves to a more specific area of research in year two. Students demonstrate this commitment through a second qualifying examination, which consists of two stages: an area exam and a publishable paper. The two stages of this exam are required and should be related.

Following successful completion of the first and second qualifying examinations, and required and elective course work (totaling 42 semester hours), the students proceed to a formal dissertation proposal defense.

## Doctoral Degree Candidacy

A student achieves candidacy when he or she has successfully completed all course work (42 semester hours for students with advanced standing), passed the foundations qualifying examination, the area qualifying examination, and deposited the final version of their dissertation proposal (approved by their full committee) with the school's graduate program office. Candidacy is certified, in writing, by the college.

## Program Requirements

### Advanced Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

Annual review

Two qualifying examinations—foundations exam and area exam/  
publishable paper

Dissertation committee

Dissertation proposal

Dissertation defense

### Core Requirements

A cumulative 3.000 GPA is required for the core requirement.

Code	Title	Hours
<b>Criminal Justice Process</b>		
CRIM 7202	The Criminal Justice Process	4
<b>Policy</b>		
CRIM 7710	Criminology and Public Policy 1	4
CRIM 7711	Criminology and Public Policy 2	4
<b>Analysis &amp; Methods</b>		

CRIM 7713	Advanced Research and Evaluation Methods	4
INSH 7400	Quantitative Analysis	4
INSH 7500	Advanced Quantitative Analysis	4
<b>Practicum</b>		
CRIM 7706	Practicum in Writing and Publishing	2
CRIM 7700	Practicum in Teaching	0

## Electives

Code	Title	Hours
Complete 16 semester hours in the following range:		16
CRIM 7200 to CRIM 7989		

## Dissertation

Code	Title	Hours
<b>Dissertation</b>		
Complete the following (repeatable) course twice:		
CRIM 9990	Dissertation	

### Dissertation Continuation

Following completion of two semesters of CRIM 9990, registration in the following class is required in each semester (including the summer if the dissertation is submitted in summer) until the dissertation is completed:

CRIM 9996	Dissertation Continuation
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## Program Credit/GPA Requirements

42 total semester hours required

Minimum 3.000 GPA required

## Criminology and Criminal Justice, MS

The master's program in criminology and criminal justice at Northeastern University concentrates both on the problem of crime as a form of deviant behavior and on the criminal justice and private security systems that deal with it. The program emphasizes a systems approach to criminal justice, stressing policy development and analysis, as well as the impact these policies have on the individuals and organizations charged with delivering justice in a fair and equitable manner. In concept and scope, the MS degree encompasses such related disciplines as law, sociology, political science, psychology, criminology, and public administration.

The master's program is comprised of required courses encompassing both substantive and technical skills. Additionally, students choose elective courses from offerings within the graduate program in criminal justice or in other graduate programs in the College of Social Sciences and Humanities. The course offerings afford students the flexibility to customize their own programs, which may include an internship, directed study, or master's thesis.

For students interested in criminal justice in an increasingly digital world, the Master of Science in Criminology and Criminal Justice with a Concentration in Cybersecurity offers a strong criminal justice foundation coupled with the conceptual and practical skills that enables them to contribute to ensuring the reliability and security of cyberspace. Successful students will learn the principles, practices, and responsibilities of criminal justice professionals alongside the fundamental knowledge of computer science skills necessary for practical applications in the field. The concentration in cybersecurity provides criminal justice students an opportunity to learn how social



behavior, policy, and legal rules can affect cybersecurity and the tools of information technology.

Faculty members in the graduate program represent several different academic disciplines, and teaching activities vary in nature depending on the instructors' specific objectives. The faculty's specialized interests help make possible a broad range of program offerings, including courses on the criminal justice process, victimology, security management, criminal law, juvenile justice, law and psychology, and terrorism.

The master's program offers an optional cooperative education experience (co-op) to eligible students. Students extend the two-semester program to 18 months through a co-op work experience and its associated 2-credit experiential integration course. Cooperative education is central to both the Northeastern experience and to the College of Social Sciences and Humanities experiential liberal arts framework. Northeastern's signature co-op ecosystem provides qualified master's students with six-month work experiences in businesses, nonprofits, and government agencies in Boston and across the United States. Graduate students take their work from campus learning spaces, apply their knowledge outside of the classroom, and then bring knowledge and skills gained in community learning spaces back to our campus learning spaces during the cocurricular experiential integration course.

Briefly stated, the graduate program endeavors to:

- Assist in developing criminal justice and private security leaders capable of assuming responsibility for policy planning and administration
- Offer students an opportunity to acquire the necessary skills and knowledge to conduct applied research while assisting them in developing the ability to apply this research in a variety of criminal justice settings
- Provide an opportunity for a solid educational foundation for those who wish to pursue more advanced graduate study beyond the Master of Science degree

Graduate study in criminology and criminal justice may be pursued on either a full- or part-time basis. All candidates for the Master of Science in Criminology and Criminal Justice degree must successfully complete a minimum of 32 semester hours of credit in course work.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirements

A cumulative 3.000 GPA is required for the core requirement.

Code	Title	Hours
<b>Required Core</b>		
CRIM 7200	Criminology	4
CRIM 7202	The Criminal Justice Process	4
<b>Research and Statistics</b>		
INSH 6300	Research Methods in the Social Sciences	4
INSH 6500 or INSH 5301	Statistical Analysis Introduction to Computational Statistics	4

### Electives

Code	Title	Hours
Complete 16 semester hours in the following range:		16
CRIM 5000 to CRIM 7989		

### Concentration in Cybersecurity

Students adding a concentration in cybersecurity must use 12 semester hours of their elective credits to complete the following courses:

Code	Title	Hours
Required:		4
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
Choose two courses from the following:		8
CRIM 7262	Evidence-Based Crime Policy	
CY 5040	Introduction to Cyberspace Programming 2 <small>Instructor Approval</small>	
CY 5200	Security Risk Management and Assessment <small>Instructor Approval</small>	
CY 5210	Information System Forensics <small>Instructor Approval</small>	
CY 5250	Decision Making for Critical Infrastructure	

### Optional Co-op Experience

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

### Program Credit/GPA Requirements

32 total semester hours required (34 with optional co-op)  
Minimum 3.000 GPA required

### Law, Criminology and Justice Policy, JD/PhD

The joint JD/PhD program will expand the knowledge base and career options of students. The disciplines of criminology and justice policy and law share common interests in identifying opportunities to create conditions for justice, equality, and societal well-being. The joint degree will provide students with a comprehensive interdisciplinary understanding of what influences criminal justice problems and the sociopolitical, legal, and economic context in which they are found. Solving problems requires interdisciplinary knowledge and an analytical and practical skill set that includes interprofessional problem solving.

### Program Requirements

#### Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

#### Milestones

- Two qualifying examinations—foundations exam and area exam/  
publishable paper
- Annual review
- PhD candidacy
- Dissertation committee
- Dissertation proposal
- Dissertation defense

## Core Requirements

A cumulative 3.000 GPA is required for the core requirement.

Code	Title	Hours
<b>Criminal Justice Process</b>		
CRIM 7202	The Criminal Justice Process	4
<b>Policy</b>		
CRIM 7710	Criminology and Public Policy 1	4
CRIM 7711	Criminology and Public Policy 2	4
<b>Analysis &amp; Methods</b>		
CRIM 7713	Advanced Research and Evaluation Methods	4
INSH 7400	Quantitative Analysis	4
INSH 7500	Advanced Quantitative Analysis	4
<b>Practicum</b>		
CRIM 7706	Practicum in Writing and Publishing	2

## Electives

Code	Title	Hours
Complete 28 hours from the following:		28
CRIM 7201	Global Criminology	
CRIM 7224	Law and Psychology	
CRIM 7232	Juvenile Law	
LAW 6103	Criminal Justice	
LAW 7301	Advanced Criminal Procedure: Adjudication	
LAW 7332	Evidence	
LAW 7351	Prisoners' Rights Clinic	
LAW 7398	Federal Courts and the Federal System	
LAW 7410	Domestic Violence Clinic	
LAW 7495	Advanced Criminal Procedure: Investigation	
LAW 7526	Juvenile Courts: Delinquency, Abuse, Neglect	
LAW 7528	Balancing Liberty and Security Seminar	
LAW 7597	Civil Rights and Restorative Justice Clinic	
LAW 7612	Wrongful Convictions and Post-Conviction Remedies	
LAW 7619	Healthcare Fraud and Abuse Law	
LAW 7647	Trial Practice	

## Dissertation

Code	Title	Hours
<b>Dissertation</b>		
Complete the following (repeatable) course twice:		
CRIM 9990	Dissertation	
<b>Dissertation Continuation</b>		
Following completion of two semesters of CRIM 9990, registration in the following class is required in each semester (excluding summers) until the dissertation is completed:		
CRIM 9996	Dissertation Continuation	

## Program Credit/GPA Requirements

54 total semester hours required for PhD. Please contact the School of Law (<https://www.northeastern.edu/law/academics/jd/dual-degrees/>) for JD requirements.

Minimum 3.000 GPA required for PhD

## Law, Criminology and Justice Policy, JD/PhD—Advanced Entry

The joint JD/PhD program will expand the knowledge base and career options of students. The disciplines of criminology and justice policy and law share common interests in identifying opportunities to create conditions for justice, equality, and societal well-being. The joint degree will provide students with a comprehensive interdisciplinary understanding of what influences criminal justice problems and the sociopolitical, legal, and economic context in which they are found. Solving problems requires interdisciplinary knowledge and an analytical and practical skill set that includes interprofessional problem solving.

## Program Requirements

### Advanced Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

Two qualifying examinations—foundations exam and area exam/  
publishable paper  
Annual review  
PhD candidacy  
Dissertation Committee  
Dissertation proposal  
Dissertation defense

## Core Requirements

A cumulative 3.000 GPA is required for the core requirement.

Code	Title	Hours
<b>Policy</b>		
CRIM 7710	Criminology and Public Policy 1	4
CRIM 7711	Criminology and Public Policy 2	4
<b>Analysis &amp; Methods</b>		
CRIM 7713	Advanced Research and Evaluation Methods	4
INSH 7400	Quantitative Analysis	4
INSH 7500	Advanced Quantitative Analysis	4
<b>Practicum</b>		
CRIM 7706	Practicum in Writing and Publishing	2

## Electives

Code	Title	Hours
Complete 16 hours from the following:		16
CRIM 7201	Global Criminology	
CRIM 7224	Law and Psychology	
CRIM 7232	Juvenile Law	
LAW 6103	Criminal Justice	
LAW 7301	Advanced Criminal Procedure: Adjudication	
LAW 7332	Evidence	
LAW 7351	Prisoners' Rights Clinic	
LAW 7398	Federal Courts and the Federal System	
LAW 7410	Domestic Violence Clinic	
LAW 7495	Advanced Criminal Procedure: Investigation	

LAW 7526	Juvenile Courts: Delinquency, Abuse, Neglect
LAW 7528	Balancing Liberty and Security Seminar
LAW 7597	Civil Rights and Restorative Justice Clinic
LAW 7612	Wrongful Convictions and Post-Conviction Remedies
LAW 7619	Healthcare Fraud and Abuse Law
LAW 7647	Trial Practice

## Dissertation

Code	Title	Hours
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### Dissertation

Complete the following (repeatable) course twice:

CRIM 9990	Dissertation
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### Dissertation Continuation

Following completion of two semesters of CRIM 9990, registration in the following class is required in each semester (excluding summers) until the dissertation is completed:

CRIM 9996	Dissertation Continuation
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## Program Credit/GPA Requirements

38 total semester hours required for PhD. Please contact the School of Law (<https://www.northeastern.edu/law/academics/jd/dual-degrees/>) for JD requirements.

Minimum 3.000 GPA required for PhD

### Law, Criminology and Criminal Justice, JD/MS

The joint JD/MS program will expand the knowledge base and career options of students. The disciplines of criminal justice and law share common interests in identifying opportunities to create the conditions for justice, social equality, and societal well-being. The joint degree is designed to provide students with a comprehensive interdisciplinary understanding of what influences criminal justice problems and the social, political, legal, economic context in which they are found. Solving these problems requires interdisciplinary knowledge and an analytical and practical skill set that includes interprofessional problem solving.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

A cumulative 3.000 GPA is required for the core requirement.

Code	Title	Hours
<b>Criminology and Criminal Justice</b>		
CRIM 7200	Criminology	4
CRIM 7202	The Criminal Justice Process	4
<b>Research and Statistics</b>		
INSH 6300	Research Methods in the Social Sciences	4
INSH 6500 or INSH 5301	Statistical Analysis Introduction to Computational Statistics	4

## Electives

Code	Title	Hours
Complete 16 hours from the following:		
CRIM 7201	Global Criminology	16
CRIM 7224	Law and Psychology	
CRIM 7232	Juvenile Law	
LAW 6103	Criminal Justice	
LAW 7301	Advanced Criminal Procedure: Adjudication	
LAW 7332	Evidence	
LAW 7410	Domestic Violence Clinic	
LAW 7495	Advanced Criminal Procedure: Investigation	
LAW 7528	Balancing Liberty and Security Seminar	
LAW 7351	Prisoners' Rights Clinic	
LAW 7398	Federal Courts and the Federal System	
LAW 7526	Juvenile Courts: Delinquency, Abuse, Neglect	
LAW 7597	Civil Rights and Restorative Justice Clinic	
LAW 7612	Wrongful Convictions and Post-Conviction Remedies	
LAW 7619	Healthcare Fraud and Abuse Law	
LAW 7647	Trial Practice	

## Program Credit/GPA Requirements

32 total semester hours required for MS. Please contact the School of Law (<https://www.northeastern.edu/law/academics/jd/dual-degrees/>) for JD requirements.

Minimum 3.000 GPA required

### Economics

Website (<http://www.northeastern.edu/cssh/economics/>)

#### Robert Triest, PhD

Professor and Chair

#### James Dana, Jr., PhD

Professor and PhD Program Director

#### Jun Ma, PhD

Associate Professor and Graduate Program Director

301 Lake Hall  
617.373.2871  
617.373.3640 (fax)  
econ@northeastern.edu (gradecon@northeastern.edu)

Graduate Programs Contact

**Jacquetta Hester**, Graduate Administration Coordinator,  
j.hester@northeastern.edu

CSSH Graduate Programs General Regulations ([http://www.northeastern.edu/cssh/graduate/current\\_students/](http://www.northeastern.edu/cssh/graduate/current_students/))

The Department of Economics offers both an MS and a PhD program. The most distinctive feature of these programs is their emphasis on applied economics, coupled with attention to providing a solid grounding in microeconomic and macroeconomic theory, and econometrics. Students come from all over the world, and the curriculum is designed with this

in mind, striving for balance in coverage of economies that are rich and poor, large and small, mixed and market. This gives a unique flavor to the course of study, making it well-suited to the analysis of the emerging global economy of the 21st century.

The Master of Science program is in applied economic policy analysis, with broad specialization areas. The program is large enough to support a full slate of core and area courses each year, yet small enough to maintain a sense of community among the students. The program is especially appropriate for those who wish to work in or return to positions in government, teaching, finance, or industry, while providing a rigorous basis for those who want to continue their studies to the doctoral level.

Our world-famous co-op system offers qualified MS students the opportunity to apply for paid work positions as practicing economists for up to six months as part of their academic program. This paid work experience enhances our MS degree and its emphasis on application. Students have an opportunity to learn how to apply their knowledge, to solve problems, and to make a difference in the world before they graduate. Our graduates either find full-time work in their area of specialty or go on to earn additional graduate degrees. All of our graduates find jobs after completing our program.

The PhD program is small and focused, and we welcome applications from those with a bachelor's or master's degree who have had prior training in macroeconomic and microeconomic theory and possess strong quantitative skills. Students take course work in *industrial organization, competition policy, and regulatory* and *labor economics*.

## Programs

### Doctor of Philosophy (PhD)

- Economics (p. 428)
- Economics—Advanced Entry (p. 429)

### Master of Science (MS)

- Economics (p. 431)

## Economics, PhD

The PhD program in economics is small and focused, specializing in *industrial organization, competition policy, and regulatory economics* and *labor economics*.

## Requirements

Students entering the doctoral program with a Master's degree in economics, please see Economics PhD—Advanced Entry (p. 429).

### COURSE WORK

Students entering the doctoral program with a bachelor's degree will take four master's-level core classes (16 semester hours), three doctoral-level core classes (12 semester hours), two classes in each of two doctoral fields (16 semester hours), and one elective (4 semester hours), for a total program requirement of 48 semester hours. Core courses at the master's and doctoral level are focused on developing an advanced theoretical and quantitative foundation (Macroeconomic Theory, Microeconomic Theory, and Applied Econometrics). The remainder of the course work is focused on the sophisticated application of analytical tools in the chosen field of concentration.

PhD students are expected to take three classes per semester as necessary to meet the degree's course work requirements in the minimum number of semesters.

## EXAMINATIONS

### Two Qualifying Examinations—Macroeconomics and Microeconomics

Qualifying examinations are required upon completion of Macroeconomics 2 and Microeconomics 2. Students must receive a minimum grade of B– in the associated theory class to sit for its exam. Students are given a maximum of two attempts to pass each exam to continue in the program. Failure to sit for an exam at the appropriate time without prior consent of the graduate program director will result in an automatic fail on that exam.

### One Field Comprehensive Examination

A field examination is required upon completion of the associate field classes. Students will complete course work in two fields but are required to take a field examination in one field of their choosing. Students must receive a minimum grade of B– in the associated field classes in order to sit for that field's exam. The field examination includes questions from the chosen field, as well as questions on econometrics methodology. Students are given a maximum of two attempts to pass the exam to continue in the program. Failure to sit for an exam at the appropriate time without prior consent of the graduate program director will result in an automatic fail on that exam.

## DOCTORAL DEGREE CANDIDACY

Following completion of required course work and examinations, students are certified as doctoral degree candidates (ABD). A degree candidate has a maximum of five years to defend and submit an acceptable doctoral dissertation.

## DISSERTATION

The department expects that a doctoral candidate's **dissertation committee** will be formed and the dissertation proposal presented within six months of reaching degree candidacy. A dissertation committee includes a principal advisor and a minimum of two other members. The principal advisor must be a member of the economics department who holds a PhD degree and who is qualified in the chosen field. Other committee members must be qualified in the chosen field or econometrics, and one member may be from outside the department. Committee compositions must be approved by the graduate program director and department chair.

A **dissertation proposal** states the question or hypothesis, reviews the relevant literature, and explains how the proposed work will contribute to that literature and general understanding. The proposal sets forth data sources, models, and econometric issues in sufficient detail so that any faculty member not in the field will be able to assess its merits. Normally, the proposal should not exceed twenty double-spaced pages. The proposal is first approved by the dissertation committee and then presented at an open seminar.

## WRITING THE DOCTORAL DISSERTATION

Writing the dissertation entails working with the principal advisor and other committee members until it is determined that a dissertation is complete, and the candidate is ready to present and defend the work at an open seminar. Candidates must arrange a date and time for the defense at least three weeks in advance. Students must familiarize themselves with the Guide to the Preparation of Theses and Dissertations (<https://www.northeastern.edu/cssh/graduate/commencement/formatting-guidelines/>). The guide provides links to formatting tips, sample introductory pages, sample approval record, and deadlines. In

addition, a checklist is provided to ensure students have fulfilled the required steps in the commencement clearance process.

### Milestones

Maintaining satisfactory academic progress during doctoral candidacy requires the following:

#### PhD Annual Student Progress Review

Each PhD student will have an annual review of his or her progress toward the degree. Receipt of financial support administered by the graduate school is contingent upon satisfactory academic progress toward the degree and satisfactory performance in assigned duties. See the CSSH Graduate Programs General Regulations ([https://www.northeastern.edu/cssh/graduate/current\\_students/](https://www.northeastern.edu/cssh/graduate/current_students/)) for further details.

#### Field Lunch Participation

All PhD students registered for Doctoral Dissertation or Continuation who are in residence are expected to regularly attend a field seminar in industrial organization or labor. These seminars meet roughly every week, and their purpose is to assist students in choosing and evaluating dissertation topics as well as advancing and completing their dissertation. All doctoral candidates will be expected to present their research at various stages of writing their dissertation.

#### Seminar Series Participation

All PhD students registered for Doctoral Dissertation or Continuation who are in residence are expected to regularly attend academic seminars by speakers invited to campus through the Department of Economics Seminar Series. Participation in these seminars is an important component of doctoral training and is intended to expose students to current research in their field while helping to develop and hone their own presentation skills.

#### Practical Experience in Applied Economics Program

Participation in at least one semester of the Practical Experience in Applied Economics program is required of all students who have reached doctoral candidacy. The program is offered in the spring semester every other year. In this program, a variety of prominent practitioners working in consulting and government agencies in the fields of industrial organization and labor will describe their practical experience applying economics to a variety of consulting and policy problems, including antitrust, regulation, labor market policy, education, and health policy. This is a participatory class that will require advanced reading and preparation of questions for the practitioners in addition to other assignments.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

Two qualifying examinations—microeconomics and macroeconomics  
Field comprehensive examination (student chooses field)  
Doctoral degree candidacy  
PhD annual student progress review  
Dissertation committee  
Dissertation proposal  
Dissertation defense  
Field lunch participation  
Seminar series participation

## Core Requirements

Code	Title	Hours
<b>Quantitative</b>		
ECON 5105	Math and Statistics for Economists	4
ECON 5140	Applied Econometrics	4
ECON 7740	Applied Econometrics 2	4
<b>Theory</b>		
ECON 5110	Microeconomic Theory	4
ECON 5120	Macroeconomic Theory	4
ECON 7710	Microeconomic Theory 2	4
ECON 7720	Macroeconomic Theory 2	4
<b>Field</b>		
<i>Labor Economics Field</i>		
ECON 7763	Labor Market Analysis	4
ECON 7764	Topics in Labor Economics	4
<i>Industrial Organization Field</i>		
ECON 7771	Framework of Industrial Organization	4
ECON 7772	Public Policy Toward Business	4

## Elective

Code	Title	Hours
Complete 4 semester hours from the following:		4
ECON 5200 to ECON 5299		
ECON 7200 to ECON 7299		
ECON 7976	Directed Study	

## Dissertation

Code	Title	Hours
Registration in the following class is required in the semester prior to sitting for the field examination:		
ECON 8960	Exam Preparation—Doctoral	
Registration in the following class is required in the semester that students sit for the field examination and begin dissertation planning:		
ECON 9986	Research	
Registration in the following class is required in the fall and spring semesters following achievement of doctoral candidacy:		
ECON 9990	Dissertation	
Following completion of two semesters of ECON 9990, registration in the following class is required in each semester (excluding summers) until the dissertation is completed:		
ECON 9996	Dissertation Continuation	

## Program Credit/GPA Requirements

48 total semester hours required  
Minimum 3.000 GPA required

### Economics, PhD—Advanced Entry

The PhD program in applied economics is small and focused, specializing in *industrial organization, competition policy, and regulatory economics* and *labor economics*.

## Requirements

Students entering the doctoral program without a master's degree, please see *Economics PhD* (p. 428).

### COURSE WORK

Students entering the doctoral program with a master's degree will take three doctoral-level core classes (12 semester hours), two classes in each of two doctoral fields (16 semester hours), and one elective (4 semester hours), for a total program requirement of 32 semester hours. If the master's degree is not in economics, additional course work may be required in order to meet course prerequisites. Core courses are focused on developing an advanced theoretical and quantitative foundation (macroeconomic theory, microeconomic theory, and applied econometrics). The remainder of the course work is focused on the sophisticated application of analytical tools in the chosen field of concentration.

PhD students are expected to take three classes per semester as necessary to meet the degree's course work requirements in the minimum number of semesters.

### EXAMINATIONS

#### Two Qualifying Examinations—Macroeconomics and Microeconomics

Qualifying examinations are required upon completion of Macroeconomics 2 and Microeconomics 2. Students must receive a minimum grade of B– in the associated theory class to sit for its exam. Students are given a maximum of two attempts to pass each exam to continue in the program. Failure to sit for an exam at the appropriate time without prior consent of the graduate program director will result in an automatic fail on that exam.

#### One Field Comprehensive Examination

A field examination is required upon completion of the associate field classes. Students will complete course work in two fields but are required to take a field examination in one field of their choosing. Students must receive a minimum grade of B– in the associated field classes in order to sit for that field's exam. The field examination includes questions from the chosen field, as well as questions on econometrics methodology. Students are given a maximum of two attempts to pass the exam to continue in the program. Failure to sit for an exam at the appropriate time without prior consent of the graduate program director will result in an automatic fail on that exam.

### DOCTORAL DEGREE CANDIDACY

Following completion of required course work and examinations, students are certified as doctoral degree candidates (ABD). A degree candidate has a maximum of five years to defend and submit an acceptable doctoral dissertation.

### DISSERTATION COMMITTEE AND PROPOSAL

The department expects that a doctoral candidate's dissertation committee will be formed and the dissertation proposal presented within six months of reaching degree candidacy.

A **dissertation committee** includes a principal advisor and a minimum of two other members. The principal advisor must be a current member of the economics department who holds a PhD degree and who is qualified in the chosen field. Other committee members must be qualified in the chosen field or econometrics, and one member may be from outside the department. Committee compositions must be approved by the graduate program director and department chair.

A **dissertation proposal** states the question or hypothesis, reviews the relevant literature, and explains how the proposed work will contribute to that literature and general understanding. The proposal sets forth data sources, models, and econometric issues in sufficient detail so that any faculty member not in the field will be able to assess its merits. Normally, the proposal should not exceed twenty double-spaced pages. The proposal is first approved by the dissertation committee and then presented at an open seminar.

### WRITING THE DOCTORAL DISSERTATION

Writing the dissertation entails working with the principal advisor and other committee members until it is determined that a dissertation is complete, and the candidate is ready to present and defend the work at an open seminar. Candidates must arrange a date and time for the defense at least three weeks in advance. Students must familiarize themselves with the *Guide to the Preparation of Theses and Dissertations* (<https://www.northeastern.edu/cssh/graduate/commencement/formatting-guidelines/>). The guide provides links to formatting tips, sample introductory pages, sample approval record, and deadlines. In addition, a checklist is provided to ensure students have fulfilled the required steps in the commencement clearance process.

### Milestones

Maintaining satisfactory academic progress during doctoral candidacy requires the following:

#### PhD Annual Student Progress Review

Each PhD student will have an annual review of his or her progress toward the degree. Receipt of financial support administered by the college is contingent upon satisfactory academic progress toward the degree and satisfactory performance in assigned duties. See the College of Social Sciences and Humanities Graduate Programs General Regulations ([https://www.northeastern.edu/cssh/graduate/current\\_students/](https://www.northeastern.edu/cssh/graduate/current_students/)) for further details.

#### Field Lunch Participation

All PhD students registered for Doctoral Dissertation or Continuation who are in residence are expected to regularly attend a field seminar in industrial organization or labor. These seminars meet roughly every week, and their purpose is to assist students in choosing and evaluating dissertation topics as well as advancing and completing their dissertation. All doctoral candidates will be expected to present their research at various stages of writing their dissertation.

#### Seminar Series Participation

All PhD students registered for Doctoral Dissertation or Continuation who are in residence are expected to regularly attend academic seminars by speakers invited to campus through the Department of Economics Seminar Series. Participation in these seminars is an important component of doctoral training and is intended to expose students to current research in their field while helping to develop and hone their own presentation skills.

#### Practical Experience in Applied Economics Program

Participation in at least one semester of the Practical Experience in Applied Economics program is required of all students who have reached doctoral candidacy. The program is offered in the spring semester every other year. In this program, a variety of prominent practitioners working in consulting and government agencies in the fields of industrial organization and labor will describe their practical experience applying economics to a variety of consulting and policy problems, including antitrust, regulation, labor market policy, education, and health policy. This is a participatory class that will require advanced reading and preparation of questions for the practitioners in addition to other assignments.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

Two qualifying examinations—microeconomics and macroeconomics  
 Field comprehensive examination (student chooses field)  
 Doctoral degree candidacy  
 PhD annual student progress review  
 Dissertation committee  
 Dissertation proposal  
 Dissertation defense  
 Field lunch participation  
 Seminar series participation

### Core Requirements

Code	Title	Hours
<b>Quantitative</b>		
ECON 7740	Applied Econometrics 2	4
<b>Theory</b>		
ECON 7710	Microeconomic Theory 2	4
ECON 7720	Macroeconomic Theory 2	4
<b>Field</b>		
<i>Labor Economics Field</i>		
ECON 7763	Labor Market Analysis	4
ECON 7764	Topics in Labor Economics	4
<i>Industrial Organization Field</i>		
ECON 7771	Framework of Industrial Organization	4
ECON 7772	Public Policy Toward Business	4

### Elective

Code	Title	Hours
Complete 4 semester hours from the following:		4
ECON 7200 to ECON 7299		
ECON 7976	Directed Study	

### Dissertation

Code	Title	Hours
Registration in the following class is required in the semester prior to sitting for the field examination:		
ECON 8960	Exam Preparation—Doctoral	
Registration in the following class is required in the semester that students sit for the field examination and begin dissertation planning:		
ECON 9986	Research	
Registration in the following class is required in the fall and spring semesters following achievement of doctoral candidacy:		
ECON 9990	Dissertation	
Following completion of two semesters of ECON 9990, registration in the following class is required in each semester (excluding summers) until the dissertation is completed:		
ECON 9996	Dissertation Continuation	

### Program Credit/GPA Requirements

32 total semester hours required  
 Minimum 3.000 GPA required

## Economics, MS

The Master of Science program focuses on applied economic policy analysis, with broad specialization areas. The program is large enough to support a full slate of core and area courses each year, yet small enough to maintain a sense of community among the students. The program is especially appropriate for those who wish to work in or return to positions in government, teaching, finance, or industry, while providing a rigorous basis for those who want to continue their studies to the doctoral level.

The Master of Science in Economics is a STEM-eligible program that offers the opportunity for master's students to apply for paid work positions through Northeastern's world-famous co-op program. Qualified and approved master's students can participate in co-op as practicing economists for up to six months as part of their academic program (note that a 3.500 GPA is required in order to apply). This paid work experience enhances the degree and its emphasis on application. Students have an opportunity to learn how to apply their knowledge, to solve problems, and to make a difference in the world before they graduate. Our graduates either find full-time work in their area of specialty or go on to earn additional graduate degrees. All of our graduates find jobs after completing our program. For more information, please visit economics co-op (<https://www.northeastern.edu/cssh/economics/undergraduate/experiential-learning/co-op/>).

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
<b>Quantitative</b>		
ECON 5105	Math and Statistics for Economists	4
ECON 5140	Applied Econometrics	4
<b>Theory</b>		
ECON 5110	Microeconomic Theory	4
ECON 5120	Macroeconomic Theory	4

### Electives

With prior approval from the graduate program director, the following courses may substitute for electives: Thesis (ECON 7990) or Internship In Economics (ECON 8550). Additionally, a student may select a maximum of eight graduate semester hours offered by other departments.

Code	Title	Hours
Complete 16 semester hours in the following range:		16
ECON 5200 to ECON 7772		

### Optional Co-op Experience

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

## Program Credit/GPA Requirements

32 semester hours required (34 with optional co-op)  
Minimum 3.000 GPA required

### English

Website (<http://www.northeastern.edu/cssh/english/graduate/>)

#### Neal Lerner, EdD

Professor and Chair  
n.lerner@northeastern.edu

#### Ryan Cordell, PhD

Associate Professor and Graduate Program Director  
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405 Lake Hall  
617.373.3692  
617.373.2509 (fax)  
gradenglish@northeastern.edu

Graduate Programs Contact  
Melissa Daigle, Graduate Program Administrator,  
m.daigle@northeastern.edu

CSSH Graduate Programs General Regulations ([http://www.northeastern.edu/cssh/graduate/current\\_students/](http://www.northeastern.edu/cssh/graduate/current_students/))

The graduate program in English is grounded in the study of British and American literature through the most current modes of humanistic inquiry and in the disciplines of writing and rhetoric. Both in course work and through the NULab for Texts, Maps, and Networks (<http://www.northeastern.edu/nulab/>), the graduate program in English also offers training in the digital humanities. Altogether, our degree programs provide a challenging, flexible, and wide-ranging education in English studies today.

## Programs

### Doctor of Philosophy (PhD)

- English (p. 432)
- English—Advanced Entry (p. 433)

### Master of Arts (MA)

- English (p. 434)

### Graduate Certificate

- Digital Humanities (p. 435)

### English, PhD

The PhD program seeks to train students to be productive scholars and teachers in the fields of both literary studies and rhetoric and composition. In course work, students read and analyze the important texts, current issues, and critical methodologies of the discipline. Drawing on the breadth of this preparation, students demonstrate their ability to recognize and produce scholarly arguments in designing the three comprehensive field papers in areas of scholarly interest and competence corresponding to recognized and emerging fields of study. Finally, the dissertation offers students an opportunity to design a focused research project in consultation with a dissertation advisor. Throughout

the program, faculty works closely with doctoral students to develop their scholarly and professional identities in preparation for careers in academia.

## Academic Standing/Progress

To be considered in good academic standing, PhD students must be making progress toward their degree requirements, including maintaining a 3.500 minimum cumulative grade-point average (GPA) and completing the comprehensive examination within one year of finishing course work.

## Doctoral Degree Candidacy

Students entering with a relevant BA must complete 48 semester hours, complete the language requirement, and pass the comprehensive examination.

## General Regulations

Program requirements are described in the CSSH Graduate Programs General Regulations ([http://www.northeastern.edu/cssh/graduate/current\\_students/](http://www.northeastern.edu/cssh/graduate/current_students/)) and the Graduate Program in English PhD Guide (<https://www.northeastern.edu/cssh/english/graduate/current-student-resources/>). Both documents are updated annually.

## Program Requirements

### Bachelor's Degree Entrance

#### Milestones

Annual progress review  
Two languages  
Comprehensive exam  
Doctoral degree candidacy  
Dissertation committee  
Dissertation prospectus  
Public prospectus/dissertation work-in-progress presentation  
Dissertation defense

## Core Requirements

Code	Title	Hours
<b>Proseminar</b>		
ENGL 5103	Proseminar	4
<b>Writing and the Teaching of Writing</b>		
ENGL 7392	Writing and the Teaching of Writing	4
<b>Theories and Methods</b>		
Complete 4 semester hours from the following:		4
ENGL 7342	Topics in Criticism	
ENGL 7351	Topics in Literary Study (selected topics only)	
ENGL 7358	Topics in Literature and other Disciplines (selected topics only)	
ENGL 7370	Introduction to Digital Humanities	
WMNS 6100	Theorizing Gender and Sexuality	
WMNS 7976	Directed Study (GCWS Consortium, selected topics only)	
<b>Writing and Rhetoric</b>		
Complete 4 semester hours from the following:		4
ENGL 7360	Topics in Rhetoric	
ENGL 7395	Topics in Writing	
<b>Literary Periods</b>		
<i>Literature Pre-1700</i>		
Complete 4 semester hours from the following:		4
ENGL 7281	Topics in Medieval Literature	



ENGL 7282	Topics in Renaissance Literature
ENGL 7342	Topics in Criticism (selected topics only)

*Literature 1700–1900*

Complete 4 semester hours from the following: 4

ENGL 7284	Topics in 18th-Century Literature
ENGL 7351	Topics in Literary Study (selected topics only)

*Literature Post-1900*

Complete 4 semester hours from the following: 4

ENGL 7215	Topics in 20th-Century American Literature
ENGL 7244	African-American Novel
ENGL 7351	Topics in Literary Study (selected topics only)

**Electives**

Code	Title	Hours
Complete 20 semester hours of ENGL courses.		20

**Dissertation**

Code	Title	Hours
<b>Exam Preparation</b>		
ENGL 8960	Exam Preparation—Doctoral (Only needed for PhD students who have completed coursework but have yet to complete the comprehensive exams. Not repeatable.)	

**Research**

ENGL 9986	Research
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**Dissertation**

Complete the following (repeatable) course twice:  
ENGL 9990 Dissertation

**Dissertation Continuation**

Following completion of two semesters of ENGL 9990, registration in the following class is required in each semester (excluding summers) until the dissertation is completed:

ENGL 9996	Dissertation Continuation
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**Program Credit/GPA Requirements**

48 total semester hours required  
Minimum 3.500 GPA required

**English, PhD—Advanced Entry**

The PhD program seeks to train students to be productive scholars and teachers in the fields of both literary studies and rhetoric and composition. In course work, students read and analyze the important texts, current issues, and critical methodologies of the discipline. Drawing on the breadth of this preparation, students demonstrate their ability to recognize and produce scholarly arguments in designing the three comprehensive field papers in areas of scholarly interest and competence corresponding to recognized and emerging fields of study. Finally, the dissertation offers students an opportunity to design a focused research project in consultation with a dissertation advisor. Throughout the program, faculty works closely with doctoral students to develop

their scholarly and professional identities in preparation for careers in academia.

**Academic Standing/Progress**

To be considered in good academic standing, PhD students must be making progress toward their degree requirements, including maintaining a 3.500 minimum cumulative grade-point average (GPA) and completing the comprehensive examination within one year of finishing course work.

**Doctoral Degree Candidacy**

Students entering with a relevant MA must complete 24 semester hours, complete the language requirement, and pass the comprehensive examination.

**General Regulations**

Program requirements are described in the CSSH Graduate Programs General Regulations and the Graduate Program in English PhD Guide. Both documents are updated annually.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Milestones**

- Annual progress review
- Two languages
- Comprehensive exam
- Doctoral degree candidacy
- Dissertation prospectus
- Public prospectus/dissertation work-in-progress presentation
- Dissertation defense

**Core Requirements**

Code	Title	Hours
<b>Proseminar</b>		
ENGL 5103	Proseminar	4
<b>Writing and the Teaching of Writing</b>		
ENGL 7392	Writing and the Teaching of Writing	4

**Electives**

Code	Title	Hours
Complete 16 semester hours of ENGL courses.		16

**Dissertation**

Code	Title	Hours
<b>Exam Preparation</b>		
ENGL 8960	Exam Preparation—Doctoral (Only needed for PhD students who have completed coursework but have yet to complete the comprehensive exams. Not repeatable.)	

**Research**

ENGL 9986	Research
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**Dissertation**

Complete the following (repeatable) course twice:  
ENGL 9990 Dissertation

**Dissertation Continuation**

Following completion of two semesters of ENGL 9990, registration in the following class is required in each semester (excluding summers) until the dissertation is completed:

ENGL 9996	Dissertation Continuation
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## Program Credit/GPA Requirements

24 total semester hours required  
Minimum 3.500 GPA required

### English, MA

The Master of Arts degree launches students into the study of literature, writing, and rhetoric at the graduate level. The program offers two years of intensive study in the major fields of British and American literature, covering the debates and approaches that animate the discipline of English. Our MA graduates are fully prepared to proceed to study at the doctoral level, and their training in critical thinking, language skills, and cultural history has also proven to be fruitful preparation for a range of careers outside of academia.

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

## Academic Standing/Progress

To be considered in good academic standing, MA students must be making progress toward their degree requirements, including maintaining a 3.000 minimum cumulative grade-point average (GPA).

## General Regulations

Program requirements are described in the CSSH Graduate Programs General Regulations ([http://www.northeastern.edu/cssh/graduate/current\\_students/](http://www.northeastern.edu/cssh/graduate/current_students/)) and the Graduate Program in English MA Guide (<https://www.northeastern.edu/cssh/english/graduate/current-student-resources/>). Both documents are updated annually.

## Program Requirements

### Milestones

Annual progress review  
One language

## Core Requirements

Code	Title	Hours
<b>Proseminar</b>		
ENGL 5103	Proseminar	4
<b>Theories and Methods</b>		
Complete 4 semester hours from the following:		4
ENGL 7342	Topics in Criticism	
ENGL 7351	Topics in Literary Study (selected topics only)	
ENGL 7358	Topics in Literature and other Disciplines (selected topics only)	
ENGL 7370	Introduction to Digital Humanities	

WMNS 6100	Theorizing Gender and Sexuality
WMNS 7976	Directed Study (GCWS Consortium, selected topics only)

## Writing and Rhetoric

Complete 4 semester hours from the following (if completing 12 semester hours of Literary Period requirements). 4-8

Complete 8 semester hours from the following (if completing 8 hours of Literary Period requirements).

ENGL 7360	Topics in Rhetoric
ENGL 7392	Writing and the Teaching of Writing (Master's students may register with permission from the instructor)
ENGL 7395	Topics in Writing

## Literary Periods

Complete 8 semester hours from TWO of the following Literary Periods (if completing 8 semester hours of Writing and Rhetoric requirements), or Complete 12 semester hours from THREE of the following Literary Periods (if completing 4 semester hours of Writing and Rhetoric requirements): 8-12

### Literature Pre-1700

ENGL 7281	Topics in Medieval Literature
ENGL 7282	Topics in Renaissance Literature
ENGL 7342	Topics in Criticism (selected topics only)
ENGL 7358	Topics in Literature and other Disciplines (selected topics only)

### Literature 1700–1900

ENGL 7284	Topics in 18th-Century Literature
ENGL 7351	Topics in Literary Study (selected topics only)

### Literature Post-1900

ENGL 7215	Topics in 20th-Century American Literature
ENGL 7244	African-American Novel
ENGL 7351	Topics in Literary Study (selected topics only)
ENGL 7358	Topics in Literature and other Disciplines (selected topics only)

## Electives

Code	Title	Hours
Complete 8 semester hours of ENGL courses. Students with a minimum GPA of 3.5 may pursue a Master's thesis project (ENGL 7990) for elective credit.		8

## Optional Co-op Experience

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

## Program Credit/GPA Requirements

32 total semester hours required (34 with optional co-op)  
Minimum 3.000 GPA required

## Digital Humanities, Graduate Certificate

### Elizabeth Maddock Dillon, PhD

Certificate Co-Director  
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### Julia Flanders, PhD

Certificate Co-Director  
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### Sarah Connell, PhD

Certificate Administrator  
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CSSH Graduate Programs General Regulations ([https://www.northeastern.edu/cssh/graduate/current\\_students/](https://www.northeastern.edu/cssh/graduate/current_students/))

The Graduate Certificate in Digital Humanities allows students to pursue an organized course of study in digital humanities with the interdisciplinary faculty of the NULab for Texts, Maps, and Networks (<http://www.northeastern.edu/nulab/>) while completing requirements for their degrees in existing Northeastern University doctoral and master's programs. *This is not a stand-alone certificate*; rather, it will be completed by students in the course of their existing program of study.

Digital humanities (DH) is an emerging field of research that is interdisciplinary in scope and collaborative in nature. The field is developing in relation to new digital technologies that have changed the objects of study, methods, and opportunities for research and teaching in existing humanities fields. Digitized texts are now read and accessed in new ways; digitized corpora of texts make possible new modes of quantitative and qualitative analysis (including "distant reading," text mining, mapping, and network analysis); born digital objects constitute new primary sources in need of humanistic theorization, approaches, and critical vocabularies; and modes of encoding, aggregating, and connecting texts enable the creation of new archival resources that are changing our understanding of the archive itself as well revealing new historical, literary, and cultural patterns.

The field is new and developing rapidly and many students are eager for training in this area—both because DH is at the cutting edge of disciplinary work and because it offers new opportunities for employment within the academy and outside of it.

### Academic Standing/Progress

Students in the program are monitored for academic progress. Those students whose GPA falls below a 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to a 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

### Final Project

The student will complete a final independent DH research project located in the student's home program (such as a thesis, or a portion thereof) or participation in a collaborative DH project with substantial student participation. The final project will be overseen by the NULab faculty members teaching the NULab Project Seminar during its development; NULab workshop instructors will advise students on their projects and help students get guidance from other faculty as appropriate. Final projects will be submitted with three components: the project itself, a written project description of about 2,000 words, and a presentation to the NULab community. The DH certificate committee will formally approve all final projects.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
<b>Topics/Readings/Methods</b>		
ENGL 7370	Introduction to Digital Humanities (Introduction to Digital Humanities)	4
or HIST 7370	Texts, Maps, and Networks: Readings and Methods for Digital History	

### Lab Project Seminar

Complete the following (repeatable) 2-credit course two times:		4
INSH 7910	NULab Project Seminar	

### Elective

Code	Title	Hours
Complete 4 semester hours from the following:		
ARTG 5100	Information Design Studio 1: Principles	4
ARTG 5120	Research Methods for Design	
CS 6120	Natural Language Processing	
CS 7290	Special Topics in Data Science	
ENGL 7370	Introduction to Digital Humanities	
INSH 5301	Introduction to Computational Statistics	
INSH 5302	Information Design and Visual Analytics	
INSH 6406	Analyzing Complex Digitized Data	
JRNJ 6340	Fundamentals of Digital Journalism	
JRNJ 6341	Telling Your Story with Data	
JRNJ 6355	Seminar in Investigative Reporting	
HIST 7219	Topics in Cultural History (selected topics only)	
POLS 7334	Social Networks	

### Program Credit/GPA Requirements

Minimum 12 total semester hours required  
Minimum 3.000 GPA required

## History

Website (<https://www.northeastern.edu/cssh/history/graduate/programs/>)

### Timothy Brown, PhD

Professor and Chair

### Timothy Brown, PhD

Professor, Chair, and Graduate Program Director, PhD and MA (World History concentration)

### Martin Blatt, PhD

Professor of the Practice and Graduate Program Director, MA (Public History concentration)

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617.373.2662  
617.373.3661 (fax)

gradhistory@northeastern.edu

Graduate Programs Contact  
 Bonne Knipfer, Graduate Program Administrator,  
 b.knipfer@northeastern.edu

CSSH Graduate Programs General Regulations ([https://www.northeastern.edu/cssh/graduate/current\\_students/](https://www.northeastern.edu/cssh/graduate/current_students/))

Graduate work in history focuses on global and world history, which study the interactions among geographical regions and historical processes around the globe. Students at both the master's and doctoral levels concentrate their work on the history of regions or peoples in Africa, Asia, Europe, Latin America, or the United States, with attention to the intersections and connections between national, regional, and global developments. The Department of History also offers a master's degree with a concentration in public history that emphasizes the study of topics such as material culture, historical exhibits and museums, historical agencies, and archival administration. Recent doctoral students have been the recipients of major fellowships for conducting dissertation research abroad, including Fulbright, Fulbright-Hays, Social Science Research Council, and Chateaubriand fellowships.

## Programs

### Doctor of Philosophy (PhD)

- History (p. 436)
- History—Advanced Entry (p. 436)

### Master of Arts (MA)

- History (p. 437)

### Graduate Certificate

- Public History (p. 438)

## History, PhD

The PhD program, with a focus on global, transnational, and comparative history, seeks to train research historians who plan to teach at the college and university level. Systematic training in theory and methodology and preparation for college teaching are distinctive features of the Northeastern program.

## Academic Standing/Progress

Students are required to maintain an overall GPA of at least 3.500. In addition, the PhD annual review is based on a report by the student's advisor, with attention to:

1. Success in setting up a doctoral committee
2. Passing the departmental language examination in the language of their field
3. Successful performance of teaching assistant duties
4. Successful completion of courses in the tiered system (i.e., the required course sequence)
5. Successful completion, where appropriate, of other required activities, including construction of the comprehensive examination list and the dissertation proposal and scheduling of comprehensive examinations

## Doctoral Degree Candidacy

Students entering without an MA in history must complete 45 semester hours and must pass the qualifying examination by the end of the third year in the program. Upon completion of these two requirements, students will be deemed PhD degree candidates by the college.

## Program Requirements

### Milestones

Qualifying examination  
 Annual review  
 Language  
 PhD candidacy  
 Dissertation committee  
 Dissertation proposal  
 Dissertation defense

### Core Requirements

Code	Title	Hours
<b>Theory and Methodology</b>		
A grade of B or higher is required:		
HIST 5101	Theory and Methodology 1	4
HIST 5102	Theory and Methodology 2	4
<b>Digital History</b>		
HIST 7370	Texts, Maps, and Networks: Readings and Methods for Digital History	4
<b>Readings or Directed Study</b>		
Complete 20 semester hours in either Readings or Directed Study:		20
HIST 8982	Readings	
or HIST 7976	Directed Study	
<b>Research Seminar</b>		
HIST 7314	Research Seminar in World History	4
<b>Practicum</b>		
HIST 8409	Practicum in Teaching	1

### Electives

Code	Title	Hours
Complete 8 semester hours from the following range:		8
HIST 7200 to HIST 7702		

### Dissertation

Code	Title	Hours
<b>Exam Preparation</b>		
Only needed for PhD students who have completed all course work but have not yet passed the comprehensive exam:		
HIST 8960	Exam Preparation—Doctoral	
<b>Dissertation</b>		
Complete the following (repeatable) course twice:		
HIST 9990	Dissertation	
<b>Dissertation Continuation</b>		
Following completion of two semesters of HIST 9990, registration in the following class is required in each semester (excluding summers) until the dissertation is completed:		
HIST 9996	Dissertation Continuation	

## Program Credit/GPA Requirements

45 total semester hours required  
 Minimum 3.500 GPA required

## History, PhD—Advanced Entry

The PhD program, with a focus on global, transnational, and comparative history seeks to train research historians who plan to teach at the college

and university level. Systematic training in theory and methodology and preparation for college teaching are distinctive features of the Northeastern program.

### Academic Standing/Progress

Students are required to maintain an overall GPA of at least 3.500. In addition, the PhD annual review is based on a report by the student's advisor, with attention to:

1. Success in setting up a doctoral committee
2. Passing the departmental language examination in the language of their field
3. Successful performance of teaching assistant duties
4. Successful completion of courses in the tiered system (i.e., the required course sequence)
5. Successful completion, where appropriate, of other required activities, including construction of the comprehensive examination list and the dissertation proposal and scheduling of comprehensive examinations

### Doctoral Degree Candidacy

Students entering with an MA in history from outside Northeastern must complete 37 semester hours and must pass the qualifying examination by the end of the third year in the program. Upon completion of these two requirements, students will be certified as PhD degree candidates by the college.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

Qualifying examination  
Annual review  
Language  
PhD Candidacy  
Dissertation committee  
Dissertation proposal  
Dissertation defense

### Core Requirements

Code	Title	Hours
<b>Theory and Methodology</b>		
A grade of B or higher is required:		
HIST 5101	Theory and Methodology 1	4
HIST 5102	Theory and Methodology 2	4
<b>Digital History</b>		
HIST 7370	Texts, Maps, and Networks: Readings and Methods for Digital History	4
<b>Readings or Directed Study</b>		
Complete 12 semester hours of either Readings or Directed Study:		12
HIST 8982	Readings	
or HIST 7976	Directed Study	
<b>Research Seminar</b>		
HIST 7314	Research Seminar in World History	4
<b>Practicum</b>		
HIST 8409	Practicum in Teaching	1

### Electives

Code	Title	Hours
Complete 8 semester hours from the following range:		8
HIST 7200 to HIST 7702		

### Dissertation

Code	Title	Hours
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#### Exam Preparation

Only needed for PhD students who have completed all course work but have yet to pass the comprehensive exam. Not repeatable.

HIST 8960	Exam Preparation—Doctoral
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#### Dissertation

Complete the following (repeatable) course twice:

HIST 9990	Dissertation
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#### Dissertation Continuation

Following completion of two semesters of HIST 9990, registration in the following class is required in each semester (excluding summers) until the dissertation is completed:

HIST 9996	Dissertation Continuation
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### Program Credit/GPA Requirements

37 total semester hours required  
Minimum 3.500 GPA required

### History, MA

The Master of Arts in History offers two concentrations: public history and world history.

Public history encompasses the practice of history outside the academy in museums, state and local historical societies, archives, the National Park Service, and more. Public history includes the study of such topics as material culture, historical exhibits and museums, historical agencies, archival administration, and how difficult issues including slavery and site of violence are presented to the public.

World history focuses on the history of regions or peoples in Africa, Europe, Latin America, Asia, or the United States, with attention to the intersections and connections between national, regional, and global developments.

The master's program offers an optional cooperative education experience ("co-op") to eligible students. Cooperative education is central to both the Northeastern experience and to the College of Social Sciences and Humanities experiential liberal arts framework. Northeastern's signature co-op ecosystem provides qualified master's students with six-month work experiences as practicing public historians. Graduate students take their work from campus learning spaces, apply their knowledge outside of the classroom, and then bring knowledge and skills gained in community learning spaces back to our campus learning spaces during the cocurricular experiential integration course.

### Academic Standing/Progress

Students are expected to maintain a 3.000 grade-point average (GPA). Should the GPA drop below 3.000, the student will be placed on academic probation and allowed one more semester to bring his or her GPA to the 3.000 level. If the student is not able to meet this requirement by the end of the following semester, the student may be asked to leave the program.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

The Master of Arts in History offers two concentrations: world history (p. 438) and public history (p. 438). The program requires a concentration. Please consult with a Department of History graduate program director for additional details.

### Concentration in World History

#### CORE REQUIREMENTS

Code	Title	Hours
<b>Theory and Methodology</b>		
A grade of B or higher is required:		
HIST 5101	Theory and Methodology 1	4
HIST 5102	Theory and Methodology 2	4
<b>Research Seminar</b>		
HIST 7301 to HIST 7325		4

#### ELECTIVES

Code	Title	Hours
Complete 20 semester hours from the following:		20
HIST 5101 to HIST 5295		
HIST 7205 to HIST 7218		
HIST 7220 to HIST 7297		

### Concentration in Public History

#### CORE REQUIREMENTS

Code	Title	Hours
<b>Theory and Methodology</b>		
A grade of B or higher is required:		
HIST 5101	Theory and Methodology 1	4
<b>Public History</b>		
HIST 5237	Issues and Methods in Public History	4
<b>Digital History</b>		
HIST 7370	Texts, Maps, and Networks: Readings and Methods for Digital History	4
<b>Fieldwork</b>		
Complete the following (repeatable) course twice:		4
HIST 8410	Fieldwork in History 1	
<b>Research Seminar</b>		
Complete 4 semester hours from the following:		4
HIST 7301 to HIST 7325		
HIST 5000 to 5900		

#### ELECTIVES

Code	Title	Hours
Complete 12 semester hours from the following:		12
HIST 5238 to HIST 5248		
HIST 5295 to HIST 6966		
HIST 7201 to HIST 7297		

### Optional Co-op Experience

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

HIST 6964 and INSH 6864	Co-op Work Experience and Experiential Integration
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### Program Credit/GPA Requirements

32 total semester hours required (34 with optional co-op)  
Minimum 3.000 GPA required

## Public History, Graduate Certificate

The Graduate Certificate in Public History allows students to pursue an organized course of study in public history while completing requirements for their degrees in existing doctoral and master's programs. Students have an opportunity to gain a knowledge of core methods and issues in the field of public history and are enabled to use public history approaches in their own research and work.

Public history is a well-established field of practice that marries academic research and methods to public applications and collaborations. Public historians typically work in museums, archives, historical societies, documentary film production, and social activism, though training in public history is useful to a wide variety of humanistic, social science, and legal fields.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirements

Code	Title	Hours
<b>Issues and Methods</b>		
HIST 5237	Issues and Methods in Public History	4
<b>Fieldwork</b>		
Complete the following (repeatable) course twice:		4
HIST 8410	Fieldwork in History 1	

#### Elective

Code	Title	Hours
Complete one of the following:		4
HIST 5238	Managing Nonprofit Organizations	
HIST 5241	Exhibits and Museums	
HIST 7219	Topics in Cultural History	
HIST 7250	Topics in Public History (Sites of Violence and Public Memory)	
HIST 7250	Topics in Public History (Public History and Slavery)	

### Program Credit/GPA Requirements

12 total semester hours required  
Minimum 3.000 GPA required

## Political Science

Website (<https://www.northeastern.edu/cssh/polisci/>)

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CSSH Graduate Programs General Regulations ([http://www.northeastern.edu/cssh/graduate/current\\_students/](http://www.northeastern.edu/cssh/graduate/current_students/))

Graduate training in political science prepares students to analyze important issues in world affairs and succeed in a wide array of careers—from government and academia to the nonprofit and private sectors. Graduate programs in political science, public policy, public administration, security and resilience studies, and international affairs at Northeastern explore the theory and practice of politics, public policy, and public management in the United States and throughout the world. In teaching and research, faculty members in the department cover a broad range of topics and issues in the field of political science. Core areas of inquiry within our department include national and international security, international and U.S. public policy, resilience, network science, European studies, Middle East studies, and democratization and development.

## Programs

### Doctor of Philosophy (PhD)

- Political Science (p. 439)
- Political Science, PhD—Advanced Entry (p. 440)

### Master of Arts (MA)

- Political Science (p. 441)

### Master of Public Administration (MPA)

- Public Administration (p. 443)

### Master of Science (MS)

- Security and Resilience Studies (p. 444)

### Graduate Certificate

- Security and Resilience Studies (p. 446)

## Political Science, PhD

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CSSH Graduate Programs General Regulations ([https://www.northeastern.edu/cssh/graduate/current\\_students/](https://www.northeastern.edu/cssh/graduate/current_students/))

The Doctor of Philosophy in Political Science is grounded in the core fields of the discipline—American government and politics, comparative

politics, international relations, and public policy. Students identify a primary and secondary field as areas of emphasis. The curriculum introduces students to the core fields and also seeks to develop their research skills through a series of methods courses. Students may develop a traditional, academic focus in one of the fields, or they may combine it with public policy to highlight a policy orientation. The program focuses on preparing students to be academic scholars and teachers as well as practitioners in research and public service. The PhD degree includes completion of required courses, passing a written and oral comprehensive examination, and the successful defense of the dissertation before a faculty committee.

## Credit Requirements

Students entering with a bachelor's degree must complete 56 semester hours. Students currently in the MA or MPA program and accepted into the PhD program before completing the MA or MPA must complete 56 semester hours as well as all curriculum requirements of the PhD program.

## Doctoral Degree Candidacy

Doctoral degree candidacy is attained after successfully completing all course work and passing written and oral comprehensive examinations.

## Academic Standing/Progress

All doctoral students must maintain an overall cumulative grade-point average (GPA) of 3.500 while making progress toward the degree requirements. Students who fall below any applicable standard for two consecutive semesters are subject to dismissal from the graduate program. Additionally, receipt of financial support administered by the department, college, or university is contingent on satisfactory academic progress toward the degree and specific guidelines as published in the terms of award. Students who have ungraded courses or courses graded as incomplete risk no longer being eligible for financial aid awards.

## Language Proficiency

Students who conduct research in a language other than English must demonstrate proficiency as necessary for completion of the dissertation. Language courses do not count as electives.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

Annual review  
Comprehensive examination  
Dissertation committee  
Dissertation proposal  
Dissertation proposal oral defense  
Language (as determined by committee)  
PhD candidacy  
Dissertation defense

## Core Requirements

Code	Title	Hours
<b>Seminars</b>		
Complete 12 semester hours from the following:		12
POLS 7204	Seminar in Public Policy	
POLS 7205	Seminar in American Government and Politics	
POLS 7206	Seminar in Comparative Politics	
POLS 7207	Seminar in International Relations	

**Inquiry and Design**

INSH 6300	Research Methods in the Social Sciences	4
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**Quantitative Techniques**

INSH 6500	Statistical Analysis	4
INSH 7400	Quantitative Analysis	4

Advanced methods courses from other disciplines may be chosen in consultation with your faculty advisor.

**Electives**

Courses from other disciplines may be chosen in consultation with your faculty advisor.

Code	Title	Hours
Complete 32 semester hours in the following:		32
POL 7200 to POL 7978		

**Dissertation**

Code	Title	Hours
<b>Exam Preparation</b>		
POLS 8960	Exam Preparation—Doctoral (Only required for PhD students who have completed coursework but have yet to complete the comprehensive exam. Required for students who must maintain full-time status while completing thesis or comprehensive exam.)	

**Dissertation**

Complete the following (repeatable) course twice:

POLS 9990	Dissertation	
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**Dissertation Continuation**

Following completion of two semesters of POLS 9990, registration in the following class is required in each semester (excluding summers) until the dissertation is completed:

POLS 9996	Dissertation Continuation	
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**Program Credit/GPA Requirements**

56 total semester hours required  
Minimum 3.500 GPA required

**Political Science, PhD—Advanced Entry****Mai'a K. Davis Cross, PhD**

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CSSH Graduate Programs General Regulations ([https://www.northeastern.edu/cssh/graduate/current\\_students/](https://www.northeastern.edu/cssh/graduate/current_students/))

The Doctor of Philosophy in Political Science is grounded in the core fields of the discipline—American government and politics, comparative politics, international relations, and public policy. Students identify a primary and secondary field as areas of emphasis. The curriculum introduces students to these fields and also seeks to develop their research skills through a series of methods courses. Students may develop a traditional, academic focus in one of the fields, or they may combine it with public policy to highlight a policy orientation. The

program is designed to prepare students to be academic scholars and teachers as well as practitioners in research and public service. The PhD degree requires completion of required courses, passing a written and oral comprehensive examination, and the successful defense of the dissertation before a faculty committee.

**Credit Requirements and Advanced Standing**

Students entering with a master's degree from outside Northeastern may receive advanced standing for relevant prior course work but must complete a minimum of 32 semester hours. Students entering with a Northeastern MA in political science must complete a minimum of 24 semester hours while also satisfying all PhD course requirements. Master's-level course work that results in advanced standing is evaluated by the graduate program director to determine its applicability to the PhD curriculum.

**Doctoral Degree Candidacy**

Doctoral degree candidacy is attained after successful completion of all course work and passing written and oral comprehensive examinations.

**Academic Standing/Progress**

All doctoral students must maintain an overall cumulative grade-point average (GPA) of 3.500 while making progress toward the degree requirements. Students who fall below any applicable standard for two consecutive semesters are subject to dismissal from the graduate program. Additionally, receipt of financial support administered by the department, college, or university is contingent on satisfactory academic progress toward the degree and specific guidelines as published in the terms of award. Students who have ungraded courses or courses graded as incomplete risk no longer being eligible for financial aid awards.

**Language Proficiency**

For students who conduct research in a language other than English, he or she must demonstrate proficiency as necessary for completion of the dissertation. Language courses do not count as electives.

**Program Requirements**

Complete all courses and requirements listed below.

**Milestones**

- Annual review
- Comprehensive examination
- Dissertation committee
- Dissertation proposal
- Dissertation proposal oral defense
- Language (as determined by committee)
- PhD candidacy
- Dissertation defense

**Core Requirements**

Consult the graduate program director regarding which major-required courses apply to your individual plan of study.

Code	Title	Hours
<b>Seminar</b>		
Complete 12 semester hours from the following:		12
POLS 7204	Seminar in Public Policy	
POLS 7205	Seminar in American Government and Politics	
POLS 7206	Seminar in Comparative Politics	
POLS 7207	Seminar in International Relations	

**Inquiry and Design**



INSH 6300	Research Methods in the Social Sciences	4
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#### Quantitative Techniques

INSH 6500 or INSH 7400	Statistical Analysis Quantitative Analysis	4
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INSH 7500	Advanced Quantitative Analysis	4
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Advanced methods courses from other disciplines may be chosen in consultation with your faculty advisor.

#### Electives

Code	Title	Hours
Complete 16 semester hours in the following. Courses from other disciplines may be chosen in consultation with your faculty advisor.		16

POLS 7200 to POLS 7978

#### Dissertation

Code	Title	Hours
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##### Exam Preparation

POLS 8960	Exam Preparation—Doctoral (Only required for PhD students who have completed coursework but have yet to complete the comprehensive exam.)	
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##### Dissertation

Complete the following (repeatable) course twice:

POLS 9990	Dissertation	
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##### Dissertation Continuation

Following completion of two semesters of POLS 9990, registration in the following class is required in each semester (excluding summers) until the dissertation is completed:

POLS 9996	Dissertation Continuation	
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#### Program Credit/GPA Requirements

40 total semester hours required

Minimum 3.500 GPA required

### Political Science, MA

**Mai'a K. Davis Cross, PhD**

Director of Graduate Studies

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CSSH Graduate Programs General Regulations ([https://www.northeastern.edu/cssh/graduate/current\\_students/](https://www.northeastern.edu/cssh/graduate/current_students/))

The Master of Arts program focuses on the core scholarly areas of political science. Students specialize in one of five concentration areas: American government and politics, comparative government and politics, international relations, public policy, and security studies. Courses in the MA program serve as a foundation for work in a doctoral program or as preparation for careers in government, nonprofit organizations, or related work in the private sector.

To earn the Master of Arts in Political Science degree at Northeastern, you must successfully complete 32 semester hours (typically eight courses) of credit. Full-time students can expect to complete the degree within two academic years. Course work consists of 4 semester hours in a required statistics course, 12 semester hours within a chosen

concentration, and 16 semester hours of electives (including the experiential education requirement). To see the full breakdown, click the Program Requirements tab above.

#### Academic Standing/Progress

Satisfactory progress in the MA program includes maintaining a grade-point average (GPA) of 3.000 overall as well as in the student's concentration area. A final cumulative GPA of at least 3.000 in all course work is required to qualify for the Master of Arts degree. Any course in which a student earns lower than a C grade cannot be used to fulfill concentration area requirements. A student who fails to make satisfactory progress is placed on academic probation, which is a warning that the student may not be allowed to continue in the graduate program unless the deficiency is addressed.

#### Experiential Learning Requirement

In addition to in-class course work, students are required to complete an experiential education component that advances their learning, research, and/or career objectives. Experiential education offers MA students a direct experience with focused reflection relevant to their academic studies. For students with research interests, the experience focuses on related activities, such as primary source analysis and data gathering. For other students, the experience involves engagement with areas of practice and policy, such as an internship. Students register for the relevant course with a minimum of 4 semester hours and maximum of 8 semester hours to satisfy the experiential education requirement.

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

#### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirement

Code	Title	Hours
<b>Quantitative Techniques</b>		
INSH 6500 or INSH 7400 or INSH 7500 or INSH 7600	Statistical Analysis Quantitative Analysis Advanced Quantitative Analysis Advanced Methodological and Quantitative Techniques	4
or PPUA 5263 or CS 6220 or PHYS 7331	Geographic Information Systems for Urban and Regional Policy Data Mining Techniques Network Science Data	

#### Concentrations

- American Government (p. 442)
- International Relations (p. 442)
- Comparative Politics (p. 442)

- Public Policy (p. 442)
- Security Studies (p. 442)

**AMERICAN GOVERNMENT CONCENTRATION**

Code	Title	Hours
<b>Seminar</b>		
POLS 7205	Seminar in American Government and Politics	4
<b>American Government Courses</b>		
Complete 8 semester hours from the following:		8
POLS 7257	The U.S. Judicial Process	
POLS 7313	State Government	
POLS 7341	Security and Resilience Policy	
PPUA 5270	Food Systems and Public Policy	
PPUA 6502	Economic Analysis for Policy and Planning	
PPUA 6505	Public Budgeting and Financial Management	
PPUA 6522	Administrative Ethics and Public Management	
PPUA 6530	State and Local Public Finance	
PPUA 6551	Nonprofit Organizations and Social Change	
PPUA 6552	The Nonprofit Sector in Civil Society and Public Affairs	
PPUA 7232	Immigration and Urban America	
PPUA 7233	Contemporary Community Development	
PPUA 7234	Land Use and Urban Growth Policy	
PPUA 7240	Health Policy and Politics	
PPUA 7245	Education Policy in the United States	
PPUA 7247	U.S. Healthcare Reform: Past, Present, and Future	

**INTERNATIONAL RELATIONS CONCENTRATION**

Code	Title	Hours
<b>Seminar</b>		
POLS 7207	Seminar in International Relations	4
<b>International Relations Courses</b>		
Complete 8 semester hours from the following:		8
POLS 7341	Security and Resilience Policy	
POLS 7343	Counterterrorism	
POLS 7344	Hard Power, Soft Power, and Smart Power	
POLS 7369	International Security	
POLS 7370	Europe and European Union Governance	
POLS 7387	Global Governance	
POLS 7394	Topical Seminar in International Relations	
POLS 7441	Cyberconflict	
PPUA 7243	International Development Administration and Planning	

**COMPARATIVE POLITICS CONCENTRATION**

Code	Title	Hours
<b>Seminar</b>		
POLS 7206	Seminar in Comparative Politics	4
<b>Comparative Politics Courses</b>		
Complete 8 semester hours from the following:		8
POLS 7325	Contemporary Issues in Third World Development	
POLS 7333	Science, Technology, and Public Policy	
POLS 7346	Resilient Cities	
POLS 7362	Nationalism	
POLS 7366	Genocide in a Comparative Perspective	
POLS 7370	Europe and European Union Governance	
POLS 7376	Government and Politics of the Middle East	
PPUA 5266	Urban Theory and Science	
PPUA 5268	International Environmental Policy	
PPUA 5270	Food Systems and Public Policy	
PPUA 7239	Problems in Metropolitan Policymaking	
PPUA 7240	Health Policy and Politics	
PPUA 7243	International Development Administration and Planning	

**PUBLIC POLICY CONCENTRATION**

Code	Title	Hours
<b>Seminar</b>		
POLS 7204 or PPUA 6506	Seminar in Public Policy Techniques of Policy Analysis	4
<b>Public Policy Courses</b>		
Complete 8 semester hours from the following:		8
POLS 7333	Science, Technology, and Public Policy	
POLS 7341	Security and Resilience Policy	
POLS 7362	Nationalism	
PPUA 6500	Principles of Public Administration	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6507	Institutional Leadership and the Public Manager	
PPUA 6509	Techniques of Program Evaluation	
PPUA 6552	The Nonprofit Sector in Civil Society and Public Affairs	
PPUA 7239	Problems in Metropolitan Policymaking	
PPUA 7240	Health Policy and Politics	
PPUA 7245	Education Policy in the United States	

**SECURITY STUDIES CONCENTRATION**

Code	Title	Hours
<b>Seminar</b>		
POLS 7341	Security and Resilience Policy	4
<b>Security Studies Courses</b>		
Complete 8 semester hours from the following:		8
POLS 7207	Seminar in International Relations	
POLS 7343 to POLS 7346		
POLS 7366	Genocide in a Comparative Perspective	
POLS 7369	International Security	

POLS 7370	Europe and European Union Governance
POLS 7376	Government and Politics of the Middle East
POLS 7387	Global Governance

**Electives**

**Code**                      **Title**    **Hours**  
 Complete 12 semester hours in the following range:                      12

POLS 5100 to POLS 7990

**Experiential Learning Requirement <sup>1</sup>**

POLS 7980	Capstone Project	4
or POLS 7976	Directed Study	
or POLS 7990	Thesis	
or POLS 8407	Internship	

**Optional Co-op Experience**

**Code**                      **Title**    **Hours**  
 Complete two consecutive semesters of Co-op Work Experience and Experiential Integration:                      2

POLS 6964                      Co-op Work Experience and INSH 6864                      and Experiential Integration

**Program Credit/GPA Requirements**

32 total semester hours required (34 with optional co-op)  
 Minimum 3.000 GPA required

<sup>1</sup> Students who decide to fulfill the Experiential Learning Requirement with the optional Co-op, will enroll in one additional elective course and graduate with 34 semester hours instead of 32.

**Public Administration, MPA**

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CSSH Graduate Programs General Regulations ([https://www.northeastern.edu/cssh/graduate/current\\_students/](https://www.northeastern.edu/cssh/graduate/current_students/))

The Master of Public Administration (MPA) is the management and leadership degree for those seeking to serve the public good. The program seeks to equip its students with skills in policy analysis, program evaluation, research methods, and written and verbal communications. Students have an opportunity to develop competencies in budgeting and human resources, organizational management and leadership, and the interplay between ethics and accountability in a diverse society. Throughout the degree program, students gain career-oriented experience through internships, small group projects, and other interactions with professionals in the field. These experiences are designed to enable the Northeastern MPA graduate to move into a wide array of public and

nonprofit sector positions at the local, state, national, and international levels.

**Mission Statement**

The mission of the MPA program at Northeastern University is to serve the needs of the public affairs community, including students, working professionals, faculty, and researchers, by providing a practice-oriented and research-based graduate educational experience. The faculty pledges the best instruction available in a set of courses designed to integrate theoretical foundations with practical skills. The MPA program will prepare students to be effective in a dynamic and increasingly diverse professional environment. We also commit ourselves to assisting students in every possible way to secure internships, postgraduate employment, and overall career advancement. Students, in turn, are expected to meet high levels of academic excellence combined with ethical and professional integrity. Committed to the ideals of public service and advancing the public interest, we seek students who share the same enthusiasm.

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

The Northeastern University MPA program is nationally accredited by NASPAA.

**Academic Standing/Progress**

Students in the program are monitored for academic progress. Those students whose grade-point average (GPA) falls below a 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to a 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Core Requirements**

A cumulative 3.000 GPA is required for the core requirements.

Code	Title	Hours
<b>Quantitative Techniques</b>		
INSH 6500	Statistical Analysis	4
<b>Analysis</b>		
PPUA 6506	Techniques of Policy Analysis	4
PPUA 6502	Economic Analysis for Policy and Planning	4
<b>Administration and Management</b>		
PPUA 6500	Principles of Public Administration	4
PPUA 6505	Public Budgeting and Financial Management	4
PPUA 6507	Institutional Leadership and the Public Manager	4
<b>Capstone</b>		

PPUA 7673	Capstone in Public Policy and Urban Affairs	4
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## Internship Requirement

An approved internship or waiver is required.

Code	Title	Hours
<b>Internship Waived</b>		
<i>Electives</i>		
Complete 12 semester hours from the Course List. (p. 444)		12
<b>Internship Completed for Course Credit</b>		
PPUA 6862	Internship with Research	4
<i>Electives</i>		
Complete 8 semester hours from the Course List. (p. 444)		8
<b>Internship Completed Not for Course Credit</b>		
PPUA 6861	Internship	0
<i>Electives</i>		
Complete 12 semester hours from the Course List. (p. 444)		12

## Optional Co-op Experience

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

## Course List

Code	Title	Hours
LPSC 5000 to LPSC 7999		
PPUA 5000 to PPUA 7999		
CRIM 5000 to CRIM 7999 (by advisement only)		
ECON 5000 to ECON 7999 (by advisement only)		
ENGL 5000 to ENGL 7999 (by advisement only)		
HIST 5000 to HIST 7999 (by advisement only)		
POLS 5000 to POLS 7999 (by advisement only)		
SOCL 5000 to SOCL 7999 (by advisement only)		

## Program Credit/GPA Requirements

40 total semester hours required (42 with optional co-op)  
Minimum 3.000 GPA

## Security and Resilience Studies, MS

### Daniel Aldrich, PhD

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CSSH Graduate Programs General Regulations ([http://www.northeastern.edu/cssh/graduate/current\\_students/](http://www.northeastern.edu/cssh/graduate/current_students/))

Security and resilience studies is an emerging field of inquiry that focuses on how global, national, and subnational actors manage a range of chronic transnational challenges—such as terrorism, organized crime, weapons proliferation, cyberattacks, bioterrorism, climate

change and catastrophic disasters, migration, and radicalization—that can be destabilizing to societies. It explores how strategic doctrines, organization processes, bureaucratic behaviors, and security tools and tactics are adapting to these challenges by placing greater emphasis on resilience. Resilience is a concept rooted in multiple disciplines that is gaining widespread currency at the community, societal, and global levels given the prevalence of human-made and naturally occurring threats that do not lend themselves to preventive and protective measures. Strategies for dealing with these threats emphasize measures that mitigate, respond to, recover from, and adapt to risk in order to safeguard essential functions and societal values. Many of these measures involve the role of technologies, system design, and engineering as well as policy, regulatory, and governance issues. Students at Northeastern who enroll in the Master of Science in Security and Resilience Studies have an opportunity to become prepared to inform and support domestic and international efforts to deal with the major sources of turbulence in the 21st century.

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

To earn the Master of Science in Security and Resilience Studies degree at Northeastern, you must successfully complete 32 semester hours of credit (34 semester hours with co-op). Full-time students can expect to complete the degree within one calendar year. This program can be completed either at Northeastern University's Boston campus or online.

## Academic Standing/Progress

Satisfactory progress in the MS program includes maintaining a minimum grade-point average of 3.000.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
<b>Required Core Courses</b>		
POLS 7341	Security and Resilience Policy <sup>1</sup>	4
<b>Research Method</b>		
INSH 6300	Research Methods in the Social Sciences	4
or INSH 6500	Statistical Analysis	
or INSH 7400	Quantitative Analysis	
or INSH 7500	Advanced Quantitative Analysis	
or INSH 7600	Advanced Methodological and Quantitative Techniques	
or PPUA 5263	Geographic Information Systems for Urban and Regional Policy	

## Core Elective Courses

Complete 8 semester hours from the following:		8
CRIM 7200	Criminology <sup>1</sup>	

POLS 7343	Counterterrorism
POLS 7346	Resilient Cities
or PPUA 7346	Resilient Cities
POLS 7369	International Security
POLS 7441	Cyberconflict
PPUA 5390	Special Topics in Public Policy and Urban Affairs <sup>1</sup>
CY 5010	Foundations of Information Assurance <sup>1</sup>

**Capstone**

Code	Title	Hours
Choose one of the following options in consultation with faculty advisor and program director:		4
POLS 7980	Capstone Project <sup>1</sup>	
or PPUA 7673	Capstone in Public Policy and Urban Affairs	

**Electives**

Electives are organized by themes to allow students to think thematically.

Code	Title	Hours
Complete 12 credits from any combination of the following elective themes:		12

- Administration, Management, and Policy (p. 445)
- Counterterrorism and Conflict Studies (p. 445)
- Cybersecurity Policy (p. 445)
- Resilient Cities (p. 445)
- Criminal Justice (p. )

**ADMINISTRATION, MANAGEMENT, AND POLICY**

Code	Title	Hours
CRIM 7202	The Criminal Justice Process	
POLS 7387	Global Governance	
POLS 7704	Critical Infrastructure Resilience <sup>1</sup>	
PPUA 6502	Economic Analysis for Policy and Planning	
PPUA 6503	Managing People in Public and Nonprofit Sectors <sup>1</sup>	
PPUA 6504	Organizational Theory and Management <sup>1</sup>	
PPUA 6505	Public Budgeting and Financial Management <sup>1</sup>	
PPUA 6506	Techniques of Policy Analysis <sup>1</sup>	
PPUA 6507	Institutional Leadership and the Public Manager <sup>1</sup>	

**COUNTERTERRORISM AND CONFLICT STUDIES**

Code	Title	Hours
CRIM 7201	Global Criminology	
POLS 7343	Counterterrorism	
POLS 7344	Hard Power, Soft Power, and Smart Power	
POLS 7366	Genocide in a Comparative Perspective	
POLS 7369	International Security	

**CYBERSECURITY POLICY**

Code	Title	Hours
CY 5001	Cyberspace Technology and Applications	
CY 5010	Foundations of Information Assurance	
CY 5200	Security Risk Management and Assessment	
CY 5210	Information System Forensics	
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
CY 5250	Decision Making for Critical Infrastructure	
POLS 7441	Cyberconflict <sup>1</sup>	

**RESILIENT CITIES**

Code	Title	Hours
CRIM 7200	Criminology <sup>1</sup>	
CRIM 7270	Crime and Community Context	
CRIM 7312	Special Topics in Criminology and Public Policy	
CRIM 7316	Advanced Topics in Methods	
LPSC 7312	Cities, Sustainability, and Climate Change	
POLS 7346	Resilient Cities	
or PPUA 7346	Resilient Cities	
POLS 7704	Critical Infrastructure Resilience <sup>1</sup>	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5262	Big Data for Cities <sup>1</sup>	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
PPUA 5266	Urban Theory and Science	
PPUA 6201	The 21st-Century City: Urban Opportunities and Challenges in a Global Context	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	

**CRIMINAL JUSTICE**

Code	Title	Hours
CRIM 7200	Criminology	
CRIM 7201	Global Criminology	
CRIM 7202	The Criminal Justice Process	
CRIM 7262	Evidence-Based Crime Policy	
CRIM 7312	Special Topics in Criminology and Public Policy	
CRIM 7316	Advanced Topics in Methods	

**Optional Co-op Experience**

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

**Program Credit/GPA Requirements**

32 total semester hours (34 with optional co-op) required

Minimum 3.000 GPA required

<sup>1</sup> Occasional online offering

## Security and Resilience Studies, Graduate Certificate

Program Director

**Daniel Aldrich, PhD**, d.aldrich@northeastern.edu

Program Administrator

**Rosy Trovato**, r.trovato@northeastern.edu

617.373.4404

CSSH Graduate Programs General Regulations ([http://www.northeastern.edu/cssh/graduate/current\\_students/](http://www.northeastern.edu/cssh/graduate/current_students/))

The goal of the Graduate Certificate in Security and Resilience Studies is to prepare students to manage contemporary transnational risks by offering them an opportunity to gain a comprehensive understanding of the principles and policies for security and resilience of critical systems. This goal is achieved by:

- Passing a core course in security and resilience policy that introduces students to a comprehensive approach to managing transnational risks
- Passing recommended foundation courses for cyberspace policy, security administration, and counterterrorism specializations that provide a broad perspective on transnational threats and the means states use to address them
- Learning how to work with others in groups and exercise leadership in teams by completing group assignments and projects

The certificate requires students to take three courses for a total of 12 semester hours. This program can be completed at Northeastern University's Boston campus or online.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirement

Code	Title	Hours
POLS 7341	Security and Resilience Policy	4

#### Electives

Code	Title	Hours
Complete 8 semester hours from the following:		8
CRIM 7200	Criminology	
POLS 7343	Counterterrorism	
POLS 7346	Resilient Cities	
POLS 7369	International Security	
POLS 7441	Cyberconflict	
PPUA 5390	Special Topics in Public Policy and Urban Affairs	

### Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

## School of Public Policy and Urban Affairs

Website (<http://www.northeastern.edu/cssh/policyschool/>)

**Jennie Stephens, PhD**

Director

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#### Graduate Program Directors

**Alan Clayton-Matthews, PhD**

PhD Program, Public Policy

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**Christopher Bosso, PhD**

JD/MS Program, Law and Public Policy

MPP Program, MPA Program

Certificate Program, Public Policy Analysis

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MS Program, Environmental Science and Policy

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#### Graduate Programs Contacts

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CSSH Graduate Programs General Regulations ([https://www.northeastern.edu/cssh/graduate/current\\_students/](https://www.northeastern.edu/cssh/graduate/current_students/))

The School of Public Policy and Urban Affairs is nationally and internationally recognized for excellence and innovation in policy-oriented education, applied research, and engagement. Our mission is to educate professional master's and doctoral students who are sought after as policy analysts, program evaluators, and leaders of nonprofit, public, private sector, and academic institutions; to create and disseminate policy-relevant knowledge and analytical methods of value to policymakers and the public; and to serve the broader community through policy analysis and technical assistance.

The school is committed to excellence in research and education on pressing and emerging policy issues of the day—public health, climate change, environmental challenges, the court and justice systems, and creating sustainable and resilient cities that provide economic opportunity for their residents. We define our approach as locally informed and internationally relevant. Our hallmark is to engage students in building the world that they would like to live in through experiential learning opportunities and applied research.

## Programs

### Doctor of Philosophy (PhD)

- Public Policy (p. 447)
- Public Policy—Advanced Entry (p. 449)

### Master of Arts (MA)

- International Affairs (p. 450)

### Master of Public Administration (MPA)

- Public Administration (p. 443)

### Master of Public Policy (MPP)

- Public Policy (p. 452)

### Master of Science (MS)

- Urban Informatics (STEM Program) (p. 453)
- Urban Planning and Policy (p. 64)
- Environmental Science and Policy (College of Science) (p. 399)
- Engineering and Public Policy with Concentration in Energy and Environment (College of Engineering) (p. 140)
- Engineering and Public Policy with Concentration in Infrastructure Resilience (College of Engineering) (p. 142)

### Dual Degree

- Law and Public Policy, JD/MS (p. 463)

### Graduate Certificates

- Public Policy Analysis (p. 461)
- Nonprofit Sector, Philanthropy, and Social Change (p. 461)
- Urban Analytics
- Urban Studies (p. 463)

## Public Policy, PhD

Website (<https://www.northeastern.edu/cssh/policyschool/law-public-policy-phd/>)

### Alan Clayton-Matthews, PhD

Graduate Program Director  
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617.373.2909

Julie Switkes, Graduate Program Administrator, 617.373.2891, j.switkes@northeastern.edu (%20j.switkes@northeastern.edu)

CSSH Graduate Programs General Regulations ([http://www.northeastern.edu/cssh/graduate/current\\_students/](http://www.northeastern.edu/cssh/graduate/current_students/))

This is an interdisciplinary social science program that combines several social science and legal theoretical perspectives with both quantitative and qualitative research methodologies. The wide-ranging faculty in

the School of Public Policy and Urban Affairs can support students' research and dissertations in many fields—urban policy and regional economic development; sustainability and climate change; health policy; crime, social justice, and inequality; and the intersection of law and policy. Students work with faculty members to formulate a plan of study within their field of concentration by choosing courses from graduate programs offered in the policy school, the College of Social Sciences and Humanities, and in other colleges and schools at Northeastern University. Students also study a common body of knowledge developed in core courses on policy, research methods, and law. The school's research centers and faculty members' research projects provide opportunities for students to develop insight, experience, and synergies to help with their own research goals. The college and school offer a high level of support allowing all students to be devoted full-time to their studies and research.

### Doctoral Degree Candidacy

Complete all required course work with a minimum 3.500 grade-point average (GPA) in the core courses and pass the comprehensive examinations. Students entering without a JD or master's degree must complete 55 semester hours.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

Comprehensive examination  
Seminars  
Annual review  
PhD candidacy  
Dissertation committee  
Dissertation proposal  
Dissertation defense

### Core Requirements

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

Code	Title	Hours
<b>Seminar</b>		
POLS 7204	Seminar in Public Policy	4
PPUA 7976	Directed Study	1-4
<b>Research and Statistical Methods</b>		
INSH 6500	Statistical Analysis	4
INSH 6302	Qualitative Methods	4
INSH 6300	Research Methods in the Social Sciences	4
<b>Advanced Methods</b>		
Complete one of the following. An additional concentration elective may be taken in lieu of the advanced methods elective:		4
INSH 7500 or INSH 7600	Advanced Quantitative Analysis Advanced Methodological and Quantitative Techniques	

### Experiential Research Residency

A PhD research residency or waiver is required.

Code	Title	Hours
PPUA 9980	Experiential PhD Research Residency	0

**Concentrations**

Complete one of the following concentrations:

- Sustainability and Resilience (p. 448)
- Health Policy and Management (p. 448)
- Urban and Regional Policy (p. 448)

**SUSTAINABILITY AND RESILIENCE**

Code	Title	Hours
<b>Seminar</b>		
PPUA 7511	Sustainability and Resilience Research Seminar	2
<b>Law Requirement</b>		
Complete 3 semester hours from the following:		3
LW 7329	Environmental Law	
<b>Electives</b>		
Complete 24 semester hours from the following:		24
CIVE 7110	Critical Infrastructure Resilience	
LPSC 7312	Cities, Sustainability, and Climate Change	
POLS 7333	Science, Technology, and Public Policy	
POLS 7341	Security and Resilience Policy	
POLS 7704	Critical Infrastructure Resilience	
PPUA 7234	Land Use and Urban Growth Policy	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	
PPUA 7249	Urban Coastal Sustainability	
PPUA 7346	Resilient Cities	
PPUA 7976	Directed Study	
SOCL 7267	Environment, Health, and Society	

**HEALTH POLICY AND MANAGEMENT**

Code	Title	Hours
<b>Seminar</b>		
PPUA 7247	U.S. Healthcare Reform: Past, Present, and Future	4
<b>Health Organization</b>		
HRMG 6220	Health Organization Management	3
<b>Business Elective</b>		
Complete 3 semester hours from the following:		3
STRT 6220	Strategic Management for Healthcare Organizations	
SCHM 6223	Managing Healthcare Supply Chain Operations	
FINA 6220	Healthcare Finance	
<b>Law Requirement</b>		
LW 7335	Health Law	3
<b>Electives</b>		
Complete a minimum of 18 semester hours from the following:		18
ECON 7200	Topics in Applied Economics	
PPUA 6509	Techniques of Program Evaluation	
PPUA 7240	Health Policy and Politics	
PPUA 7243	International Development Administration and Planning	
SOCL 7243	Sociology of Health and Illness	
SOCL 7267	Environment, Health, and Society	

SOCL 7287	Social Movements in Health
PHTH 6000-9999 (public health elective, by advisement)	

**URBAN AND REGIONAL POLICY**

Code	Title	Hours
<b>Seminar</b>		
PPUA 7521	Seminar in Urban Theory	4
<b>Law Requirement</b>		
LW 7655	Advancing Economic and Social Equity through Municipal Policy and Law	2
<b>Electives</b>		
Complete 24 semester hours from the following:		24
SOCL 7221	Globalization, Development, and Social Justice	
SOCL 7227	Race and Ethnic Relations	
SOCL 7235	Urban Sociology	
SOCL 7268	Globalization and the City	
CRIM 7270	Crime and Community Context	
CRIM 7316	Advanced Topics in Methods	
ARCH 5210	Environmental Systems	
ECON 7210	Applied Microeconomic Policy Analysis	
ECON 7240	Workshop in Applied Econometrics	
ECON 7250	International Economic Development	
ECON 7260	Urban Economic Systems	
ECON 7261	Urban Economic Development	
ECON 7262	Regional Economic Theory	
ECON 7266	Economics of Government	
ECON 7270	Economics of Law and Regulation	
ECON 7740	Applied Econometrics 2	
ECON 7763	Labor Market Analysis	
LPSC 7215	Advanced Quantitative Techniques	
POLS 7325	Contemporary Issues in Third World Development	
POLS 7334	Social Networks	
PPUA 6201	The 21st-Century City: Urban Opportunities and Challenges in a Global Context	
PPUA 6204	Urban Development and Politics	
PPUA 6509	Techniques of Program Evaluation	
PPUA 6525	Institutions and Public Policy	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	
PPUA 7976	Directed Study	

**Exam and Dissertation**

Code	Title	Hours
<b>Exam Prep</b>		
Only needed for PhD students who have completed all course work but have not yet passed the comprehensive exam/proposal defense. Repeatable.		
PPUA 8960	Exam Preparation—Doctoral	0
PPUA 9984	Research	1-4
<b>Dissertation</b>		
Complete the following (repeatable) course twice:		
PPUA 9990	Dissertation	0
<b>Dissertation Continuation</b>		



Following completion of two semesters of PPUA 9990, registration in the following class is required in each semester (excluding summers) until the dissertation is completed:

PPUA 9996	Dissertation Continuation	0
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## Program Credit/GPA Requirements

55 total semester hours required  
Minimum 3.500 GPA required

### Public Policy, PhD—Advanced Entry

Website (<https://www.northeastern.edu/cssh/policyschool/law-public-policy-phd/>)

#### Alan Clayton-Matthews, PhD

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310 Renaissance Park  
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#### Julie Switkes

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CSSH Graduate Programs General Regulations ([http://www.northeastern.edu/cssh/graduate/current\\_students/](http://www.northeastern.edu/cssh/graduate/current_students/))

This is an interdisciplinary social science program that combines several social science and legal theoretical perspectives with both quantitative and qualitative research methodologies. The wide-ranging faculty in the School of Public Policy and Urban Affairs can support students' research and dissertations in many fields—urban policy and regional economic development; sustainability and climate change; health policy; crime, social justice, and inequality; and the intersection of law and policy. Students work with faculty members to formulate a plan of study within their field of concentration by choosing courses from graduate programs offered in the policy school, the College of Social Sciences and Humanities, and in other colleges and schools at Northeastern University. Students also study a common body of knowledge developed in core courses on policy, research methods, and law. The school's research centers and faculty members' research projects provide opportunities for students to develop insight, experience, and synergies to help with their own research goals. The college and school offer a high level of support allowing all students to be devoted full-time to their studies and research.

## Doctoral Degree Candidacy

Complete all required course work with a minimum 3.500 grade-point average (GPA) in the core courses, pass the comprehensive examinations, and defend a dissertation proposal. Students entering with a JD or master's degree must complete 47 semester hours.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

Comprehensive examination  
Seminars  
Annual review  
PhD candidacy  
Dissertation committee

Dissertation proposal  
Dissertation defense

## Core Requirements

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

Code	Title	Hours
<b>Seminar</b>		
POLS 7204	Seminar in Public Policy	4
PPUA 7976	Directed Study	1-4
<b>Research and Statistical Methods</b>		
INSH 6500	Statistical Analysis	4
INSH 6302	Qualitative Methods	4
INSH 6300	Research Methods in the Social Sciences	4
<b>Advanced Methods</b>		
Complete one of the following. An additional concentration elective may be taken in lieu of the advanced methods elective:		4
INSH 7500	Advanced Quantitative Analysis	
or INSH 7600	Advanced Methodological and Quantitative Techniques	

## Experiential Research Residency

A PhD research residency or waiver is required.

Code	Title	Hours
PPUA 9980	Experiential PhD Research Residency	0

## Concentrations

Complete one of the following concentrations:

- Sustainability and Resilience (p. 449)
- Health Policy and Management (p. 450)
- Urban and Regional Policy (p. 450)

## SUSTAINABILITY AND RESILIENCE

Code	Title	Hours
<b>Seminar</b>		
PPUA 7511	Sustainability and Resilience Research Seminar	2
<b>Law Requirement</b>		
Complete 3 semester hours from the following:		3
LW 7329	Environmental Law	
<b>Electives</b>		
Complete 16 semester hours from the following:		16
CIVE 7110	Critical Infrastructure Resilience	
LPSC 7312	Cities, Sustainability, and Climate Change	
POLS 7333	Science, Technology, and Public Policy	
POLS 7341	Security and Resilience Policy	
POLS 7704	Critical Infrastructure Resilience	
PPUA 7234	Land Use and Urban Growth Policy	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	
PPUA 7249	Urban Coastal Sustainability	
PPUA 7346	Resilient Cities	

PPUA 7976	Directed Study	
SOCL 7267	Environment, Health, and Society	

**HEALTH POLICY AND MANAGEMENT**

Code	Title	Hours
<b>Seminar</b>		
PPUA 7247	U.S. Healthcare Reform: Past, Present, and Future	4
<b>Health Organization</b>		
HRMG 6220	Health Organization Management	3
<b>Law Requirement</b>		
LW 7335	Health Law	3
<b>Business Elective</b>		
Complete 3 semester hours from the following:		3
FINA 6220	Healthcare Finance	
SCHM 6223	Managing Healthcare Supply Chain Operations	
STRT 6220	Strategic Management for Healthcare Organizations	

<b>Electives</b>		
Complete a minimum of 10 semester hours from the following:		10
ECON 7200	Topics in Applied Economics	
PPUA 6509	Techniques of Program Evaluation	
PPUA 7240	Health Policy and Politics	
PPUA 7243	International Development Administration and Planning	
SOCL 7243	Sociology of Health and Illness	
SOCL 7267	Environment, Health, and Society	
SOCL 7287	Social Movements in Health	
PHTH 6000-9999 (public health elective, by advisement)		

**URBAN AND REGIONAL POLICY**

Code	Title	Hours
<b>Seminar</b>		
PPUA 7521	Seminar in Urban Theory	4
<b>Law Requirement</b>		
LW 7655	Advancing Economic and Social Equity through Municipal Policy and Law	2
<b>Electives</b>		
Complete 16 semester hours from the following:		16
ARCH 5210	Environmental Systems	
CRIM 7270	Crime and Community Context	
CRIM 7316	Advanced Topics in Methods	
ECON 7210	Applied Microeconomic Policy Analysis	
ECON 7240	Workshop in Applied Econometrics	
ECON 7250	International Economic Development	
ECON 7260	Urban Economic Systems	
ECON 7261	Urban Economic Development	
ECON 7262	Regional Economic Theory	
ECON 7266	Economics of Government	
ECON 7270	Economics of Law and Regulation	
ECON 7740	Applied Econometrics 2	
ECON 7763	Labor Market Analysis	
LPSC 7215	Advanced Quantitative Techniques	

POLS 7325	Contemporary Issues in Third World Development	
POLS 7334	Social Networks <small>javascript:void(0)</small>	
PPUA 6201	The 21st-Century City: Urban Opportunities and Challenges in a Global Context	
PPUA 6204	Urban Development and Politics	
PPUA 6509	Techniques of Program Evaluation	
PPUA 6525	Institutions and Public Policy	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	
PPUA 7976	Directed Study	
SOCL 7221	Globalization, Development, and Social Justice	
SOCL 7227	Race and Ethnic Relations	
SOCL 7235	Urban Sociology	
SOCL 7268	Globalization and the City	

**Exam and Dissertation**

Code	Title	Hours
<b>Exam Prep</b>		
PPUA 8960	Exam Preparation—Doctoral	0
PPUA 9984	Research	1-4
Only required for students who have completed PhD course work but have yet to complete the comprehensive exam/proposal defense. Repeatable.		
<b>Dissertation</b>		
Complete the following (repeatable) course twice:		
<b>Dissertation Continuation</b>		
PPUA 9990	Dissertation	0
Following completion of two semesters of PPUA 9990, registration in the following class is required in each semester (including summer if the dissertation is submitted in summer) until the dissertation is completed:		
PPUA 9996	Dissertation Continuation	0

**Program Credit/GPA Requirements**

47 total semester hours required  
Minimum 3.500 GPA required

**International Affairs, MA****Jeffrey Juris, PhD**

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**Brianna Freeman**

Academic Program Administrator  
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CSSH Graduate Programs General Regulations ([http://www.northeastern.edu/cssh/graduate/current\\_students/](http://www.northeastern.edu/cssh/graduate/current_students/))

We live in an increasingly interconnected global environment where people, goods, ideas, and conflicts traverse borders with rising

frequency. Leaders in the activist, policy, and academic spheres must learn not only how to critically analyze these phenomena but also to envisage harnessing their constructive potential. The Master of Arts in International Affairs is an interdisciplinary graduate program dedicated to preparing tomorrow's global citizens.

A holistic approach to enhancing our understanding of the world must span the limits of any one academic field and embrace cross-disciplinary analytical competencies. Spanning several social sciences and humanities, our courses are taught by leading scholars who research democratization, gender, globalization, ethnic conflict and cooperation, human rights and international law, international relations, social activism, social justice, and many other topics. Through its core courses, its two thematic emphases—globalization, development, and social justice and international public policy—as well as global, policy, and methodological electives, this graduate program allows students to pursue a variety of themes.

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

### Academic Standing/Progress

Students in the program are monitored for academic progress. Those students whose grade-point average (GPA) falls below a 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to a 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirements

Code	Title	Hours
<b>Political Economy</b>		
Complete 8 semester hours from the following:		8
INTL 5200	Political Economy: Interdisciplinary Perspectives	
POLS 7387	Global Governance	
SOCL 7221	Globalization, Development, and Social Justice	
PPUA 5268	International Environmental Policy	
<b>Social Science Methods</b>		
Complete 4 semester hours from the following:		4
ECON 5110	Microeconomic Theory	
ECON 5120	Macroeconomic Theory	
ECON 7251	International Finance	
INSH 6300	Research Methods in the Social Sciences	
INSH 6500	Statistical Analysis	
INSH 6302	Qualitative Methods	
<b>Public Policy</b>		

Complete 4 semester hours from the following:		4
PPUA 6502	Economic Analysis for Policy and Planning	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6507	Institutional Leadership and the Public Manager	
PPUA 6509	Techniques of Program Evaluation	
PPUA 6551	Nonprofit Organizations and Social Change	
PPUA 6553	Nonprofit Financial Resource Development	

### Electives

Selected in consultation with faculty advisor.

Code	Title	Hours
Complete 20 semester hours from the following:		20
LPSC 5000 to LPSC 7999		
PPUA 5000 to PPUA 7999		
CRIM 5000 to CRIM 7999 (by advisement only)		
ECON 5000 to ECON 7999 (by advisement only)		
ENGL 5000 to ENGL 7999 (by advisement only)		
HIST 5000 to HIST 7999 (by advisement only)		
POLS 5000 to POLS 7999 (by advisement only)		
SOCL 5000 to SOCL 7999 (by advisement only)		

### Optional Co-op Experience

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

### Program Credit/GPA Requirements

36 total semester hours required (38 with optional co-op)  
Minimum 3.000 GPA required

## Public Administration, MPA

#### Christopher Bosso, PhD

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617.373.4398

#### Julie Switkes

Graduate Program Coordinator  
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(l.daros@northeastern.edu)  
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617.373.2891

CSSH Graduate Programs General Regulations ([https://www.northeastern.edu/cssh/graduate/current\\_students/](https://www.northeastern.edu/cssh/graduate/current_students/))

The Master of Public Administration (MPA) is the management and leadership degree for those seeking to serve the public good. The program seeks to equip its students with skills in policy analysis, program evaluation, research methods, and written and verbal communications. Students have an opportunity to develop competencies in budgeting

and human resources, organizational management and leadership, and the interplay between ethics and accountability in a diverse society. Throughout the degree program, students gain career-oriented experience through internships, small group projects, and other interactions with professionals in the field. These experiences are designed to enable the Northeastern MPA graduate to move into a wide array of public and nonprofit sector positions at the local, state, national, and international levels.

## Mission Statement

The mission of the MPA program at Northeastern University is to serve the needs of the public affairs community, including students, working professionals, faculty, and researchers, by providing a practice-oriented and research-based graduate educational experience. The faculty pledges the best instruction available in a set of courses designed to integrate theoretical foundations with practical skills. The MPA program will prepare students to be effective in a dynamic and increasingly diverse professional environment. We also commit ourselves to assisting students in every possible way to secure internships, postgraduate employment, and overall career advancement. Students, in turn, are expected to meet high levels of academic excellence combined with ethical and professional integrity. Committed to the ideals of public service and advancing the public interest, we seek students who share the same enthusiasm.

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

The Northeastern University MPA program is nationally accredited by NASPAA.

## Academic Standing/Progress

Students in the program are monitored for academic progress. Those students whose grade-point average (GPA) falls below a 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to a 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

A cumulative 3.000 GPA is required for the core requirements.

Code	Title	Hours
<b>Quantitative Techniques</b>		
INSH 6500	Statistical Analysis	4
<b>Analysis</b>		
PPUA 6506	Techniques of Policy Analysis	4
PPUA 6502	Economic Analysis for Policy and Planning	4
<b>Administration and Management</b>		
PPUA 6500	Principles of Public Administration	4

PPUA 6505	Public Budgeting and Financial Management	4
PPUA 6507	Institutional Leadership and the Public Manager	4
<b>Capstone</b>		
PPUA 7673	Capstone in Public Policy and Urban Affairs	4

## Internship Requirement

An approved internship or waiver is required.

Code	Title	Hours
<b>Internship Waived</b>		
<i>Electives</i>		
Complete 12 semester hours from the Course List. (p. 444)		12
<b>Internship Completed for Course Credit</b>		
PPUA 6862	Internship with Research	4
<i>Electives</i>		
Complete 8 semester hours from the Course List. (p. 444)		8
<b>Internship Completed Not for Course Credit</b>		
PPUA 6861	Internship	0
<i>Electives</i>		
Complete 12 semester hours from the Course List. (p. 444)		12

## Optional Co-op Experience

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

## Course List

Code	Title	Hours
LPSC 5000 to LPSC 7999		
PPUA 5000 to PPUA 7999		
CRIM 5000 to CRIM 7999 (by advisement only)		
ECON 5000 to ECON 7999 (by advisement only)		
ENGL 5000 to ENGL 7999 (by advisement only)		
HIST 5000 to HIST 7999 (by advisement only)		
POLS 5000 to POLS 7999 (by advisement only)		
SOCL 5000 to SOCL 7999 (by advisement only)		

## Program Credit/GPA Requirements

40 total semester hours required (42 with optional co-op)  
Minimum 3.000 GPA

## Public Policy, MPP

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CSSH Graduate Programs General Regulations ([http://www.northeastern.edu/cssh/graduate/current\\_students/](http://www.northeastern.edu/cssh/graduate/current_students/))

The Master of Public Policy (MPP) is the recognized industry standard for those seeking careers in public policy analysis and design. As such, a typical MPP degree emphasizes the analysis of data and other relevant information to enable graduates to assess public problems, develop appropriate policy responses, and evaluate program effectiveness. MPP graduates enter careers as policy analysts, researchers, consultants, program evaluators, and policymakers in a broad range of public and nonprofit settings, ranging from the local to the international, and in the private sector. At Northeastern, the MPP joins our long-established and nationally accredited Master of Public Administration (MPA) as well as our Master of Science in Urban and Regional Policy (MURP), Urban Informatics, and International Affairs. As such, MPP students will be part of a larger School of Public Policy and Urban Affairs community of great intellectual and policy area diversity.

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

### Academic Standing/Progress

Students in the program are monitored for academic progress. Those students whose grade-point average (GPA) falls below a 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to a 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
<b>Methods, Statistics, and Applications Core</b>		
PPUA 6509 or PPUA 6506	Techniques of Program Evaluation Techniques of Policy Analysis	4
INSH 6300	Research Methods in the Social Sciences	4
INSH 6500	Statistical Analysis	4
<b>Policy Frameworks and Practice Core</b>		
PPUA 6502	Economic Analysis for Policy and Planning	4
LPSC 7311	Strategizing Public Policy	4
PPUA 7673	Capstone in Public Policy and Urban Affairs	4
<b>Methods and Statistics Elective</b>		
Complete 4 semester hours from the following:		4
INSH 7400	Quantitative Analysis	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	

PPUA 5262	Big Data for Cities
PPUA 5263	Geographic Information Systems for Urban and Regional Policy

### Internship Requirement

An approved internship or waiver is required.

Code	Title	Hours
<b>Internship Waived</b>		
<i>Electives</i>		
Complete 12 semester hours from the Course List. (p. 453)		12
<b>Internship Completed for Course Credit</b>		
PPUA 6862	Internship with Research	4
<i>Electives</i>		
Complete 8 semester hours from the Course List. (p. 453)		8
<b>Internship Completed Not for Course Credit</b>		
PPUA 6861	Internship	0
<i>Electives</i>		
Complete 12 semester hours from the Course List. (p. 453)		12

### Specialization

No specialization is required. If you wish to pursue a specialization, please consult the program director. Specializations can include policy analysis and statistics, sustainability and climate change, urban informatics, law and policy, health policy, security and resilience.

### Optional Co-op Experience

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

### Course List

Code	Title	Hours
PPUA 5000 to PPUA 7999		
LPSC 5000 to LPSC 7999		
CRIM 5000 to CRIM 7999 (by advisement only)		
ECON 5000 to ECON 7999 (by advisement only)		
ENGL 5000 to 7999 (by advisement only)		
HIST 5000 to HIST 7999 (by advisement only)		
POLS 5000 to POLS 7999 (by advisement only)		
SOCL 5000 to SOCL 7999 (by advisement only)		

### Program Credit/GPA Requirements

40 total semester hours required (42 with optional co-op)  
Minimum 3.000 GPA required

### Urban Informatics, MS

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CSSH Graduate Programs General Regulations ([https://www.northeastern.edu/cssh/graduate/current\\_students/](https://www.northeastern.edu/cssh/graduate/current_students/))

The STEM-designated Master of Science in Urban Informatics (MSUI) degree couples comprehensive data analytics skills with an understanding of the big questions faced by cities in the 21st-century city. This cutting-edge program is built upon a unique cross-college initiative, which offers comprehensive state-of-the-art training in the core skills of data analytics—including quantitative analysis, data mining, machine learning, and data visualization. Urban informatics students supplement training in these foundational skills with a specialized sequence of courses that address how data and technology are being used to tackle key social, infrastructural, and environmental challenges.

By combining a theoretically informed perspective of cities with advanced skills in accessing, managing, analyzing, and communicating insights from large complex, data sets, graduates are a part of the next wave of urban professionals ready to lead in the public, private, and nonprofit sectors. Given the continuous growth in urban data and technology, these professionals are essential to shaping the future of urban areas around the globe.

This program provides a uniquely integrated urban and informatics degree with a substantial experiential education component. The focus throughout is on practical application, and students have multiple opportunities to apply what they are learning.

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

## Academic Standing/Progress

Students in the program are monitored for academic progress. Those students whose grade-point average (GPA) falls below a 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to a 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
<b>Data Science Courses</b>		
DA 5020	Collecting, Storing, and Retrieving Data	4
or DA 5030	Introduction to Data Mining/Machine Learning	
INSH 5301	Introduction to Computational Statistics	4
INSH 5302	Information Design and Visual Analytics	4

### Methods and Applications

PPUA 5262	Big Data for Cities	4
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	4
PPUA 5266	Urban Theory and Science	4

### Analysis

Complete one of the following options. 4

#### Option 1

PPUA 7237	Advanced Spatial Analysis of Urban Systems	
or PPUA 5261	Dynamic Modeling for Environmental Decision Making	

#### Option 2

Complete two of the following:

PPUA 6210	Research Toolkit for Urban and Regional Policy: Cost/Benefit Analysis	
PPUA 6212	Research Toolkit for Urban and Regional Policy: Project Management	
PPUA 6213	Research Toolkit for Urban and Regional Policy: Data Visualization	
PPUA 6216	Research Toolkit for Urban and Regional Policy: Grant Writing	
PPUA 6218	Real Estate Finance Toolkit	

#### Option 3

Complete one elective approved by program director

### Research or Capstone

PPUA 6966	Practicum	4
or PPUA 7673	Capstone in Public Policy and Urban Affairs	

### Portfolio

PPUA 6410	Urban Informatics Portfolio	1
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## Optional Co-op Experience

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

## Program Credit/GPA Requirements

33 total semester hours required (35 with optional co-op)  
Minimum 3.000 GPA required

## Urban Planning and Policy, MS

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The Master of Science in Urban Planning and Policy (MUPP) program trains leaders interested in building just and sustainable solutions to today's critical urban problems, including challenges of affordable housing provision, equitable and sustainable economic growth,

sustainable transportation, and climate change adaptation and mitigation. This innovative program combines the expertise in urban planning and policy analysis and data analytics of the School of Public Policy and Urban Affairs with expertise in physical planning, design, and data visualization at the School of Architecture. The core curriculum of the program provides students with a solid foundation in essential skills and concepts, including research design and statistics, economic analysis, legal foundations of urban planning and policy, and the history of urban development and urban planning. Students also have the opportunity to develop substantial expertise in a specialization area, including urban analytics, urban sustainability and resilience, urban design and physical planning, and urban development policy and planning.

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

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

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirements

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

#### Focus Areas

Complete one of the following focus areas:

- Urban Design and Physical Planning (p. 65)
- Urban Analytics (p. 65)
- Sustainability and Resilience (p. 65)
- Urban Development Policy and Planning (p. 65)

#### URBAN DESIGN AND PHYSICAL PLANNING

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

#### URBAN ANALYTICS

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

#### SUSTAINABILITY AND RESILIENCE

Code	Title	Hours
<b>Gateway Course</b>		
LPSC 7312	Cities, Sustainability, and Climate Change	4
or SUEN 6310	Cities, Nature, and Design in Contemporary History and Theory	
<b>Methods</b>		
Complete one of the following:		4
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
SUEN 7230	Urban Ecologies and Technologies 1	
<b>Capstone</b>		

PPUA 7673	Capstone in Public Policy and Urban Affairs	4
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**Elective**

Complete one of the following: 4

PPUA 5260	Ecological Economics	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 7231	Transportation Policy	
PPUA 7234	Land Use and Urban Growth Policy	
PPUA 7249	Urban Coastal Sustainability	
SUEN 6110	Graduate Studio 1: Sustainable Urban Sites	
SUEN 6120	Graduate Studio 2: Sustainable Urban Systems	
SUEN 6220	Implementation and Visualization for Urban Environments 2	
SUEN 6310	Cities, Nature, and Design in Contemporary History and Theory	
SUEN 6340	Topics in Urban Environmental Design	
SUEN 7230	Urban Ecologies and Technologies 1	
SUEN 7240	Urban Ecologies and Technologies 2	
SUEN 7320	Pro-Seminar: Issues in Designed Urban Environments	

**URBAN DEVELOPMENT POLICY AND PLANNING**

Code	Title	Hours
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**Gateway Course**

Complete one of the following: 4

PPUA 7230	Housing Policy	
PPUA 7231	Transportation Policy	
PPUA 7233	Contemporary Community Development	

**Methods**

PPUA 5263	Geographic Information Systems for Urban and Regional Policy	4
or PPUA 7236	Introduction to Real Estate Development for Urban Policy Makers	

**Capstone**

PPUA 7673	Capstone in Public Policy and Urban Affairs	4
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**Elective**

Complete one of the following: 4

PPUA 5270	Food Systems and Public Policy	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6530	State and Local Public Finance	
PPUA 6551	Nonprofit Organizations and Social Change	
PPUA 7230	Housing Policy	
PPUA 7231	Transportation Policy	
PPUA 7232	Immigration and Urban America	
PPUA 7233	Contemporary Community Development	
PPUA 7234	Land Use and Urban Growth Policy	
PPUA 7236	Introduction to Real Estate Development for Urban Policy Makers	

SUEN 6110	Graduate Studio 1: Sustainable Urban Sites	
SUEN 6120	Graduate Studio 2: Sustainable Urban Systems	
SUEN 6340	Topics in Urban Environmental Design	

**Electives**

Code	Title	Hours
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Complete two of the following: 8

ARCH 5310	Design Tactics and Operations	
ARCH 5530	Innovative Models in Real Estate Development and Design	
ARCH 6100	Graduate Skills Studio	
ARCH 6330	Seminar in Modern Architecture	
ARCH 6340	Graduate Topics in Architecture	
ARTG 5100	Information Design Studio 1: Principles	
ARTG 5120	Research Methods for Design	
ARTG 5130	Visual Communication for Information Design	
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 6330	Information Design Mapping Strategies	
DA 5020	Collecting, Storing, and Retrieving Data	
DA 5030	Introduction to Data Mining/Machine Learning	
INSH 5302	Information Design and Visual Analytics	
PPUA 5260	Ecological Economics	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
PPUA 5270	Food Systems and Public Policy	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6530	State and Local Public Finance	
PPUA 6551	Nonprofit Organizations and Social Change	
PPUA 7245	Education Policy in the United States	
PPUA 7230	Housing Policy	
PPUA 7231	Transportation Policy	
PPUA 7232	Immigration and Urban America	
PPUA 7233	Contemporary Community Development	
PPUA 7234	Land Use and Urban Growth Policy	
PPUA 7236	Introduction to Real Estate Development for Urban Policy Makers	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	
PPUA 7249	Urban Coastal Sustainability	
SUEN 6110	Graduate Studio 1: Sustainable Urban Sites	
SUEN 6120	Graduate Studio 2: Sustainable Urban Systems	
SUEN 6210	Implementation and Visualization for Urban Environments 1	



SUEN 6220	Implementation and Visualization for Urban Environments 2
SUEN 6310	Cities, Nature, and Design in Contemporary History and Theory
SUEN 6340	Topics in Urban Environmental Design
SUEN 7230	Urban Ecologies and Technologies 1
SUEN 7240	Urban Ecologies and Technologies 2
SUEN 7320	Pro-Seminar: Issues in Designed Urban Environments

## Optional Co-op Experience

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

## Program Credit/GPA Requirements

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

### Environmental Science and Policy, MS

The Master of Science in Environmental Science and Policy program emphasizes a broadly interdisciplinary and synthetic approach that integrates knowledge in the environmental sciences (conservation biology, climate change, fisheries science, ecosystem function, biodiversity, restoration ecology) with the social sciences (policy, economics, sociology, political science, and development) and humanities (environmental history, philosophy, and ethics). The goal of the program is to equip professionals with substantive breadth in knowledge and skills at the intersection of environmental science and policy. The program focuses on training students to think critically about the underlying causes of environmental problems and understanding the reciprocal relationships between coupled human-natural ecosystems and the interconnections between social and technological innovations. The program explores practical approaches and potential solutions that decision makers need to evaluate in policy debates related to promoting environmental sustainability.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
<b>Seminars</b>		
PPUA 6101	Environmental Science and Policy Seminar 1	4
ENVR 6102	Environmental Science and Policy Seminar 2	4

### Skills Courses

Complete 2 courses from the following. At least one course needs to be taken from the College of Science Skills Course List and one course from the College of Social Sciences and Humanities Skills Course List.

<i>College of Science Skills Course List</i>	
EEMB 5130	Ecological Dynamics
EEMB 5522	Experimental Design Marine Ecology

ENVR 5210	Environmental Planning
ENVR 5260	Geographical Information Systems
ENVR 6500	Biostatistics

### *College of Social Sciences and Humanities Skills Course List*

INSH 5301	Introduction to Computational Statistics
LPSC 6313	Economic Analysis for Law, Policy, and Planning
LPSC 7215	Advanced Quantitative Techniques
LPSC 7305	Research and Statistical Methods
LPSC 7311	Strategizing Public Policy
POLS 7201	Research Design
PPUA 5260	Ecological Economics
PPUA 5261	Dynamic Modeling for Environmental Decision Making
PPUA 5263	Geographic Information Systems for Urban and Regional Policy
PPUA 6205	Research Design and Methodology in Urban and Regional Policy
PPUA 6210	Research Toolkit for Urban and Regional Policy: Cost/Benefit Analysis
PPUA 6212	Research Toolkit for Urban and Regional Policy: Project Management
PPUA 6213	Research Toolkit for Urban and Regional Policy: Data Visualization
PPUA 6216	Research Toolkit for Urban and Regional Policy: Grant Writing
PPUA 6502	Economic Analysis for Policy and Planning
PPUA 6506	Techniques of Policy Analysis
PPUA 6509	Techniques of Program Evaluation
PPUA 6525	Institutions and Public Policy
PPUA 7237	Advanced Spatial Analysis of Urban Systems

## Electives

Complete 5 courses from the following list. At least two courses must be taken from the College of Science Elective Course List and two courses from the College of Social Sciences and Humanities Elective Course List. Any skills course not taken to fulfill the skills courses requirement can be taken as an elective. Students may petition to enroll in other relevant graduate courses offered by other schools at Northeastern University.

### COLLEGE OF SCIENCE ELECTIVE LIST

Code	Title	Hours
EEMB 5536	Ocean and Coastal Sustainability	
EEMB 6465	Ecological and Conservation Genomics	
EEMB 6470	Coastal Ecology and Sustainability	
ENVR 5210	Environmental Planning	
ENVR 5984	Research	
ENVR 6150	Food Security and Sustainability	
ENVR 6900	Topics: Networks and Biology	

### COLLEGE OF SOCIAL SCIENCES AND HUMANITIES ELECTIVE LIST

Code	Title	Hours
INSH 5302	Information Design and Visual Analytics	
LPSC 7311	Strategizing Public Policy	

LPSC 7312	Cities, Sustainability, and Climate Change
PHTH 5214	Environmental Health
PPUA 5225	The Open Classroom: Public Debates on Public Policy
PHTH 5230	Global Health
PHTH 5440	Community-Based Participatory Research: Environmental Health
PPUA 5260	Ecological Economics
PPUA 5262	Big Data for Cities
PPUA 5264	Energy Transitions and Climate Resilience: Technology, Policy, and Social Change
PPUA 5266	Urban Theory and Science
PPUA 5270	Food Systems and Public Policy
PPUA 5390	Special Topics in Public Policy and Urban Affairs
PPUA 6201	The 21st-Century City: Urban Opportunities and Challenges in a Global Context
PPUA 6204	Urban Development and Politics
PPUA 6505	Public Budgeting and Financial Management
PPUA 6506	Techniques of Policy Analysis
PPUA 6522	Administrative Ethics and Public Management
PPUA 6551	Nonprofit Organizations and Social Change
PPUA 6552	The Nonprofit Sector in Civil Society and Public Affairs
PPUA 6553	Nonprofit Financial Resource Development
PPUA 6862	Internship with Research
PPUA 6966	Practicum
PPUA 7230	Housing Policy
PPUA 7231	Transportation Policy
PPUA 7234	Land Use and Urban Growth Policy
PPUA 7239	Problems in Metropolitan Policymaking
PPUA 7249	Urban Coastal Sustainability
PPUA 7346	Resilient Cities
PPUA 7673	Capstone in Public Policy and Urban Affairs
SOCL 7235	Urban Sociology
SOCL 7243	Sociology of Health and Illness
SOCL 7257	Contemporary Issues in Sociology
SOCL 7267	Environment, Health, and Society
SOCL 7287	Social Movements in Health

### Program Credit/GPA Requirements

36 total semester hours required

Minimum 3.000 GPA required

### Engineering and Public Policy with Concentration in Infrastructure Resilience, MS

The purpose of this degree is to provide students with a background in engineering with the tools necessary to conduct robust policy

analysis. It includes required core courses from the Department of Civil and Environmental Engineering and the School of Public Policy, complemented by electives in engineering and public policy, which can be met by two courses and a master's report (recommended), or by one course and a thesis, or by three courses. A minimum of 16 semester hours must be taken in the College of Engineering.

Degree Requirements	With Report	With Thesis	Course Work Only
Required core courses	20 SH	20 SH	20 SH
Other electives	8 SH	4 SH	12 SH
Master of Science report/thesis	4 SH	8 SH	
Minimum semester hours required	32 SH	32 SH	32 SH

### Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 230).

#### GORDON INSTITUTE OF ENGINEERING LEADERSHIP

#### Master's Degree in Engineering and Public Policy with Concentration in Infrastructure Resilience with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Engineering and Public Policy with Concentration in Infrastructure Resilience in addition to earning a Graduate Certificate in Engineering Leadership. Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16 semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour degree and certificate will require 20 hours of advisor-approved infrastructure resilience technical courses.

Engineering Leadership (p. 225)

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirements

Code	Title	Hours
<b>Infrastructure Resilience</b>		
CIVE 7110	Critical Infrastructure Resilience	4
<b>Environmental Systems Modeling</b>		
Complete 4 semester hours from the following:		4
CIVE 5261	Dynamic Modeling for Environmental Investment and Policymaking	
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure	
CIVE 5280	Remote Sensing of the Environment	
CIVE 5699	Special Topics in Civil Engineering (Climate Science and Technology Adaptation Policy)	

IE 5500 Systems Engineering in Public Programs

**Economics**

Complete 4 semester hours from the following: 4

ECON 7210	Applied Microeconomic Policy Analysis
PPUA 6502	Economic Analysis for Policy and Planning

**Public Policy and Analysis**

Complete 4 semester hours from the following: 4

LPSC 7311	Strategizing Public Policy
PPUA 6506	Techniques of Policy Analysis
PPUA 6509	Techniques of Program Evaluation

**Statistics**

Complete 4 semester hours from the following: 4

CIVE 7100	Time Series and Geospatial Data Sciences
CIVE 7388	Special Topics in Civil Engineering (Informatics in Civil Engineering)
IE 5640	Data Mining for Engineering Applications
IE 6200	Engineering Probability and Statistics
IE 7280	Statistical Methods in Engineering
INSH 5301	Introduction to Computational Statistics
INSH 6500	Statistical Analysis
LPSC 7215	Advanced Quantitative Techniques

**Options**

Complete one of the following options:

**COURSE WORK OPTION**

Code	Title	Hours
Complete 12 semester hours from the infrastructure course list below.		12

**REPORT OPTION**

Code	Title	Hours
CIVE 8674	Master's Report	4
Complete 8 semester hours from the Infrastructure course list below.		8

**THESIS OPTION**

Code	Title	Hours
CIVE 7990	Thesis	8
Complete 4 semester hours from the Infrastructure course list below.		4

**Infrastructure Course List**

Any required core course not used to meet the required core course requirement can be taken as a restricted elective.

Code	Title	Hours
CIVE 5699	Special Topics in Civil Engineering (Building Energy Performance Simulation)	
CY 5250	Decision Making for Critical Infrastructure	
EMGT 6225	Economic Decision Making	
ENVR 5260	Geographical Information Systems	

IE 7290 Reliability Analysis and Risk Assessment

LPSC 7312	Cities, Sustainability, and Climate Change
ME 5645	Environmental Issues in Manufacturing and Product Use
PHTH 5214	Environmental Health
PHTH 5230	Global Health
PPUA 5260	Ecological Economics
PPUA 5262	Big Data for Cities
PPUA 5263	Geographic Information Systems for Urban and Regional Policy
PPUA 5264	Energy Transitions and Climate Resilience: Technology, Policy, and Social Change
PPUA 5270	Food Systems and Public Policy
PPUA 6205	Research Design and Methodology in Urban and Regional Policy
PPUA 6210	Research Toolkit for Urban and Regional Policy: Cost/Benefit Analysis
PPUA 6212	Research Toolkit for Urban and Regional Policy: Project Management
PPUA 6213	Research Toolkit for Urban and Regional Policy: Data Visualization
PPUA 7230	Housing Policy
PPUA 7231	Transportation Policy
PPUA 7234	Land Use and Urban Growth Policy
PPUA 7237	Advanced Spatial Analysis of Urban Systems
PPUA 7239	Problems in Metropolitan Policymaking
PPUA 7240	Health Policy and Politics

**Program Credit/GPA Requirements**

32 total semester hours required  
Minimum 3.000 GPA required

**Engineering and Public Policy with Concentration in Energy & Environment, MS**

The purpose of this degree is to provide students with a background in engineering with the tools necessary to conduct robust policy analysis. It includes required core courses from the Department of Civil and Environmental Engineering and the School of Public Policy, complemented by electives in engineering and public policy, which can be met by two courses and a master's report (recommended), or by one course and a thesis, or by three courses. A minimum of 16 semester hours must be taken in the College of Engineering.

Degree Requirements	With Report	With Thesis	Course Work Only
Required core courses	20 SH	20 SH	20 SH
Other electives	8 SH	4 SH	12 SH
Master of Science report/thesis	4 SH	8 SH	

Minimum semester hours required	32 SH	32 SH	32 SH
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## Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 230).

### GORDON INSTITUTE OF ENGINEERING LEADERSHIP

#### Master's Degree in Engineering and Public Policy with Concentration in Energy and Environment with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Engineering and Public Policy with Concentration in Energy and Environment in addition to earning a Graduate Certificate in Engineering Leadership. Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16 semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour degree and certificate will require 20 hours of advisor-approved energy and environment technical courses.

Engineering Leadership (p. 225)

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
<b>Energy and Environment</b>		
ENGR 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage	4
<b>Environmental Systems Modeling</b>		
Complete 4 semester hours from the following:		4
CIVE 5261	Dynamic Modeling for Environmental Investment and Policymaking	
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure	
IE 5500	Systems Engineering in Public Programs	
<b>Economics</b>		
Complete 4 semester hours from the following:		4
ECON 7210	Applied Microeconomic Policy Analysis	
PPUA 5260	Ecological Economics	
PPUA 6502	Economic Analysis for Policy and Planning	
<b>Public Policy and Analysis</b>		
Complete 4 semester hours from the following:		4
LPSC 7311	Strategizing Public Policy	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6509	Techniques of Program Evaluation	
<b>Statistics</b>		
Complete 4 semester hours from the following:		4
CIVE 7100	Time Series and Geospatial Data Sciences	

CIVE 7388	Special Topics in Civil Engineering (Informatics in Civil Engineering)
IE 5640	Data Mining for Engineering Applications
IE 6200	Engineering Probability and Statistics
IE 7280	Statistical Methods in Engineering
INSH 5301	Introduction to Computational Statistics
INSH 6500	Statistical Analysis
LPSC 7215	Advanced Quantitative Techniques

## Options

Complete one of the following options:

### COURSE WORK OPTION

Code	Title	Hours
Complete 12 semester hours from the Energy and Environment Course List below.		12

### REPORT OPTION

Code	Title	Hours
CIVE 8674	Master's Report	4
Complete 8 semester hours from the Energy and Environment Course List below.		8

### THESIS OPTION

Code	Title	Hours
CIVE 7990	Thesis	8
Complete 4 semester hours from the Energy and Environment Course List below.		4

## Energy and Environment Course List

Any required core course not used to meet the required core course requirement can be taken as a restricted elective.

Code	Title	Hours
CIVE 5271	Solid and Hazardous Waste Management	
CIVE 5280	Remote Sensing of the Environment	
CIVE 5300	Environmental Engineering Laboratory	
CIVE 5699	Special Topics in Civil Engineering (Building Energy Performance Simulation)	
CIVE 7252	Water Engineering: Planning, Design, and Management	
CIVE 7261	Surface Water Quality Modeling	
EMGT 6225	Economic Decision Making	
ENVR 5210	Environmental Planning	
ENVR 5260	Geographical Information Systems	
LPSC 7312	Cities, Sustainability, and Climate Change	
ME 5645	Environmental Issues in Manufacturing and Product Use	
PHTH 5214	Environmental Health	
PHTH 5230	Global Health	
PPUA 5262	Big Data for Cities	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	

PPUA 5264	Energy Transitions and Climate Resilience: Technology, Policy, and Social Change
PPUA 5270	Food Systems and Public Policy
PPUA 6205	Research Design and Methodology in Urban and Regional Policy
PPUA 6210	Research Toolkit for Urban and Regional Policy: Cost/Benefit Analysis
PPUA 6212	Research Toolkit for Urban and Regional Policy: Project Management
PPUA 6213	Research Toolkit for Urban and Regional Policy: Data Visualization
PPUA 7237	Advanced Spatial Analysis of Urban Systems

### Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

### Public Policy Analysis, Graduate Certificate

#### Christopher Bosso, PhD

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#### Brianna Freeman

Graduate Program Administrator

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CSSH Graduate General Regulations ([https://www.northeastern.edu/cssh/graduate/current\\_students/](https://www.northeastern.edu/cssh/graduate/current_students/))

The Graduate Certificate in Public Policy Analysis seeks to provide current Northeastern students in a variety of graduate programs—except the Master of Public Policy (MPP) program—with the tools to analyze and shape public policy at the local, state, and national levels. Students have an opportunity to gain an understanding of the political and legal processes of policymaking, develop skills central to conducting research on policy questions, and learn techniques for evaluating the effectiveness of competing policies.

### Academic Standing/Progress

Students in the program are monitored for academic progress. Those students whose grade-point average (GPA) falls below a 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to a 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

### Program Requirements

#### Core Requirements \*

Code	Title	Hours
Analysis Methods and Skills		
Complete 8 semester hours from the following:		8
INSH 5302	Information Design and Visual Analytics	

INSH 6300	Research Methods in the Social Sciences
LPSC 7311	Strategizing Public Policy
or PPUA 6506	Techniques of Policy Analysis
PPUA 6502	Economic Analysis for Policy and Planning
PPUA 5260	Ecological Economics
PPUA 5261	Dynamic Modeling for Environmental Decision Making
PPUA 5262	Big Data for Cities
PPUA 5263	Geographic Information Systems for Urban and Regional Policy
PPUA 6509	Techniques of Program Evaluation
PPUA 7237	Advanced Spatial Analysis of Urban Systems

#### Policy

Complete 4 semester hours from the following: 4

PPUA 5264	Energy Transitions and Climate Resilience: Technology, Policy, and Social Change
PPUA 5270	Food Systems and Public Policy
PPUA 6525	Institutions and Public Policy
PPUA 7230	Housing Policy
PPUA 7231	Transportation Policy
PPUA 7232	Immigration and Urban America
PPUA 7234	Land Use and Urban Growth Policy
PPUA 7239	Problems in Metropolitan Policymaking
PPUA 7240	Health Policy and Politics
PPUA 7245	Education Policy in the United States

\* Students cannot double count required degree courses for the certificate.

### Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

### Nonprofit Sector, Philanthropy, and Social Change, Graduate Certificate

#### Christopher Bosso, PhD

Graduate Program Director

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#### Louis DaRos

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CSSH Graduate Programs General Regulations ([https://www.northeastern.edu/cssh/graduate/current\\_students/](https://www.northeastern.edu/cssh/graduate/current_students/))

The Graduate Certificate in Nonprofit Sector, Philanthropy, and Social Change is a response to recent developments in social change theory, practice, and funding that are placing new demands and expectations on social change actors in the nonprofit, public, and private sectors, including nonprofit leaders, philanthropists, policymakers, and corporate

social responsibility managers. These developments include the emergence of hybrid, cross-sector business models and new intermediary mechanisms for channeling the flow of capital into social change; new expectations and standards for performance measurement, transparency, and accountability; more sophisticated use of data and technology to support decision making, evaluation, and continual improvement; decreased public funding for traditional nonprofit activities; and the emergence of social media as a vehicle for mobilizing people and resources. The certificate enables social change professionals in all sectors to respond to these changes more effectively and will distinguish itself from other nonprofit certificate programs by focusing on the relationship between social program implementation and funding.

The certificate is a professionally oriented, application-based program for students seeking leadership positions in nonprofit organizations or in a public agency that deals extensively with nonprofits. The curriculum is designed to address the distinctive features and practices of the nonprofit sector and emphasizes management techniques helpful to nonprofit leaders.

### Academic Standing/Progress

Students in the program are monitored for academic progress. Those students whose GPA falls below a 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to a 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirements

Code	Title	Hours
PPUA 6551	Nonprofit Organizations and Social Change	4
PPUA 6552	The Nonprofit Sector in Civil Society and Public Affairs	4

#### Elective

Complete 4 semester hours from the following. Courses outside this list may be taken as electives with approval of the graduate program director.

Code	Title	Hours
PPUA 6509	Techniques of Program Evaluation	4
PPUA 6522	Administrative Ethics and Public Management	4
PPUA 6523	Accountability, Performance Measurement, and Contracting in the Public Sector	4
PPUA 6553	Nonprofit Financial Resource Development	4
PPUA 6966	Practicum	4
PPUA 7243	International Development Administration and Planning	4
PPUA 7976	Directed Study	4

### Program Credit/GPA Requirements

12 total semester hours required  
Minimum 3.000 GPA required

## Urban Analytics, Graduate Certificate

### Daniel O'Brien, PhD

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### Brianna Freeman

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CSSH Graduate General Regulations ([https://www.northeastern.edu/cssh/graduate/current\\_students/](https://www.northeastern.edu/cssh/graduate/current_students/))

With 75 percent of the world's population projected to be living in cities by 2050, the need for professionals in urban planning and related careers will only increase. The Graduate Certificate in Urban Analytics seeks to prepare students outside of the Master of Science in Urban Informatics program to manage the progressively complex issues involved with rapidly expanding data and technological resources in cities. As Claire Lane of the City of Boston recently noted, "The blueprints for great cities are increasingly anchored in big data, expressed in GIS [Geographic Information Systems] and codified in coherent policy." Successful graduates with an urban analytics certificate have skills in each of these areas, which prepares them to be professionals ready to shape the future of cities across the globe.

Students are trained with the practical and theoretical knowledge necessary to understand the intricacies of interconnected urban systems and to analyze how these systems work together to create sustainable, resilient, and just cities. The curriculum emphasizes the expertise needed to bridge emerging technological capacities and traditional policymaking processes. Students cultivate applied skills in visual presentation, analysis, and modeling of new data sets—all of which helps to inform investment and policymaking. Inspired by Northeastern's leadership in experiential education, students use Boston and cities around the world as learning labs.

### ACADEMIC STANDING/PROGRESS

Students in the program are monitored for academic progress. Those students whose grade-point average (GPA) falls below a 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to a 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirements

Code	Title	Hours
PPUA 5262	Big Data for Cities	4
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	4

#### Elective

Complete 4 semester hours from the following or another elective in consultation with your faculty advisor.

PPUA 5261	Dynamic Modeling for Environmental Decision Making
PPUA 5266	Urban Theory and Science
PPUA 6210	Research Toolkit for Urban and Regional Policy: Cost/Benefit Analysis
PPUA 6212	Research Toolkit for Urban and Regional Policy: Project Management
PPUA 6213	Research Toolkit for Urban and Regional Policy: Data Visualization
PPUA 6216	Research Toolkit for Urban and Regional Policy: Grant Writing
PPUA 6218	Real Estate Finance Toolkit
PPUA 7237	Advanced Spatial Analysis of Urban Systems

PPUA 7673	Capstone in Public Policy and Urban Affairs	4
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**Elective**

Code	Title	Hours
Complete 4 semester hours in the following range (selected by advisement):		4
PPUA 5000 to PPUA 7999		

**Program Credit/GPA Requirements**

12 total semester hours required  
 Minimum 3.000 GPA required

**Law and Public Policy, JD/MS**

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CSSH Graduate Programs General Regulations ([http://www.northeastern.edu/cssh/graduate/current\\_students/](http://www.northeastern.edu/cssh/graduate/current_students/))

The JD/MS in Law and Public Policy (LPP) is a joint program with and open only to students in the Northeastern University School of Law designed to equip graduates with a unique blend of skills for navigating a complex and rapidly changing policy landscape. The program builds on students' legal training with a compelling blend of skills in applied public policy analysis, policy design, and strategic policy formation. Students also gain career-relevant experience through internships, small group capstone projects, and other interactions with professionals in the field. All are part of a learning process designed to enable the Northeastern law and public policy graduates to navigate, and to redefine, diverse policy areas.

Ideally, students apply to the joint LPP simultaneously. Those who apply and are admitted complete the MS in LPP after completing the first year in the School of Law. Applicants will also be considered once enrolled in the JD, provided the student applies for entry to the MS in LPP in the fall of year two or the fall of year three of the JD program. In these cases, permission of the School of Law is required.

Please note that the School of Public Policy and Urban Affairs offers approximately 20 MS graduate courses in the fall and spring semesters.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Core Requirements**

Code	Title	Hours
<b>Analysis and Statistical Methods</b>		
PPUA 6502	Economic Analysis for Policy and Planning	4
INSH 6500	Statistical Analysis	4
<b>Policy Courses</b>		
LPSC 7311	Strategizing Public Policy	4

**Program Credit/GPA Requirements**

12 total semester hours required  
 Minimum 3.000 GPA required

**Urban Studies, Graduate Certificate**

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CSSH Graduate Programs General Regulations ([https://www.northeastern.edu/cssh/graduate/current\\_students/](https://www.northeastern.edu/cssh/graduate/current_students/))

The Graduate Certificate in Urban Studies provides a foundation in the fundamentals of urban planning and policy theory for students outside the Master of Science in Urban Planning and Policy degree. It also allows students to pursue course work in a range of areas of concentration, including housing and community development, urban environmental sustainability, economic development, international comparative urban policy, and transportation. The certificate is not a stand-alone program but is anchored by and incorporated into participating graduate programs.

**Academic Standing/Progress**

Students in the program are monitored for academic progress. Those students whose grade-point average (GPA) falls below a 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to a 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Core Requirements**

Code	Title	Hours
PPUA 6201	The 21st-Century City: Urban Opportunities and Challenges in a Global Context	4

PPUA 7673	Capstone in Public Policy and Urban Affairs	4
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**Evaluation and Research**

PPUA 6509	Techniques of Program Evaluation	4
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**Electives**

Code	Title	Hours
Complete 8 semester hours from the following:		8
LPSC 5000 to LPSC 7999		
PPUA 5000 to PPU 7999		
CRIM 5000 to CRIM 7999 (by advisement)		
ECON 5000 to ECON 7999 (by advisement)		
ENGL 5000 to ENGL 7999 (by advisement)		
HIST 5000 to HIST 7999 (by advisement)		
POLS 5000 to POLS 7999 (by advisement)		
SOCL 5000 to SOCL 7999 (by advisement)		

**Law Requirements**

Code	Title	Hours
Complete 9 semester hours from the following subject areas:		9
LW, LAW		

**Program Credit/GPA Requirements**

37 total semester hours required  
Minimum 3.000 GPA required

**Sociology**

Website (<http://www.northeastern.edu/cssh/socant/>)

**Liza Weinstein, PhD**

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**Gordana Rabrenovic, PhD**

Associate Professor of Sociology and Education  
Director of the Brudnick Center on Violence and Conflict  
Graduate Program Director  
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**Graduate Programs Contact**

Pamela Simmons, Graduate Program Administrator  
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**Department information**

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CSSH Graduate Programs General Regulations (<https://cssh.northeastern.edu/wp-content/uploads/2018/05/2017-GENREGS.pdf>)

Uncertainty about the economy, healthcare, and the labor market. Ethnic conflicts in an era of rapid globalization. Concern for the environment. Shifting gender arrangements as work and family come into conflict. Violence in school and even in houses of worship.

Never has there been a greater need for sociological research focused on the problems and issues of our time.

The Department of Sociology and Anthropology at Northeastern University offers a PhD degree in sociology within a flexible program attractive to students interested in both academic and nonacademic careers. Students pursuing the PhD degree earn an MA degree en route to completing the doctorate, unless they earned the MA in sociology elsewhere. The program seeks to provide students with the theoretical foundation and research skills needed to engage in a career in teaching and research, in the public sector, or in industry. Thirty-two faculty members bring a wide range of substantive interests, organized around four specialization areas: the sociology of gender; globalization; environment and health; and urban sociology. Apart from these formal areas of concentration, the department has extraordinary strengths in inequality and social movements.

Our faculty have won numerous prizes for excellence in the classroom, and many have also played leadership roles in establishing prestigious centers and interdisciplinary programs on Northeastern's campus.

The Department of Sociology and Anthropology is a founding unit of Northeastern's School of Public Policy and Urban Affairs, which is dedicated to providing advanced research opportunities in a multidisciplinary environment. The department also maintains strong ties with the Brudnick Center for the Study of Conflict and Violence; the Women's, Gender, and Sexuality Studies program; the Kitty and Michael Dukakis Center for Urban and Regional Policy; the Northeastern Environmental Justice Research Collaborative; the Social Science Environmental Health Research Institute; and PhD in Public Policy program.

**Programs****Doctor of Philosophy**

- Sociology (p. 464)
- Sociology—Advanced Entry (p. 466)

**Sociology, PhD**

The PhD program is designed to attract students who wish to develop a broad base of sociological knowledge, such as would equip students to embark on academic careers in leading institutions of higher education. The PhD program boasts a wide array of curricular strengths and diverse methodological offerings, all of which draw upon the department's emphasis on the study of social inequalities along lines of race, class, and gender. Faculty expertise ranges widely from domestic U.S. concerns to issues that affect groups, regions, and societies on a global scale.

The PhD program is organized around four key areas of specialization:

- Globalization (<http://www.northeastern.edu/cssh/socant/graduate/globalization/>)
- Urban Sociology (<http://www.northeastern.edu/cssh/socant/graduate/urban-sociology/>)
- Sociology of Gender (<http://www.northeastern.edu/cssh/socant/graduate/sociology-of-gender/>)
- Environment and Health (<http://www.northeastern.edu/cssh/socant/graduate/environment-and-health/>)

In addition to the graduate courses offered in the areas of specialization, the program offers a strong foundation in both theory (classical and contemporary) and methods (quantitative and qualitative). Reflecting the program's distinctive emphasis on social inequalities, students are required to select a core elective in this field, choosing from a list of approved courses maintained by the department (e.g., a course on the social psychology of stratification or a seminar in social inequality).



As students complete their core requirements, they also work closely with individual faculty members to advance their work within one of the department's standing areas of specialization. Students also have the right to petition to construct their own areas of specialization (pending departmental approval) and have completed area examinations in a host of subfields. Among these are environmental justice, political economy of global capitalism, theoretical criminology, feminist theory, political sociology, social psychology, sociology of violence, and immigration, among many others.

The PhD program is designed to admit relatively small numbers of graduate students each year, which affords students the opportunity to forge close working relationships with the faculty. Our faculty and graduate students work together in a number of interdisciplinary research projects, programs, and centers, including the Social Science Environmental Health Research Institute (<http://www.northeastern.edu/environmentalhealth/>); the Brudnick Center on Violence and Conflict (<http://www.northeastern.edu/brudnickcenter/>); the Dukakis Center for Urban and Regional Policy (<http://www.northeastern.edu/dukakiscenter/>); the (<http://catalog.northeastern.edu/graduate/social-sciences-humanities/sociology/sociology-phd/Institute%20on%20Urban%20Health%20Research%20and%20Practice/>)Institute on Urban Health Research and Practice (<http://www.northeastern.edu/iuhrp/>); the Environmental Justice Research Collaborative (<http://www.northeastern.edu/nejrc/>); the Institute on Race and Justice (<http://www.northeastern.edu/irj/>); and the Women's, Gender, and Sexuality Studies Program (<https://www.northeastern.edu/cssh/wgss/>). Many of the faculty in the Department of Sociology and Anthropology have additional interests and are affiliated with other departments on campus, including environmental studies; law and public policy; Latino, Latin American, and Caribbean studies; African-American studies; international affairs; Jewish studies; and criminal justice. Students who wish to work with faculty in other disciplines are encouraged to enlist the aid of the sociology graduate director or their advisors in contacting individual faculty members.

**Admissions**

Students interested in the PhD apply directly to that program. Students admitted without a master's degree earn the MA in sociology en route once PhD course work is completed. Please note that all applicants for the doctoral program are required to submit a writing sample that should consist of written materials that demonstrate their capacity for scholarship at the doctoral level. (Copies of several course or term papers or a copy of a master's thesis or paper are appropriate.)

**Theory Examination**

Students entering the graduate program must take a theory qualifying examination at the conclusion of their first year of study during the spring semester. The theory qualifying examination is a standard exam taken by all students in the same cohort. The exam is graded on a pass/fail basis. Students who fail the examination may take it a second time but will not be allowed to enroll for course work beyond the 30-semester-hour MA requirement or their first year of PhD residence (whichever case applies) until successfully completing the qualifying exam. Students who fail the examination on their second attempt will be asked to leave the program. In the latter case, a student may petition the graduate committee for a review of the student's record and performance in the program.

**Course Requirements**

As prerequisites, all doctoral candidates are expected to have completed the core methodology and theory requirements for the Master of Arts in Sociology.

In addition to the core, students must take one course on social inequality to fulfill the department's "inequality" requirement. Doctoral candidates are also required to complete two advanced methods classes from a list of approved courses maintained by the department.

Students entering with a bachelor's degree complete 60 semester hours. Students entering with a master's degree complete a minimum of 40 semester hours beyond the master's degree.

**Degree Candidacy**

To enter into degree candidacy, the student must have earned a Master of Arts degree or its departmental semester-hour equivalent, passed the qualifying examination, established a graduate committee of three faculty members from the sociology department, and successfully completed the candidacy examination.

**Program Requirements**

**Bachelor's Degree Entrance**

Complete all courses and requirements listed below unless otherwise indicated.

**Milestones**

- Qualifying examination
- Annual review
- Two field statements
- Dissertation committee
- Dissertation proposal
- Dissertation defense

**Core Requirements**

Code	Title	Hours
<b>Foundations</b>		
SOCL 7200	Foundations of Social Theory 1	4
SOCL 7201	Foundations of Social Theory 2	4
SOCL 7263	Social Psychology of Stratification	4
<b>Research Methods</b>		
INSH 6300	Research Methods in the Social Sciences	4
INSH 6500	Statistical Analysis	4
<b>Advanced Methods</b>		
Complete 8 semester hours from the following:		8
INSH 6302	Qualitative Methods	
INSH 7400	Quantitative Analysis	
INSH 7600	Advanced Methodological and Quantitative Techniques	
PHTH 6320	Qualitative Methods in Health and Illness	
PPUA 6509	Techniques of Program Evaluation	

**Electives**

Code	Title	Hours
Complete 32 semester hours in the following subject area:		32
SOCL		

**Dissertation**

Code	Title	Hours
<b>Exam Preparation</b>		
Required for students who must maintain full-time status while completing comprehensive exam.		

SOCL 8960	Exam Preparation—Doctoral
<b>Research</b>	
SOCL 9986	Research
<b>Dissertation</b>	
Complete the following (repeatable) course twice:	
SOCL 9990	Dissertation
<b>Dissertation Continuation</b>	
Following completion of two semesters of SOCL 9990, registration in the following class is required in each semester (excluding summers) until the dissertation is completed:	
SOCL 9996	Dissertation Continuation

## Program Credit/GPA Requirements

60 total semester hours required

Minimum 3.000 GPA required

### Sociology, PhD—Advanced Entry

The PhD program is designed to attract students who wish to develop a broad base of sociological knowledge, such as would equip students to embark on academic careers in leading institutions of higher education. The PhD program boasts a wide array of curricular strengths and diverse methodological offerings, all of which draw upon the department's emphasis on the study of social inequalities along lines of race, class, and gender. Faculty expertise ranges widely from domestic U.S. concerns to issues that affect groups, regions, and societies on a global scale.

The PhD program is organized around four key areas of specialization.

- Globalization (<http://www.northeastern.edu/cssh/socant/graduate/globalization/>)
- Urban Sociology (<http://www.northeastern.edu/cssh/socant/graduate/urban-sociology/>)
- Sociology of Gender (<http://www.northeastern.edu/cssh/socant/graduate/sociology-of-gender/>)
- Environment and Health (<http://www.northeastern.edu/cssh/socant/graduate/environment-and-health/>)

In addition to the graduate courses offered in the areas of specialization, the program provides a strong foundation in both theory (classical and contemporary) and methods (quantitative and qualitative). Reflecting the program's distinctive emphasis on social inequalities, students are required to select a core elective in this field, choosing from a list of approved courses maintained by the department (e.g., a course on the social psychology of stratification or a seminar in social inequality). As students complete their core requirements, they also work closely with individual faculty members to advance their work within one of the department's standing areas of concentration. Students also have the right to petition to construct their own areas of specialization (pending departmental approval) and have completed area examinations in a host of subfields. Among these are environmental justice, political economy of global capitalism, theoretical criminology, feminist theory, political sociology, social psychology, sociology of violence, and immigration, among many others.

The PhD program is designed to admit relatively small numbers of graduate students each year, which affords students the opportunity to forge close working relationships with the faculty. Our faculty and graduate students work together in a number of interdisciplinary research projects, programs, and centers, including the Social Science Environmental Health Research Institute (<http://www.northeastern.edu/>

<http://www.northeastern.edu/brudnickcenter/>); the Dukakis Center for Urban and Regional Policy (<http://www.northeastern.edu/dukakiscenter/>); the Institute on Urban Health Research and Practice (<http://www.northeastern.edu/iuhrp/>); Environmental Justice Research Collaborative (<http://www.northeastern.edu/nejrc/>); the Institute on Race and Justice (<http://www.northeastern.edu/irj/>); and the Women's, Gender, and Sexuality Studies Program (<https://www.northeastern.edu/cssh/wgss/>). Many of the faculty in the Department of Sociology and Anthropology have additional interests and are affiliated with other departments on campus, including environmental studies; law, policy, and society; Latino, Latin American, and Caribbean studies; African-American studies; international affairs; Jewish studies; and criminal justice. Students who wish to work with faculty in other disciplines are encouraged to enlist the aid of the sociology graduate program director or their advisors in contacting individual faculty members.

## Admissions

Students admitted with a master's degree in sociology from another institution may be exempt from taking the theory exam but may be required to do some additional course work in theory and methods. For students admitted with a master's degree in a field other than sociology, the theory exam requirement and supplementary course work requirements will be determined on a case-by-case basis. Please note that all applicants for the doctoral program are required to submit a writing sample. The writing sample should consist of written materials that demonstrate students' capacity for scholarship at the doctoral level. (Copies of several course or term papers or a copy of a master's thesis or paper are appropriate.)

## Theory Examination

Students entering the graduate program must take a theory qualifying examination at the conclusion of their first year of study during the spring semester. The theory qualifying examination is a standard exam taken by all students in the same cohort. The exam is graded on a pass/fail basis. Students who fail the examination may take it a second time but will not be allowed to enroll for course work beyond the 30-semester-hour MA requirement or their first year of PhD residence (whichever case applies) until successfully completing the qualifying exam. Students who fail the examination on their second attempt will be asked to leave the program. In the latter case, a student may petition the graduate committee for a review of the student's record and performance in the program.

## Degree Candidacy

To enter into degree candidacy, the student must have earned a Master of Arts degree or its departmental semester hour's equivalent, passed the qualifying examination, established a graduate committee of three faculty members from the sociology department, and successfully completed the candidacy examination.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

Qualifying examination or waiver  
Annual review  
Two field statements  
Dissertation committee  
Dissertation proposal  
Dissertation defense

## Core Requirements

Code	Title	Hours
<b>Foundations</b>		
SOCL 7200	Foundations of Social Theory 1	4
SOCL 7201	Foundations of Social Theory 2	4
SOCL 7263 or SOCL 7259	Social Psychology of Stratification Contemporary Issues in Sociology	4
<b>Research Methods</b>		
INSH 6300	Research Methods in the Social Sciences	4
INSH 6500	Statistical Analysis	4
<b>Advanced Methods</b>		
Complete 8 semester hours from the following:		8
INSH 6302	Qualitative Methods	
INSH 7400	Quantitative Analysis	
INSH 7500	Advanced Quantitative Analysis	
INSH 7600	Advanced Methodological and Quantitative Techniques	
PHTH 6320	Qualitative Methods in Health and Illness	
PPUA 6509	Techniques of Program Evaluation	

## Electives

Code	Title	Hours
Complete 12 semester hours in the following subject area:		12
SOCL 7200 to SOCL 7999		

## Dissertation

Code	Title	Hours
<b>Exam Preparation</b>		
Students register for this course while writing each their two field statements. Must take twice.		
SOCL 8960	Exam Preparation—Doctoral	
<b>Research</b>		
SOCL 9986	Research	
<b>Dissertation</b>		
Complete the following (repeatable) course twice:		
SOCL 9990	Dissertation	
<b>Dissertation Continuation</b>		
Following completion of two semesters of SOCL 9990, registration in the following class is required in each semester (including the summer if the dissertation is submitted in summer) until the dissertation is completed:		
SOCL 9996	Dissertation Continuation	

## Program Credit/GPA Requirements

40 total semester hours required  
Minimum 3.000 GPA required

## Interdisciplinary

## Doctor of Philosophy (PhD)

- Network Science (p. 227)

## Master of Science (MS)

- Environmental Science and Policy (p. 399)
- Engineering and Public Policy with Concentration in Energy and Environment (p. 140)
- Engineering and Public Policy with Concentration in Infrastructure Resilience (p. 142)

## Graduate Certificate

- Data Analytics (p. 106)
- Digital Humanities (p. 435)
- Information Ethics (p. 474)
- Women's, Gender, and Sexuality Studies (p. 474)

## Network Science, PhD

Website (<http://www.networkscienceinstitute.org>)

### David Lazer, PhD

Distinguished Professor  
College of Social Sciences and Humanities and College of Computer and Information Science

Network Science Program  
177 Huntington Avenue, 10th Floor  
617.373.8856  
617.373.5884 (fax)  
[networkscience@northeastern.edu](mailto:networkscience@northeastern.edu)

The PhD program in network science aims to enhance our understanding of networks arising from the interplay of human behavior, sociotechnical infrastructures, information diffusion, and biological agents. This is an intrinsically multidisciplinary activity, with members of the network science community representing a wide range of fields including computer science, information science, complexity, physics, sociology, communication, organizational behavior, political science, and epidemiology. This is an interdisciplinary doctoral program focused on training students in network science across several colleges—including the College of Science, the Khoury College of Computer Sciences, 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 research and subject to prior approval by their faculty advisor. Required course work includes the following: three foundational courses in network science—Complex Networks and Applications (PHYS 5116); Network Science Data (PHYS 7331); and Social Networks (POLS 7334)—at least one supplemental course in network science—Network Science Data 2 (PHYS 7332); Social Networks (POLS 7334); or Data Mining Techniques (CS 6220)—12 semester hours of elective course work defined by their area of research; 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 are expected to maintain a cumulative GPA of 3.000 or better in all course work. Students are not allowed to retake courses. A student who does not maintain the 3.000 GPA, or is not making satisfactory

progress on their dissertation research, may be recommended for termination by the graduate program committee.

Each student will have one primary research advisor from the network science doctoral program faculty.

Students will be expected to select their research advisor by the end of the spring semester of their second year in the program.

The dissertation committee consists of at least four members: the dissertation advisor, one additional network science doctoral program faculty member, one member expert in the specific topic of research (can be from outside the university), and one additional tenured/tenure-track faculty member from the concentration department/conferring college. The dissertation advisor must be a full-time tenured or tenure-track member of the Northeastern University faculty. Students may repeat the comprehensive examination once if they are unsuccessful.

## Degree Candidacy

A student is considered a PhD candidate upon completion of all required course work with a minimum cumulative GPA of 3.000, satisfactory completion of the qualification exam, and satisfactory completion of the comprehensive exam.

## Qualifying Examination

The qualification exam will be an oral examination of the material during the students' course work. The exam will be an hour in length and consist of questions selected by network science faculty who comprise the qualifying examination and dissertation committee. Students will receive 50 to 80 potential questions, which they must be prepared to answer, one month before the exam. The exam will consist of a subset of these questions. The qualifying exam will be offered twice annually, in the fall and spring term. All students are required to initially sit for the exam in the fall, typically in their third year of the PhD program. Students who do not pass the qualifying exam on their first attempt are expected to retake the exam in the spring term. Students may sit for the qualifying exam no more than twice.

Students who fail to complete the qualifying examination but who have completed all the PhD program's required 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.

## Comprehensive Examination

Students must submit a written dissertation proposal to the qualifying examination and dissertation committee. The proposal should identify relevant literature, 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.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

Annual review

Qualifying exam  
Dissertation committee  
Dissertation proposal  
Dissertation defense

## Core Requirements

Code	Title	Hours
<b>Networks</b>		
PHYS 5116	Complex Networks and Applications	4
PHYS 7331	Network Science Data	4
PHYS 7335	Dynamical Processes in Complex Networks	4
Choose one of the following:		4
PHYS 7332	Network Science Data 2	
CS 6220	Data Mining Techniques	
POLS 7334	Social Networks	
<b>Research</b>		
Complete the following (repeatable) course twice:		
NETS 8984	Research	1-4

## Specializations

Choose one of the following specializations or 12 semester hours of elective course work from the electives course list:

- Computer Science (p. )
- Political Science (p. )
- Epidemiology (p. 228)
- Physics (p. 228)
- Math (p. 228)
- Electives (p. 228)

## COMPUTER SCIENCE

Code	Title	Hours
Choose three from the following:		12
CS 6140	Machine Learning	
CS 6220	Data Mining Techniques	
CS 6240	Large-Scale Parallel Data Processing	
CS 7800	Advanced Algorithms	

## POLITICAL SCIENCE

Code	Title	Hours
POLS 7200	Perspectives on Social Science Inquiry	4
POLS 7201	Research Design	4
POLS 7202	Quantitative Techniques	4

## EPIDEMIOLOGY

Code	Title	Hours
PHTH 5202	Introduction to Epidemiology	3
PHTH 6224	Social Epidemiology	3
Electives: Choose two from the elective course list below.		6-8

## PHYSICS

Code	Title	Hours
Choose three from the following:		12
PHYS 5318	Principles of Experimental Physics	
PHYS 7305	Statistical Physics	
PHYS 7731	Biological Physics 1	
PHYS 7321	Computational Physics	

**MATH**

Code	Title	Hours
MATH 7241	Probability 1	4
MATH 7233	Graph Theory	4
MATH 7733	Readings in Graph Theory	4

**ELECTIVES**

Complete a minimum of 12 semester hours of elective course work related to your area of research. Common electives include the following:

Code	Title	Hours
NETS 7341	Network Economics	4
NETS 7350	Bayesian and Network Statistics	4
NETS 7983	Topics	4
NETS 8941	Network Science Literature Review Seminar	2
MATH 7233	Graph Theory	4
CS 5800	Algorithms	4
CS 6140	Machine Learning	4
CS 7180	Special Topics in Artificial Intelligence	4
CS 7295	Special Topics in Data Visualization	4
INSH 5301	Introduction to Computational Statistics	4
PHYS 7337	Statistical Physics of Complex Networks	4

**Dissertation**

Code	Title	Hours
Complete the following (repeatable) course twice:		
NETS 9990	Dissertation	

**Program Credit/GPA Requirements**

32 total semester hours required

Minimum 3.000 GPA required

**Environmental Science and Policy, MS**

The Master of Science in Environmental Science and Policy program emphasizes a broadly interdisciplinary and synthetic approach that integrates knowledge in the environmental sciences (conservation biology, climate change, fisheries science, ecosystem function, biodiversity, restoration ecology) with the social sciences (policy, economics, sociology, political science, and development) and humanities (environmental history, philosophy, and ethics). The goal of the program is to equip professionals with substantive breadth in knowledge and skills at the intersection of environmental science and policy. The program focuses on training students to think critically about the underlying causes of environmental problems and understanding the reciprocal relationships between coupled human-natural ecosystems and the interconnections between social and technological innovations. The program explores practical approaches and potential solutions that decision makers need to evaluate in policy debates related to promoting environmental sustainability.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Core Requirements**

Code	Title	Hours
<b>Seminars</b>		
PPUA 6101	Environmental Science and Policy Seminar 1	4
ENVR 6102	Environmental Science and Policy Seminar 2	4

**Skills Courses**

Complete 2 courses from the following. At least one course needs to be taken from the College of Science Skills Course List and one course from the College of Social Sciences and Humanities Skills Course List.

*College of Science Skills Course List*

EEMB 5130	Ecological Dynamics
EEMB 5522	Experimental Design Marine Ecology
ENVR 5210	Environmental Planning
ENVR 5260	Geographical Information Systems
ENVR 6500	Biostatistics

*College of Social Sciences and Humanities Skills Course List*

INSH 5301	Introduction to Computational Statistics
LPSC 6313	Economic Analysis for Law, Policy, and Planning
LPSC 7215	Advanced Quantitative Techniques
LPSC 7305	Research and Statistical Methods
LPSC 7311	Strategizing Public Policy
POLS 7201	Research Design
PPUA 5260	Ecological Economics
PPUA 5261	Dynamic Modeling for Environmental Decision Making
PPUA 5263	Geographic Information Systems for Urban and Regional Policy
PPUA 6205	Research Design and Methodology in Urban and Regional Policy
PPUA 6210	Research Toolkit for Urban and Regional Policy: Cost/Benefit Analysis
PPUA 6212	Research Toolkit for Urban and Regional Policy: Project Management
PPUA 6213	Research Toolkit for Urban and Regional Policy: Data Visualization
PPUA 6216	Research Toolkit for Urban and Regional Policy: Grant Writing
PPUA 6502	Economic Analysis for Policy and Planning
PPUA 6506	Techniques of Policy Analysis
PPUA 6509	Techniques of Program Evaluation
PPUA 6525	Institutions and Public Policy
PPUA 7237	Advanced Spatial Analysis of Urban Systems

**Electives**

Complete 5 courses from the following list. At least two courses must be taken from the College of Science Elective Course List and two courses from the College of Social Sciences and Humanities Elective Course List. Any skills course not taken to fulfill the skills courses requirement can

be taken as an elective. Students may petition to enroll in other relevant graduate courses offered by other schools at Northeastern University.

### COLLEGE OF SCIENCE ELECTIVE LIST

Code	Title	Hours
EEMB 5536	Ocean and Coastal Sustainability	
EEMB 6465	Ecological and Conservation Genomics	
EEMB 6470	Coastal Ecology and Sustainability	
ENVR 5210	Environmental Planning	
ENVR 5984	Research	
ENVR 6150	Food Security and Sustainability	
ENVR 6900	Topics: Networks and Biology	

### COLLEGE OF SOCIAL SCIENCES AND HUMANITIES ELECTIVE LIST

Code	Title	Hours
INSH 5302	Information Design and Visual Analytics	
LPSC 7311	Strategizing Public Policy	
LPSC 7312	Cities, Sustainability, and Climate Change	
PHTH 5214	Environmental Health	
PPUA 5225	The Open Classroom: Public Debates on Public Policy	
PHTH 5230	Global Health	
PHTH 5440	Community-Based Participatory Research: Environmental Health	
PPUA 5260	Ecological Economics	
PPUA 5262	Big Data for Cities	
PPUA 5264	Energy Transitions and Climate Resilience: Technology, Policy, and Social Change	
PPUA 5266	Urban Theory and Science	
PPUA 5270	Food Systems and Public Policy	
PPUA 5390	Special Topics in Public Policy and Urban Affairs	
PPUA 6201	The 21st-Century City: Urban Opportunities and Challenges in a Global Context	
PPUA 6204	Urban Development and Politics	
PPUA 6505	Public Budgeting and Financial Management	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6522	Administrative Ethics and Public Management	
PPUA 6551	Nonprofit Organizations and Social Change	
PPUA 6552	The Nonprofit Sector in Civil Society and Public Affairs	
PPUA 6553	Nonprofit Financial Resource Development	
PPUA 6862	Internship with Research	
PPUA 6966	Practicum	
PPUA 7230	Housing Policy	
PPUA 7231	Transportation Policy	
PPUA 7234	Land Use and Urban Growth Policy	
PPUA 7239	Problems in Metropolitan Policymaking	
PPUA 7249	Urban Coastal Sustainability	

PPUA 7346	Resilient Cities
PPUA 7673	Capstone in Public Policy and Urban Affairs
SOCL 7235	Urban Sociology
SOCL 7243	Sociology of Health and Illness
SOCL 7257	Contemporary Issues in Sociology
SOCL 7267	Environment, Health, and Society
SOCL 7287	Social Movements in Health

### Program Credit/GPA Requirements

36 total semester hours required  
Minimum 3.000 GPA required

### Engineering and Public Policy with Concentration in Energy & Environment, MS

The purpose of this degree is to provide students with a background in engineering with the tools necessary to conduct robust policy analysis. It includes required core courses from the Department of Civil and Environmental Engineering and the School of Public Policy, complemented by electives in engineering and public policy, which can be met by two courses and a master's report (recommended), or by one course and a thesis, or by three courses. A minimum of 16 semester hours must be taken in the College of Engineering.

Degree Requirements	With Report	With Thesis	Course Work Only
Required core courses	20 SH	20 SH	20 SH
Other electives	8 SH	4 SH	12 SH
Master of Science report/thesis	4 SH	8 SH	
Minimum semester hours required	32 SH	32 SH	32 SH

### Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 230).

### GORDON INSTITUTE OF ENGINEERING LEADERSHIP

#### Master's Degree in Engineering and Public Policy with Concentration in Energy and Environment with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Engineering and Public Policy with Concentration in Energy and Environment in addition to earning a Graduate Certificate in Engineering Leadership. Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16 semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour degree and certificate will require 20 hours of advisor-approved energy and environment technical courses.

Engineering Leadership (p. 225)

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
<b>Energy and Environment</b>		
ENGR 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage	4
<b>Environmental Systems Modeling</b>		
Complete 4 semester hours from the following:		4
CIVE 5261	Dynamic Modeling for Environmental Investment and Policymaking	
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure	
IE 5500	Systems Engineering in Public Programs	
<b>Economics</b>		
Complete 4 semester hours from the following:		4
ECON 7210	Applied Microeconomic Policy Analysis	
PPUA 5260	Ecological Economics	
PPUA 6502	Economic Analysis for Policy and Planning	
<b>Public Policy and Analysis</b>		
Complete 4 semester hours from the following:		4
LPSC 7311	Strategizing Public Policy	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6509	Techniques of Program Evaluation	
<b>Statistics</b>		
Complete 4 semester hours from the following:		4
CIVE 7100	Time Series and Geospatial Data Sciences	
CIVE 7388	Special Topics in Civil Engineering (Informatics in Civil Engineering)	
IE 5640	Data Mining for Engineering Applications	
IE 6200	Engineering Probability and Statistics	
IE 7280	Statistical Methods in Engineering	
INSH 5301	Introduction to Computational Statistics	
INSH 6500	Statistical Analysis	
LPSC 7215	Advanced Quantitative Techniques	

### Options

Complete one of the following options:

#### COURSE WORK OPTION

Code	Title	Hours
Complete 12 semester hours from the Energy and Environment Course List below.		12

#### REPORT OPTION

Code	Title	Hours
CIVE 8674	Master's Report	4
Complete 8 semester hours from the Energy and Environment Course List below.		8

#### THESIS OPTION

Code	Title	Hours
CIVE 7990	Thesis	8
Complete 4 semester hours from the Energy and Environment Course List below.		4

### Energy and Environment Course List

Any required core course not used to meet the required core course requirement can be taken as a restricted elective.

Code	Title	Hours
CIVE 5271	Solid and Hazardous Waste Management	
CIVE 5280	Remote Sensing of the Environment	
CIVE 5300	Environmental Engineering Laboratory	
CIVE 5699	Special Topics in Civil Engineering (Building Energy Performance Simulation)	
CIVE 7252	Water Engineering: Planning, Design, and Management	
CIVE 7261	Surface Water Quality Modeling	
EMGT 6225	Economic Decision Making	
ENVR 5210	Environmental Planning	
ENVR 5260	Geographical Information Systems	
LPSC 7312	Cities, Sustainability, and Climate Change	
ME 5645	Environmental Issues in Manufacturing and Product Use	
PHTH 5214	Environmental Health	
PHTH 5230	Global Health	
PPUA 5262	Big Data for Cities	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
PPUA 5264	Energy Transitions and Climate Resilience: Technology, Policy, and Social Change	
PPUA 5270	Food Systems and Public Policy	
PPUA 6205	Research Design and Methodology in Urban and Regional Policy	
PPUA 6210	Research Toolkit for Urban and Regional Policy: Cost/Benefit Analysis	
PPUA 6212	Research Toolkit for Urban and Regional Policy: Project Management	
PPUA 6213	Research Toolkit for Urban and Regional Policy: Data Visualization	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	

### Program Credit/GPA Requirements

32 total semester hours required  
Minimum 3.000 GPA required

### Engineering and Public Policy with Concentration in Infrastructure Resilience, MS

The purpose of this degree is to provide students with a background in engineering with the tools necessary to conduct robust policy analysis. It includes required core courses from the Department of

Civil and Environmental Engineering and the School of Public Policy, complemented by electives in engineering and public policy, which can be met by two courses and a master's report (recommended), or by one course and a thesis, or by three courses. A minimum of 16 semester hours must be taken in the College of Engineering.

Degree Requirements	With Report	With Thesis	Course Work Only
Required core courses	20 SH	20 SH	20 SH
Other electives	8 SH	4 SH	12 SH
Master of Science report/thesis	4 SH	8 SH	
Minimum semester hours required	32 SH	32 SH	32 SH

### Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 230).

#### GORDON INSTITUTE OF ENGINEERING LEADERSHIP

##### Master's Degree in Engineering and Public Policy with Concentration in Infrastructure Resilience with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Engineering and Public Policy with Concentration in Infrastructure Resilience in addition to earning a Graduate Certificate in Engineering Leadership. Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16 semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour degree and certificate will require 20 hours of advisor-approved infrastructure resilience technical courses.

Engineering Leadership (p. 225)

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirements

Code	Title	Hours
<b>Infrastructure Resilience</b>		
CIVE 7110	Critical Infrastructure Resilience	4
<b>Environmental Systems Modeling</b>		
Complete 4 semester hours from the following:		4
CIVE 5261	Dynamic Modeling for Environmental Investment and Policymaking	
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure	
CIVE 5280	Remote Sensing of the Environment	
CIVE 5699	Special Topics in Civil Engineering (Climate Science and Technology Adaptation Policy)	
IE 5500	Systems Engineering in Public Programs	

<b>Economics</b>	
Complete 4 semester hours from the following:	
ECON 7210	Applied Microeconomic Policy Analysis
PPUA 6502	Economic Analysis for Policy and Planning

<b>Public Policy and Analysis</b>	
Complete 4 semester hours from the following:	
LPSC 7311	Strategizing Public Policy
PPUA 6506	Techniques of Policy Analysis
PPUA 6509	Techniques of Program Evaluation

<b>Statistics</b>	
Complete 4 semester hours from the following:	
CIVE 7100	Time Series and Geospatial Data Sciences
CIVE 7388	Special Topics in Civil Engineering (Informatics in Civil Engineering)
IE 5640	Data Mining for Engineering Applications
IE 6200	Engineering Probability and Statistics
IE 7280	Statistical Methods in Engineering
INSH 5301	Introduction to Computational Statistics
INSH 6500	Statistical Analysis
LPSC 7215	Advanced Quantitative Techniques

### Options

Complete one of the following options:

#### COURSE WORK OPTION

Code	Title	Hours
Complete 12 semester hours from the infrastructure course list below.		12

#### REPORT OPTION

Code	Title	Hours
CIVE 8674	Master's Report	4
Complete 8 semester hours from the Infrastructure course list below.		8

#### THESIS OPTION

Code	Title	Hours
CIVE 7990	Thesis	8
Complete 4 semester hours from the Infrastructure course list below.		4

### Infrastructure Course List

Any required core course not used to meet the required core course requirement can be taken as a restricted elective.

Code	Title	Hours
CIVE 5699	Special Topics in Civil Engineering (Building Energy Performance Simulation)	
CY 5250	Decision Making for Critical Infrastructure	
EMGT 6225	Economic Decision Making	
ENVR 5260	Geographical Information Systems	
IE 7290	Reliability Analysis and Risk Assessment	



LPSC 7312	Cities, Sustainability, and Climate Change
ME 5645	Environmental Issues in Manufacturing and Product Use
PHTH 5214	Environmental Health
PHTH 5230	Global Health
PPUA 5260	Ecological Economics
PPUA 5262	Big Data for Cities
PPUA 5263	Geographic Information Systems for Urban and Regional Policy
PPUA 5264	Energy Transitions and Climate Resilience: Technology, Policy, and Social Change
PPUA 5270	Food Systems and Public Policy
PPUA 6205	Research Design and Methodology in Urban and Regional Policy
PPUA 6210	Research Toolkit for Urban and Regional Policy: Cost/Benefit Analysis
PPUA 6212	Research Toolkit for Urban and Regional Policy: Project Management
PPUA 6213	Research Toolkit for Urban and Regional Policy: Data Visualization
PPUA 7230	Housing Policy
PPUA 7231	Transportation Policy
PPUA 7234	Land Use and Urban Growth Policy
PPUA 7237	Advanced Spatial Analysis of Urban Systems
PPUA 7239	Problems in Metropolitan Policymaking
PPUA 7240	Health Policy and Politics

### Program Credit/GPA Requirements

32 total semester hours required  
Minimum 3.000 GPA required

#### Data Analytics, Graduate Certificate

The interdisciplinary Graduate Certificate in Data Analytics is offered through a collaboration between the Khoury College of Computer Sciences and the College of Social Sciences and Humanities. The certificate curriculum emphasizes the skills needed to bridge between emerging technological capacities and traditional policymaking processes. The program is designed to provide students with foundational knowledge in data science—including data management, machine learning, data mining, statistics, and visualizing and communicating data—that can be applied to data-driven decision making in any discipline.

For more information on the certificate, refer to the program's website (<http://www.northeastern.edu/datascience/>).

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirements

Code	Title	Hours
DA 5020	Collecting, Storing, and Retrieving Data	4
DA 5030	Introduction to Data Mining/Machine Learning	4

INSH 5301	Introduction to Computational Statistics	4
INSH 5302	Information Design and Visual Analytics	4

### Program Credit/GPA Requirements

16 total semester hours required  
Minimum 3.000 GPA required

#### Digital Humanities, Graduate Certificate

**Elizabeth Maddock Dillon, PhD**  
Certificate Co-Director  
[e.dillon@northeastern.edu](mailto:e.dillon@northeastern.edu)

**Julia Flanders, PhD**  
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[sa.connell@northeastern.edu](mailto:sa.connell@northeastern.edu)

CSSH Graduate Programs General Regulations ([https://www.northeastern.edu/cssh/graduate/current\\_students/](https://www.northeastern.edu/cssh/graduate/current_students/))

The Graduate Certificate in Digital Humanities allows students to pursue an organized course of study in digital humanities with the interdisciplinary faculty of the NULab for Texts, Maps, and Networks (<http://www.northeastern.edu/nulab/>) while completing requirements for their degrees in existing Northeastern University doctoral and master's programs. *This is not a stand-alone certificate*; rather, it will be completed by students in the course of their existing program of study.

Digital humanities (DH) is an emerging field of research that is interdisciplinary in scope and collaborative in nature. The field is developing in relation to new digital technologies that have changed the objects of study, methods, and opportunities for research and teaching in existing humanities fields. Digitized texts are now read and accessed in new ways; digitized corpora of texts make possible new modes of quantitative and qualitative analysis (including “distant reading,” text mining, mapping, and network analysis); born digital objects constitute new primary sources in need of humanistic theorization, approaches, and critical vocabularies; and modes of encoding, aggregating, and connecting texts enable the creation of new archival resources that are changing our understanding of the archive itself as well revealing new historical, literary, and cultural patterns.

The field is new and developing rapidly and many students are eager for training in this area—both because DH is at the cutting edge of disciplinary work and because it offers new opportunities for employment within the academy and outside of it.

### Academic Standing/Progress

Students in the program are monitored for academic progress. Those students whose GPA falls below a 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to a 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

### Final Project

The student will complete a final independent DH research project located in the student's home program (such as a thesis, or a portion thereof) or participation in a collaborative DH project with substantial

student participation. The final project will be overseen by the NULab faculty members teaching the NULab Project Seminar during its development; NULab workshop instructors will advise students on their projects and help students get guidance from other faculty as appropriate. Final projects will be submitted with three components: the project itself, a written project description of about 2,000 words, and a presentation to the NULab community. The DH certificate committee will formally approve all final projects.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
<b>Topics/Readings/Methods</b>		
ENGL 7370	Introduction to Digital Humanities (Introduction to Digital Humanities)	4
or HIST 7370	Texts, Maps, and Networks: Readings and Methods for Digital History	

### Lab Project Seminar

Complete the following (repeatable) 2-credit course two times:		4
INSH 7910	NULab Project Seminar	

### Elective

Code	Title	Hours
Complete 4 semester hours from the following:		4
ARTG 5100	Information Design Studio 1: Principles	
ARTG 5120	Research Methods for Design	
CS 6120	Natural Language Processing	
CS 7290	Special Topics in Data Science	
ENGL 7370	Introduction to Digital Humanities	
INSH 5301	Introduction to Computational Statistics	
INSH 5302	Information Design and Visual Analytics	
INSH 6406	Analyzing Complex Digitized Data	
JRNL 6340	Fundamentals of Digital Journalism	
JRNL 6341	Telling Your Story with Data	
JRNL 6355	Seminar in Investigative Reporting	
HIST 7219	Topics in Cultural History (selected topics only)	
POLS 7334	Social Networks	

### Program Credit/GPA Requirements

Minimum 12 total semester hours required  
Minimum 3.000 GPA required

## Information Ethics, Graduate Certificate

The Graduate Certificate in Information Ethics is intended to help students build a working knowledge of the primary theories, frameworks, concepts, and issues in information ethics, as well as to help students develop robust skills in ethical analysis and evaluation.

Students who complete the certificate will be able to conduct comprehensive ethics and value analysis and assessment of emerging issues and problems related to such things as data collection,

management, and use; design and implementation of artificial intelligence and machine learning; development and deployment of autonomous systems; and online, networked, and digital experiences and systems.

The certificate is open to students in any graduate program at Northeastern.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

*Note:* At least two of the three courses taken to fulfill the certificate requirements must be PHIL courses.

### Core Requirements

Code	Title	Hours
Complete two of the following:		8
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
PHIL 5005		
PHIL 5010		

### Elective

Code	Title	Hours
Complete one of the following. The elective course must be different than the core courses:		4
PHIL 5001	Global Justice	
PHIL 5005		
PHIL 5010		

### Program Credit/GPA Requirements

12 total semester hours required  
Minimum 3.000 GPA required

## Women's, Gender, and Sexuality Studies, Graduate Certificate

Website (<https://www.northeastern.edu/cssh/wgss/graduate/certificate/>)

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The Graduate Certificate in Women's, Gender, and Sexuality Studies (WGSS) is designed for students currently enrolled in a Northeastern University master's or doctoral program. The certificate aims to provide enhanced competency by:

- Analyzing contemporary feminist theoretical frameworks, methodologies, issues, and topics and their relation to established disciplines
- Focusing on the intersection of gender with sexuality, race, class, and other vectors of power and identity
- Broadening and enriching analytical skills in one or more disciplines while drawing on the interdisciplinary perspectives of WGSS

- Challenging the traditional separation of academic theory from political and professional practice

Prospective certificate students are advised initially to consult with the WGSS program director to develop a plan for completing the certificate.

WGSS also offers a specific path for master's of public health students to complete a graduate certificate in WGSS. MPH students are able to apply theories, concepts, and methods gained from the WGSS certificate to urban health issues. Certificate students will work with an advisor in the public health program to develop a plan for completing the certificate.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirement

Code	Title	Hours
Complete one of the following:		4
WMNS 6100	Theorizing Gender and Sexuality	
WMNS 7615	Feminist Inquiry	
WMNS/SOCL 7100	Queer Theory: Sexualities, Genders, Politics	

### Electives

Code	Title	Hours
Complete two of the following. At least one course must come from outside the student's home discipline. Any course not taken to complete the required course work may be taken as an elective. Electives outside this list may be chosen in consultation with program director. Students may also consider courses at the Graduate Consortium for Studies of Gender, Culture, Women, and Sexuality (located at MIT).		8
CAEP 6380	Seminar in Feminist Psychology	
HIST 7304	Research Seminar in Gender and Society in the Modern World	
SOCL 7225	Gender and Social Movements	
SOCL 7265	Sociology of Gender	
SOCL 7273	Gender and Social Policy	
SOCL 7287	Social Movements in Health	
WMNS 6100	Theorizing Gender and Sexuality (if not taken as core course)	
WMNS/SOCL 7100	Queer Theory: Sexualities, Genders, Politics (if not taken as core course)	
WMNS 7615	Feminist Inquiry (if not taken as core course)	
WMNS 7635	Understanding the Pornographic and the Obscene	
WMNS 7900	Special Topics in Women's, Gender, and Sexuality Studies	
WMNS 7976	Directed Study	

The following courses are required for MPH students, in addition to one elective from the list above. Non-MPH students may not use these courses as electives.

PHTH 5120	Race, Ethnicity, and Health in the United States
PHTH 6204	Society, Behavior, and Health

The course below is an elective for MPH students only and must incorporate a project focused on gender and/or sexuality into the selected urban public health issue. A WGSS faculty member must serve on the capstone committee.

PHTH 6910	Public Health Capstone
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## Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

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- University Leadership (p. 516)
- Governing Boards and Officers of Northeastern (p. 516)
- Statements of Accreditation and State Authorization (p. 518)
- General Information (p. 520)
- Resources (p. 521)

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## Statements of Accreditation and State Authorization

### Accreditation

Northeastern University has maintained its status as a member in good standing of the New England Commission of Higher Education, Inc. (NECHE), previously New England Association of Schools and Colleges (NEASC), since it was awarded its initial accreditation in 1940. The university was last reviewed by NECHE in 2018 and will be reviewed again in fall 2028.

Northeastern University possesses degree-granting authority in Massachusetts, under the auspices of the Massachusetts Board of Higher Education.

Program	Accrediting Agency
Northeastern University	New England Commission of Higher Education, Inc. (NECHE)
<b>Bouvé College of Health Sciences</b>	
BS Health Science	Council on Education for Public Health
MS 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 Elementary and Secondary Education <sup>1</sup>
BSN	Commission on Collegiate Nursing Education (CCNE) and Massachusetts Board of Registration in Nursing <sup>2</sup>
BSN, Accelerated Program for Second Degree Students	Commission on Collegiate Nursing Education (CCNE) and Massachusetts Board of Registration in Nursing <sup>2</sup>
BSN, Accelerated Program for Second Degree Students	Commission on Collegiate Nursing Education (CCNE) and North Carolina Board of Nursing <sup>3</sup>
MS Physician Assistant Studies	Accreditation Review Commission on Education for the Physician Assistant, Inc. (ARC-PA)
MS Nursing	Commission on Collegiate Nursing Education (CCNE)

MS Nursing Anesthesia	Council on Accreditation of Nurse Anesthesia Educational Programs (COA); Commission on Collegiate Nursing Education (CCNE)
Registered Nurse/BSN <sup>4</sup>	Commission on Collegiate Nursing Education (CCNE) and Massachusetts Board of Registration in Nursing <sup>2</sup>
DNP with Concentration in Nurse Anesthesia	Council on Accreditation of Nurse Anesthesia Educational Programs (COA); Commission on Collegiate Nursing Education (CCNE)
DNP (Post-Master's)	Commission on Collegiate Nursing Education (CCNE)
Post BS Doctor of Nursing Practice US Army Program in Anesthesia Nursing (USAGPAN)	Council on Accreditation of Nurse Anesthesia Educational Programs (COA); Commission on Collegiate Nursing Education (CCNE)
DPT in Physical Therapy	Commission on Accreditation of Physical Therapy Education (CAPTE)
MS and CAGS School Psychology	Massachusetts Department of Education (DOE) and National Association of School Psychologists (NASP)
AuD Audiology	Council on Academic Accreditation in Audiology and Speech-Language Pathology (CAA) of the American Speech-Language-Hearing Association (ASHA), Massachusetts Board of Elementary and Secondary Education <sup>1</sup>
MPH Master of Public Health	Council on Education for Public Health
PharmD	Accreditation Council for Pharmacy Education (ACPE)
PhD Counseling Psychology	American Psychological Association (APA)
PhD School Psychology	American Psychological Association (APA) and National Association of School Psychologists (NASP)
<b>College of Arts, Media and Design</b>	
Master of Architecture (Urban Architecture)	National Architectural Accreditation Board (NAAB)
<b>D'Amore-McKim School of Business</b>	
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 Engineering**

BS in Computer Engineering	Accredited by the Engineering Accreditation Commission of ABET, <a href="http://www.abet.org">http://www.abet.org</a>
BS in Chemical Engineering	Accredited by the Engineering Accreditation Commission of ABET, <a href="http://www.abet.org">http://www.abet.org</a>
BS in Civil Engineering	Accredited by the Engineering Accreditation Commission of ABET, <a href="http://www.abet.org">http://www.abet.org</a>
BS in Electrical Engineering	Accredited by the Engineering Accreditation Commission of ABET, <a href="http://www.abet.org">http://www.abet.org</a>
BS in Industrial Engineering	Accredited by the Engineering Accreditation Commission of ABET, <a href="http://www.abet.org">http://www.abet.org</a>
BS in Mechanical Engineering	Accredited by the Engineering Accreditation Commission of ABET, <a href="http://www.abet.org">http://www.abet.org</a>

**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 <sup>4</sup>	AACSB International—The Association to Advance Collegiate Schools of Business
BS in Management <sup>4</sup>	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
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<b>Education Programs in:</b>	
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
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 <sup>1</sup>
MS in Criminal Justice	Massachusetts Board of Education <sup>1</sup>
PhD in Criminal Justice	Massachusetts Board of Education <sup>1</sup>
Master of Public Administration	National Association of Schools of Public Affairs and Administration

**School of Law**

JD	American Bar Association; Association of American Law Schools <sup>5</sup>
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- <sup>1</sup> The Massachusetts Board of Education approves (not accredits) programs.
- <sup>2</sup> The Massachusetts Board of Registration in Nursing approves (not accredits) programs.
- <sup>3</sup> The North Carolina Board of Nursing approves (not accredits) programs.
- <sup>4</sup> Accredited under the aegis of the “sponsoring” full-time college.
- <sup>5</sup> 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 on the Online and Graduate Professional Degree Programs website (<http://www.northeastern.edu/online/about-northeastern-online/state-agreements.php>) for up-to-date, state-prescribed regulatory information applicable to all degree levels.

### General Information

The *Northeastern University Catalog* contains the university's primary statements about approved academic programs and degree requirements, as authorized by the president or the Board of Trustees.

The *Northeastern University Catalog* contains current information about the university calendar, admissions, degree requirements, fees, and regulations; however, such information is not intended and should not be regarded to be contractual.

**Accreditation.** Northeastern University is accredited by the New England Commission of Higher Education, Inc.

**Delivery of Services.** Northeastern University assumes no liability for delay or failure to provide educational or other services or facilities due to causes beyond its reasonable control. Causes include, without limitation, power failure, fire, strikes by university employees or others, damage by natural elements, and acts of public authorities. The university will, however, exert reasonable efforts, when it judges them to be appropriate, to provide comparable services, facilities, or performance; but its inability or failure to do so shall not subject the university to liability.

Northeastern University reserves the sole right to promulgate and change rules and regulations and to make changes of any nature in its program; calendar; admissions policies, procedures, and standards; degree requirements; fees; and academic schedule whenever necessary or desirable, including, without limitation, changes in course content and class schedule, the cancellation of scheduled classes and other academic activities, and the substitution of alternatives for scheduled classes and other academic activities. In any such case, the university will give whatever notice is reasonably practical.

Northeastern University will endeavor to make available to its students a fine education and a stimulating and congenial environment. However, the quality and rate of progress of an individual's academic career and professional advancement upon completion of a degree or program are largely dependent on his or her own abilities, commitment, and effort. In many professions and occupations, there are also requirements imposed by federal and state statutes and regulatory agencies for certification or entry into a particular field. These requirements may change while

a student is enrolled in a program and may vary from state to state or country to country. Although the university stands ready to help its students find out about requirements and changes in them, it is the student's responsibility to initiate the inquiry.

**Tuition Default Policy.** In cases where the student defaults on his or her tuition, the student shall be liable for the outstanding tuition and all reasonable associated collection costs incurred by the university, including attorneys' fees.

**Emergency Closing of the University.** Northeastern University posts emergency announcements, including news of weather-related closings, on its homepage (<http://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.

*Persistence Rates under the Student Right-to-Know Act.* In the fall of 2018, the persistence rate for undergraduate students who entered in the fall 2017 cohort was 96.6% percent.

*Mission Statement:*

To educate students for a life of fulfillment and accomplishment.  
To create and translate knowledge to meet global and societal needs.

## Resources

### Online Resources

The following online resources supplement this catalog:

**University events:**

<http://calendar.northeastern.edu/>

**Course descriptions:**

<https://registrar.northeastern.edu/article/catalog-2018-2019/> (<https://registrar.northeastern.edu/article/2018-2019-catalog-and-course-descriptions/>)

**Class schedules:**

<https://registrar.northeastern.edu/article/schedule-of-classes/>

**Academic calendars:**

[www.northeastern.edu/registrar/calendars.html](http://www.northeastern.edu/registrar/calendars.html) (<http://www.northeastern.edu/registrar/calendars.html>)

**Campus maps:**

[www.northeastern.edu/campusmap](http://www.northeastern.edu/campusmap) (<http://www.northeastern.edu/campusmap/>)

3-D Animation, Graduate Certificate .....	358	Applied Behavior Analysis, MS .....	249
Absenteeism .....	95	Applied Mathematics, MS .....	406
Academic Affairs Appeals Process .....	234	Applied Nutrition, MS .....	331
Academic Appeals Policies and Procedures .....	34	Applied Physics and Engineering, MS .....	156
Academic Appeals Procedures .....	379	Applied Physics and Engineering, MS .....	156
Academic Calendars .....	28	Applied Psychology .....	245
Academic Dismissal .....	236	Art + Design .....	53
Academic Integrity .....	95	Artificial Intelligence, MS .....	101
Academic Policies and Procedures .....	46	Arts Administration and Cultural Entrepreneurship, MS .....	62
Academic Policies and Procedures .....	95	Arts Administration, Graduate Certificate .....	66
Academic Policies and Procedures .....	121	Attendance Requirements .....	304
Academic Policies and Procedures .....	231	Attendance Verification .....	305
Academic Policies and Procedures .....	303	Awards .....	382
Academic Policies and Procedures .....	379	Background Checks .....	232
Academic Probation and Dismissal .....	96	Bill Payment .....	25
Academic Probation Policy .....	234	Bioengineering .....	124
Academic Progression .....	233	Bioengineering, MSBioE .....	129
Academic Progression Standards .....	308	Bioengineering, PhD .....	125
Academic Resources .....	16	Bioengineering, PhD—Advanced Entry .....	128
Academic Resources .....	304	Bioinformatics, Graduate Certificate .....	387
Academic Standards and Degree Requirements .....	122	Bioinformatics, MS .....	385
Accommodations for Students with Disabilities .....	310	Biology .....	384
Accounting and Financial Decision Making, Graduate Certificate .....	85	Biology, PhD .....	384
Accounting and Financial Decision Making—Online Program, Graduate Certificate .....	86	Biology, PhD—Advanced Entry .....	385
Accounting, MSA .....	70	Biomedical Sciences, MS .....	285
Active-Duty Military Personnel .....	307	Biomedical Sciences, PhD .....	277
Adult And Organizational Learning, Graduate Certificate .....	359	Biomedical Sciences, PhD—Advanced Entry .....	278
Adult-Gerontology Nurse Practitioner, Acute Care, CAGS .....	267	Biopharmaceutical Analytical Sciences, Graduate Certificate .....	244
Adult-Gerontology Nurse Practitioner, Acute Care, MS .....	270	Biopharmaceutical Analytical Sciences, Graduate Certificate .....	244
Adult-Gerontology Nurse Practitioner, Primary Care, CAGS .....	267	Biotechnology Enterprise, Graduate Certificate .....	393
Adult-Gerontology Nurse Practitioner, Primary Care, MS .....	270	Biotechnology, Graduate Certificate .....	393
Advanced Study in Orthopedics, Graduate Certificate .....	359	Biotechnology, MS .....	390
Advising .....	233	Blockchain and Smart Contract Engineering, Graduate Certificate .....	222
Agile Project Management, Graduate Certificate .....	359	Bouvé College of Health Sciences .....	231
Analytics, MPS .....	323	Broadband Wireless Systems, Graduate Certificate .....	223
Appendix .....	516	Business Administration, Graduate Certificate .....	86
Applied Behavior Analysis, CAGS .....	248	Business Administration—Online Program, Graduate Certificate .....	87
Applied Behavior Analysis, Graduate Certificate .....	251	Business Analytics, MS .....	68
		Business Law, Graduate Certificate .....	298

Campus Recreation .....	18	Computer Systems Engineering, Graduate Certificate .....	223
Campus Resources .....	18	Computer Systems Engineering with Concentration in Software Design Engineering, MSCSE .....	217
Center for Advancing Teaching and Learning Through Research .....	18	Construction Management, Graduate Certificate .....	361
Certificate Programs .....	85	Cooperative Education .....	32
Changes in Requirements .....	383	Cooperative Education Policies .....	381
Chemical Engineering .....	131	Corporate and Organizational Communication, MS .....	333
Chemical Engineering, MSCHE .....	135	Corporate Finance, Graduate Certificate .....	88
Chemical Engineering, PhD .....	132	Corporate Finance—Online Program, Graduate Certificate .....	88
Chemical Engineering, PhD—Advanced Entry .....	133	Corporate Renewal, Graduate Certificate .....	89
Chemistry and Chemical Biology .....	388	Corporate Renewal—Online Program, Graduate Certificate .....	89
Chemistry, MS .....	392	Counseling Psychology, CAGS .....	248
Chemistry, PhD .....	389	Counseling Psychology, MSCP .....	249
Chemistry, PhD—Advanced Entry .....	389	Counseling Psychology, PhD .....	246
Civil and Environmental Engineering .....	137	Course Credit Guidelines .....	32
Civil Engineering, PhD .....	138	Course Registration .....	121
Civil Engineering, PhD—Advanced Entry .....	139	Course Registration .....	382
Civil Engineering with Concentration in Construction Management, MSCivE .....	144	Course Substitution .....	233
Civil Engineering with Concentration in Geotechnical/Geoenvironmental Engineering, MSCivE .....	146	Creative Practice Leadership, MS .....	63
Civil Engineering with Concentration in Structures Engineering, MSCivE .....	147	Criminal Justice, MS .....	335
Civil Engineering with Concentration in Transportation, MSCivE .....	148	Criminology and Criminal Justice, MS .....	424
Civil Engineering with Concentration in Water, Environmental, and Coastal Systems, MSCivE .....	143	Criminology and Justice Policy, PhD .....	423
Cloud Computing Application and Management, Graduate Certificate .....	360	Criminology and Justice Policy, PhD—Advanced Entry .....	423
Code of Student Conduct .....	34	Cross-Cultural Communication, Graduate Certificate .....	361
College Expenses .....	22	Cultural Entrepreneurship, Graduate Certificate .....	67
College of Arts, Media and Design .....	46	Cyber-Physical Systems, MS .....	219
College of Engineering .....	121	Cybersecurity .....	106
College of Professional Studies .....	303	Cybersecurity, Graduate Certificate .....	110
College of Science .....	379	Cybersecurity, MS .....	109
College of Social Sciences and Humanities .....	422	Cybersecurity, PhD .....	107
Collegiate Athletics Administration, Graduate Certificate .....	360	Cybersecurity, PhD—Advanced Entry .....	108
Commerce and Economic Development, MS .....	332	D'Amore-McKim School of Business .....	68
Communication Sciences and Disorders .....	251	Data Analytics Engineering, Graduate Certificate .....	212
Completing Degree Requirements .....	309	Data Analytics Engineering, MS .....	188
Computer Engineering, PhD .....	152	Data Analytics, Graduate Certificate .....	106
Computer Engineering, PhD—Advanced Entry .....	153	Data Analytics, Graduate Certificate .....	106
Computer Industry Writing, Graduate Certificate .....	361	Data Analytics, Graduate Certificate .....	106
Computer Science .....	96	Data Architecture and Management, MS .....	220
Computer Science, Graduate Certificate .....	106	Data Science, MS .....	101
Computer Science, PhD .....	97	Data Science, MS .....	101
Computer Science, PhD—Advanced Entry .....	100	Data Science, MS .....	101
		Degrees, Majors, and Concentrations .....	309
		Digital Humanities, Graduate Certificate .....	435

Digital Humanities, Graduate Certificate .....	435	Engineering and Public Policy with Concentration in Energy & Environment, MS .....	140
Digital Media Management, Graduate Certificate .....	362	Engineering and Public Policy with Concentration in Infrastructure Resilience, MS .....	142
Digital Media, MPS .....	324	Engineering and Public Policy with Concentration in Infrastructure Resilience, MS .....	142
Digital Media, MPS—Connect .....	326	Engineering and Public Policy with Concentration in Infrastructure Resilience, MS .....	142
Digital Video, Graduate Certificate .....	362	Engineering Business, Graduate Certificate .....	213
Disability Resource Center .....	19	Engineering Economic Decision Making, Graduate Certificate .....	214
Doctoral Degree Programs .....	311	Engineering Leadership, Graduate Certificate .....	225
Domestic Biopharmaceutical Regulatory Affairs, Graduate Certificate .....	362	Engineering Management, Graduate Certificate .....	214
Dual Degrees .....	82	Engineering Management, MSEM .....	196
Early Intervention, Graduate Certificate .....	244	English .....	432
Early Intervention, Graduate Certificate .....	244	English, MA .....	434
Economics .....	427	English, PhD .....	432
Economics, MS .....	431	English, PhD—Advanced Entry .....	433
Economics, PhD .....	428	Enterprise Intelligence, MPS .....	328
Economics, PhD—Advanced Entry .....	429	Environmental Engineering, MSENVE .....	149
Education, EDD .....	311	Environmental Science and Policy, MS .....	399
Education, MEd .....	321	Environmental Science and Policy, MS .....	399
eLearning and Instructional Design, Graduate Certificate .....	363	Environmental Science and Policy, MS .....	399
Electrical and Computer Engineering .....	151	Exercise Science for Clinicians, Graduate Certificate .....	262
Electrical and Computer Engineering Leadership, MSECCEL .....	176	Exercise Science with Concentration in Physical Activity and Public Health, MS .....	256
Electrical and Computer Engineering with Concentration in Communications, Control, and Signal Processing, MSECE .....	160	Experience Design, Graduate Certificate .....	58
Electrical and Computer Engineering with Concentration in Computer Networks and Security, MSECE .....	165	Experience Design, MFA .....	54
Electrical and Computer Engineering with Concentration in Computer Systems and Software, MSECE .....	162	Experience Design, MS .....	56
Electrical and Computer Engineering with Concentration in Computer Vision, Machine Learning, and Algorithms, MSECE .....	167	Experiential PhD Leadership, Graduate Certificate .....	45
Electrical and Computer Engineering with Concentration in Electromagnetics, Plasma, and Optics, MSECE .....	169	Experiential Teaching and Learning, Graduate Certificate .....	363
Electrical and Computer Engineering with Concentration in Microsystems, Materials, and Devices, MSECE .....	172	Experimental Biotechnology, Graduate Certificate .....	394
Electrical and Computer Engineering with Concentration in Power Systems, MSECE .....	174	Faculty .....	476
Electrical Engineering, PhD .....	154	Family Educational Rights and Privacy Act (FERPA) .....	33
Electrical Engineering, PhD—Advanced Entry .....	155	Family Nurse Practitioner, Primary Care, MS .....	271
Emergency Management, Graduate Certificate .....	363	Final Examinations and Related Policies on Other Exams .....	33
Employer Engagement and Career Design .....	19	Finance, MSF .....	71
Energy Systems, Graduate Certificate .....	213	Finance—Evening/Part-Time Program, MSF .....	71
Energy Systems Management, Graduate Certificate .....	213	Finance—Online Program, MSF .....	72
Energy Systems, MSENES .....	199	Financial Aid Assistance .....	23
Energy Systems, MSENES-Academic Link Program .....	201	Financial Awards .....	236
Engineering and Public Policy with Concentration in Energy & Environment, MS .....	140	Financial Markets And Institutions, Graduate Certificate .....	364
Engineering and Public Policy with Concentration in Energy & Environment, MS .....	140	Forensic Accounting, Graduate Certificate .....	364
		Full-Time Status .....	306

Game Analytics, Graduate Certificate .....	59	Health Informatics .....	110
Game Design, Graduate Certificate .....	364	Health Informatics Management and Exchange, Graduate Certificate ..	244
Game Science and Design, MS .....	57	Health Informatics Management and Exchange, Graduate Certificate ..	244
Game Science and Design, MS .....	57	Health Informatics, MS .....	114
General Admission and Transfer Credit .....	10	Health Informatics, MS .....	114
General Information .....	46	Health Informatics, MS .....	114
General Information .....	520	Health Informatics Privacy and Security, Graduate Certificate .....	245
General Regulations .....	36	Health Informatics Privacy and Security, Graduate Certificate .....	245
General Regulations and Requirements for Graduate Certificate Programs .....	11	Health Informatics Software Engineering, Graduate Certificate .....	245
General Regulations and Requirements for Interdisciplinary Graduate Degrees .....	13	Health Informatics Software Engineering, Graduate Certificate .....	245
General Regulations and Requirements for Professional Doctorate Degree Programs .....	11	Health Law, Graduate Certificate .....	299
General Regulations and Requirements for the Certificate of Advanced Graduate Study .....	12	Health Management, Graduate Certificate .....	366
General Regulations and Requirements for the Master's Degree .....	11	Health Sciences .....	253
Geographic Information Systems, Graduate Certificate .....	365	Healthcare Administration and Policy, Graduate Certificate .....	89
Geospatial Services, MPS .....	329	Healthcare Compliance, Graduate Certificate .....	300
Global Partnership Programs .....	310	Higher Education Administration, Graduate Certificate .....	366
Global Student Mobility, Graduate Certificate .....	365	Higher Education Administration, MEd .....	323
Global Studies And International Relations, Graduate Certificate .....	365	History .....	435
Global Studies and International Relations, MS .....	338	History, MA .....	437
Gordon Institute of Engineering Leadership .....	224	History, PhD .....	436
Governing Boards and Officers of Northeastern .....	516	History, PhD—Advanced Entry .....	436
Grading Policies .....	381	Homeland Security, MA .....	317
Graduate .....	9	Human Factors, MS .....	191
Graduate Campus .....	311	Human Movement and Rehabilitation Sciences, PhD .....	291
Graduate Certificate Programs .....	358	Human Resources Law, Graduate Certificate .....	300
Graduate Certificate Programs .....	420	Human Resources Management, Graduate Certificate .....	367
Graduate School of Engineering Certificates .....	230	Human Resources Management, MS .....	336
Graduate Schools Academic Policies .....	27	Human-Centered Informatics, Graduate Certificate .....	367
Graduate Student Classification .....	47	Husky Card Services .....	19
Graduate Student Government .....	19	Industrial Engineering, MSIE .....	194
Graduation Policies .....	236	Industrial Engineering, PhD .....	178
Graduation Requirements .....	33	Industrial Engineering, PhD—Advanced Entry .....	180
Graduation Requirements .....	310	Informatics, MPS .....	330
Health Certification .....	231	Information Design and Visualization, Graduate Certificate .....	59
Health Data Analytics, MS .....	102	Information Design and Visualization, MFA .....	55
Health Data Analytics, MS .....	102	Information Design and Visualization, MS .....	56
Health Data Analytics, MS .....	102	Information Ethics, Graduate Certificate .....	474
Health Data Analytics, MS .....	102	Information for Entering Students .....	15
Health Data Analytics, MS .....	102	Information for International Students .....	15
Health Data Analytics, MS .....	102	Information Security Management, Graduate Certificate .....	367
Health Data Analytics, MS .....	102	Information Systems, MSIS .....	218
		Information Technology Services .....	17

Innovation Management, Graduate Certificate .....	90	Manufacturing and Quality Operations in Biotechnology, Graduate Certificate .....	394
Innovation, MS .....	69	Marine and Environmental Sciences .....	396
Intellectual Property Law, Graduate Certificate .....	301	Marine and Environmental Sciences, PhD .....	396
Interactive Design, Graduate Certificate .....	368	Marine and Environmental Sciences, PhD—Advanced Entry .....	398
Interdisciplinary .....	115	Marine Biology, MS—Three Seas Program .....	401
Interdisciplinary .....	237	Marketing, Graduate Certificate .....	92
Interdisciplinary .....	417	Marketing—Online Program, Graduate Certificate .....	92
Interdisciplinary .....	467	Master of Architecture—One-Year Program .....	48
Interdisciplinary Engineering, PhD .....	226	Master of Architecture—Three-Year Program .....	50
Interdisciplinary PhD Programs .....	226	Master of Architecture—Three-Year Program—Advanced Degree Entrance .....	51
Interdisciplinary Professional Studies, Graduate Certificate .....	368	Master of Architecture—Two-Year Program .....	49
Interdisciplinary Programs .....	62	Master of Business Administration .....	74
International Affairs, MA .....	450	Master of Design for Sustainable Urban Environments—One-Year Program .....	52
International Biopharmaceutical Regulatory Affairs, Graduate Certificate .....	369	Master of Design for Sustainable Urban Environments—Two-Year Program .....	52
International Business, Graduate Certificate .....	90	Master of Science .....	68
International Business, MSIB .....	73	Master's Degree Admission Requirements .....	303
International Business—Online Program, Graduate Certificate .....	91	Master's Degree Policies .....	46
International Management, MS .....	69	Master's Degree Programs .....	316
Investments, Graduate Certificate .....	91	Mathematics .....	401
IP Telephony Systems, Graduate Certificate .....	223	Mathematics, MS .....	407
John A. and Marcia E. Curry Student Center .....	20	Mathematics, PhD .....	402
Journalism, MA .....	60	Mathematics, PhD—Advanced Entry .....	404
Khoury College of Computer Sciences .....	95	MBA—Full-Time Program .....	74
Law and Policy, DLP .....	314	MBA—Online Program .....	80
Law and Public Health, JD/MPH .....	241	MBA—Part-Time Program .....	77
Law and Public Policy, JD/MS .....	463	Mechanical and Industrial Engineering .....	177
Law, Criminology and Criminal Justice, JD/MS .....	427	Mechanical Engineering, PhD .....	183
Law, Criminology and Justice Policy, JD/PhD .....	425	Mechanical Engineering, PhD—Advanced Entry .....	185
Law, Criminology and Justice Policy, JD/PhD—Advanced Entry .....	426	Mechanical Engineering with Concentration in General Mechanical Engineering, MSME .....	202
Leadership and Human Capital, Graduate Certificate .....	92	Mechanical Engineering with Concentration in Materials Science, MSME .....	203
Leadership, Graduate Certificate .....	370	Mechanical Engineering with Concentration in Mechanics and Design, MSME .....	205
Leadership, MS .....	339	Mechanical Engineering with Concentration in Mechatronics, MSME ..	207
Leading and Managing Technical Projects, Graduate Certificate .....	370	Mechanical Engineering with Concentration in Thermofluids, MSME ..	208
Lean Six Sigma, Graduate Certificate .....	215	Media Advocacy, MS .....	61
Learning Analytics, Graduate Certificate .....	371	Media Advocacy, MS .....	61
Legal Studies, MLS—Online .....	296	Medical Devices Regulatory Affairs, Graduate Certificate .....	371
Liability Insurance .....	233	Medicinal Chemistry, MS .....	286
Libraries .....	16	Medicinal Chemistry, PhD .....	278
Living in Boston .....	15		

Medicinal Chemistry, PhD—Advanced Entry .....	279	Personal Information .....	311
Molecular Biotechnology, Graduate Certificate .....	394	Personal Professional Enrichment (PPE) .....	304
MSA/MBA—Accounting and Business Administration .....	82	Pharmaceutical Sciences, MS .....	286
MSCS—Master of Science in Computer Science .....	103	Pharmaceutical Sciences, PhD .....	279
MSCS—Master of Science in Computer Science—ALIGN Program .....	105	Pharmaceutical Sciences, PhD—Advanced Entry .....	280
MSF/MBA—Finance and Business Administration—Online .....	84	Pharmaceutical Technologies, Graduate Certificate .....	394
MSF/MBA—Finance and Business Administration—Part-Time .....	83	Pharmacology, MS .....	287
Multidisciplinary Programs .....	216	Pharmacology, PhD .....	280
Mutual Fund Management, Graduate Certificate .....	93	Pharmacology, PhD—Advanced Entry .....	281
		Pharmacy and Public Health, PharmD/MPH .....	258
Nanomedicine, Graduate Certificate .....	414	Pharmacy and Public Health, PharmD/MPH .....	258
Neonatal Nurse Practitioner, CAGS .....	268	Pharmacy, PharmD .....	281
Neonatal Nurse Practitioner, MS .....	271	Pharmacy, PharmD—Direct Entry .....	281
Network Science, PhD .....	227	PhD Programs .....	44
Network Science, PhD .....	227	Physical Therapy, DPT .....	315
Network Science, PhD .....	227	Physical Therapy, DPT—Direct Entry .....	315
New Student Orientation (On-Ground and Online) .....	304	Physical Therapy, Movement, and Rehabilitation Sciences .....	289
Nonclinical Biomedical Product Regulation, Graduate Certificate .....	372	Physical Therapy—Postbaccalaureate Entry .....	289
Nonprofit Management, Graduate Certificate .....	372	Physician Assistant .....	292
Nonprofit Management, MS .....	341	Physician Assistant and Nurse Practitioner Leadership and Management, Graduate Certificate .....	295
Nonprofit Sector, Philanthropy, and Social Change, Graduate Certificate .....	461	Physician Assistant Studies and Health Informatics, MS/MS .....	242
Northeastern University Bookstore .....	20	Physician Assistant Studies and Health Informatics, MS/MS .....	242
Nursing Informatics, Graduate Certificate .....	276	Physician Assistant Studies and Public Health, MS/MPH .....	259
Nursing, PhD (Post-BSN) .....	264	Physician Assistant Studies and Public Health, MS/MPH .....	259
Nursing, PhD—Advanced Entry (Post-MSN) .....	265	Physician Assistant Studies, MS .....	292
Nursing Practice, DNP (Post-Masters) .....	266	Physics .....	408
Nursing Practice with Concentration in Nurse Anesthesia, DNP .....	266	Physics, MS .....	413
Nursing—Direct Entry, MS .....	273	Physics, PhD .....	408
		Physics, PhD—Advanced Entry .....	411
Occupational Ergonomics and Health, Graduate Certificate .....	292	Political Science .....	438
Office of the Registrar .....	17	Political Science, MA .....	441
Operations Research, MSOR .....	210	Political Science, PhD .....	439
Operations Research, MSOR .....	407	Political Science, PhD—Advanced Entry .....	440
Organizational Communication, Graduate Certificate .....	373	Population Health, PhD .....	229
		Population Health, PhD .....	229
Parking .....	20	Port Security, Graduate Certificate .....	373
Pediatric Nurse Practitioner, Acute and Primary Care, CAGS .....	269	Process Safety Engineering, Graduate Certificate .....	137
Pediatric Nurse Practitioner, Acute and Primary Care, MS .....	272	Process Science, Graduate Certificate .....	395
Pediatric Nurse Practitioner, Acute Care, CAGS .....	268	Professional Sports Administration, Graduate Certificate .....	373
Pediatric Nurse Practitioner, Primary Care, CAGS .....	269	Program And Portfolio Management, Graduate Certificate .....	374
Pediatric Nurse Practitioner, Primary Care, MS .....	272	Program and Portfolio Project Management, MS .....	342
Personal Health Informatics, PhD .....	111	Project Business Analysis, Graduate Certificate .....	374
Personal Health Informatics, PhD .....	111	Project Management, Graduate Certificate .....	374

Project Management, MS .....	343	Regulatory Affairs of Food and Food Industries, MS .....	354
Psychiatric Mental Health Nurse Practitioner, CAGS .....	268	Regulatory Science, Graduate Certificate .....	395
Psychiatric Mental Health Nurse Practitioner, MS .....	273	Reinstatement after Academic Dismissal .....	309
Psychology .....	415	Remote Sensing, Graduate Certificate .....	376
Psychology, PhD .....	415	Renewable Energy, Graduate Certificate .....	215
Psychology, PhD—Advanced Entry .....	416	Requirements for Clinical, Internships, and Practicum Courses .....	231
Public Administration, MPA .....	443	Resources .....	521
Public Administration, MPA .....	443	Respiratory Care Leadership, MS .....	355
Public and Media Relations, Graduate Certificate .....	375	Respiratory Specialty Practice, Graduate Certificate .....	376
Public Health and Exercise Science with Concentration in Physical Activity and Public Health, MPH/MS .....	260	Robotics, MS .....	103
Public Health and Health Informatics, MPH/MS .....	243	Robotics, MS .....	118
Public Health and Health Informatics, MPH/MS .....	243	Robotics, MS .....	118
Public Health, MPH .....	255	Robotics, MS .....	118
Public History, Graduate Certificate .....	438	Satisfactory Progress .....	382
Public Policy Analysis, Graduate Certificate .....	461	School of Architecture .....	47
Public Policy, MPP .....	452	School of Criminology and Criminal Justice .....	422
Public Policy, PhD .....	447	School of Journalism .....	60
Public Policy, PhD—Advanced Entry .....	449	School of Law .....	296
Public Safety .....	20	School of Nursing .....	263
Quality Assurance in Biomedical Product Regulation, Graduate Certificate .....	375	School of Pharmacy .....	277
Quantitative Finance, MSF .....	72	School of Public Policy and Urban Affairs .....	446
Readmission to Program .....	306	School Psychology, MS/CAGS .....	250
Reenrollment Policy for Full-time Students .....	123	School Psychology, PhD .....	247
Reentry to Program .....	305	Security and Resilience Studies, Graduate Certificate .....	446
Registration and Taking Courses .....	307	Security and Resilience Studies, MS .....	444
Regulations Applying only to Doctor of Philosophy (PhD) Programs .....	12	Seeking more than One Certificate or Degree .....	309
Regulations Applying to All Degree Programs .....	10	Social Media And Online Communities, Graduate Certificate .....	377
Regulatory Affairs for Drugs, Biologics, and Medical Devices with Concentration in Clinical Research Regulatory Affairs, MS .....	346	Sociology .....	464
Regulatory Affairs for Drugs, Biologics, and Medical Devices with Concentration in General Regulatory Affairs, MS .....	347	Sociology, PhD .....	464
Regulatory Affairs for Drugs, Biologics, and Medical Devices with Concentration in International Regulatory Affairs, MS .....	348	Sociology, PhD—Advanced Entry .....	466
Regulatory Affairs for Drugs, Biologics, and Medical Devices with Concentration in Medical Devices, MS .....	349	Special Student Status .....	304
Regulatory Affairs for Drugs, Biologics, and Medical Devices with Concentration in Non-Clinical Biomedical Product Regulation, MS .....	350	Speech-Language Pathology, MS .....	252
Regulatory Affairs for Drugs, Biologics, and Medical Devices with Concentration in Operational Regulatory Affairs, MS .....	351	Sports Leadership, MSLD .....	357
Regulatory Affairs for Drugs, Biologics, and Medical Devices with Concentration in Quality Assurance and Compliance, MS .....	352	Statements of Accreditation and State Authorization .....	518
Regulatory Affairs for Drugs, Biologics, and Medical Devices with Concentration in Strategic Regulatory Affairs, MS .....	353	Strategic Intelligence and Analysis, MA .....	318
		Student Evaluation of Courses (EvaluationKit) .....	308
		Student Records, Transcripts, and Related Policies .....	29
		Student Refunds .....	23
		Student Right-to-Know Act .....	34
		Student's Academic Standing .....	234
		Students' Bill of Academic Rights and Responsibilities .....	42
		Supply Chain Engineering Management, Graduate Certificate .....	216



Supply Chain Management, Graduate Certificate .....	93
Supply Chain Management—Online Program, Graduate Certificate .....	94
Sustainable Building Systems, MSSBS .....	150
Sustainable Energy Systems, Graduate Certificate .....	215
Taxation, MST .....	73
Taxation—Online Program, MST .....	74
Teaching, Elementary Licensure, MAT .....	319
Teaching English To Speakers Of Other Languages, Graduate Certificate .....	377
Teaching, Secondary Licensure, MAT .....	320
Technical Communication, MS .....	356
Technological Entrepreneurship, Graduate Certificate .....	94
Technological Entrepreneurship, MS .....	70
Technology Systems Management, Graduate Certificate .....	216
Telecommunication Networks, MS .....	221
The Doctor of Philosophy Degree (PhD) .....	383
The Master's Degree Academic Requirements .....	383
Time Limitation .....	382
Transfer Credit .....	382
Transfer Credit Policies .....	303
Transfer of Credit .....	96
Transfer of Credit .....	233
Tuition and Fees .....	22
University Health and Counseling Services .....	21
University Leadership .....	516
University-Wide Academic Policies and Procedures .....	27
Urban Analytics, Graduate Certificate .....	462
Urban Informatics, MS .....	453
Urban Planning and Policy, MS .....	64
Urban Planning and Policy, MS .....	64
Urban Studies, Graduate Certificate .....	463
Usability, Graduate Certificate .....	377
We Care .....	21
Women's, Gender, and Sexuality Studies, Graduate Certificate .....	474