Electrical and Computer Engineering with Concentration in Hardware and Software for Machine Intelligence, MSECE (Boston)

The master's degree program in electrical and computer engineering offers in-depth coursework 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

Students cannot take excluded courses as part of the MSECE program and may 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, DAMG, INFO, 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 (https://catalog.northeastern.edu/graduate/ engineering/graduate-certificate-programs/).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Electrical and Computer Engineering with Concentration in Hardware and Software for Machine Intelligence with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Electrical and Computer Engineering with Concentration in Hardware and Software for Machine Intelligence in addition to earning a Graduate Certificate in Engineering Leadership (https://catalog.northeastern.edu/graduate/engineering/ multidisciplinary/engineering-leadership-graduate-certificate/). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 40-semester-hour degree and certificate will require 24 semester hours of advisor-approved hardware and software for machine intelligence technical courses. For students who concurrently enroll in the Graduate Certificate in Engineering Leadership, 8 semester hours of the certificate project may be applied to this program's thesis requirements.

GALANTE ENGINEERING BUSINESS PROGRAM

Master's Degree in Electrical and Computer Engineering with Graduate Certificate in Engineering Business

Students may complete a Graduate Certificate in Engineering Business in addition to a Master of Science in Electrical and Computer Engineering with a Concentration in Hardware and Software for Machine Intelligence. Students must apply and be admitted to the Galante Engineering Business Program (https://nam12.safelinks.protection.outlook.com/? url=https%3A%2F%2Fgalante.sites.northeastern.edu%2F&data=05%7C02%7Cp.krafka%40northeastern.edu %7C869786b563fc4a47d3f108dd1a14fefe%7Ca8eec281aaa34daeac9b9a398b9215e7%7C0%7C0%7C638695399708426107%7CUnknown %7CTWFpbGZsb3d8eyJFbXB0eU1hcGkOnRydWUsIlYiOiIwLjAuMDAwMCIsIlAiOiJXaW4zMiIsIkFOIjoiTWFpbCIsIldUljoyfQ%3D%3D%7C0%7C%7C %7C&sdata=XtG563pylBB6%2BaE0O0VogeSIrFYCBqqGfO8r13hR1RU%3D&reserved=0) 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 or another accredited university/ college within the United States. Students must fulfill all academic requirements for the MSECE program in their concentration and may use some of their credits toward both the MS degree and the certificate. The certificate coursework, along with participation in cocurricular professional development elements, earns the Graduate Certificate in Engineering Business (https://catalog.northeastern.edu/graduate/engineering/mechanical-industrial/engineering-business-graduate-certificate/). Students may **double count** up to 16 credits of their MSECE courses toward the Galante Graduate Certificate in Engineering Business. Additionally, students are allowed to take up to 8 credit hours from the Galante Catalog (https:// catalog.northeastern.edu/graduate/engineering/mechanical-industrial/engineering-business-graduate-certificate/#programrequirementstext) as part of their coursework.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Fundamental Courses

Code	Title	Hours
Complete at least 8 semester hours from the following:		8
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7205	Fundamentals of Computer Engineering	
EECE 7352	Computer Architecture	
EECE 7353	VLSI Design	

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
A maximum of three courses may be taken outside of the electrical and computer engineering EECE subject code.		
Concentration Courses		
Complete 16 semester hours from the concentration course list below. Any fundamental course not used to meet the fundamental course requirement can be used toward the concentration course requirement.		16
Electives		
Complete 8 semester hours from either concentration courses or from other concentrations.		8

THESIS OPTION

Code	Title	Hours
A maximum of three courses may be taken outside of electrical and computer engineering.		
Thesis		
EECE 7945	Master's Project	4
EECE 7990	Thesis	4
In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.		
Concentration Courses		
Complete 8 semester hours from the concentration course list below. Any fundamental course not used to meet the fundamental course requirement can be used toward the concentration course requirement.		8
Electives		
Complete 8 semester hours from either concentration courses or from other concentrations.		8

Optional Co-op Experience

Code	Title	Hours
Complete the following (students must complete ENCP 6100 to qualify for co-op experience):		
ENCP 6100	Introduction to Cooperative Education	
ENCP 6964	Co-op Work Experience	
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Course Lists

CONCENTRATION COURSES

Code	Title	Hours
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5335	Robotic Science and Systems	
CS 7340	Theory and Methods in Human Computer Interaction	
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	
EECE 5614	Reinforcement Learning and Decision Making Under Uncertainty	
EECE 5639	Computer Vision	
EECE 5640	High-Performance Computing	
EECE 5641	Introduction to Software Security (*Students taking EECE 5641 can't receive credit for CY 5770)	
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 5698	Special Topics in Electrical and Computer Engineering (Formal Methods for Dynamical Systems)	

EECE 5698	Special Topics in Electrical and Computer Engineering (Visual Sensing & Computing Co-Design Edge Machine Perception)
EECE 5699	Computer Hardware and System Security
EECE 6400	Special Problems in Electrical and Computer Engineering (*For MSECE and PhD-BS students only)
EECE 7150	Autonomous Field Robotics
EECE 7204	Applied Probability and Stochastic Processes
EECE 7205	Fundamentals of Computer Engineering
EECE 7215	Introduction to Distributed Intelligence
EECE 7323	Numerical Optimization Methods
EECE 7337	Information Theory
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization
EECE 7346	Probabilistic System Modeling and Analysis
EECE 7352	Computer Architecture
EECE 7353	VLSI Design
EECE 7368	High-Level Design of Hardware-Software Systems
EECE 7370	Advanced Computer Vision
EECE 7390	Computer Hardware Security
EECE 7393	Analysis and Design of Data Networks
EECE 7397	Advanced Machine Learning
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advances in Deep Learning)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Deep Learning Embedded Systems)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Flexible Robotics)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Human Centered Computing)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Large Language Model Based Dialogue Agent)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Legged Robotics)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Machine Learning with Small Data)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Verifiable Machine Learning)
EECE 7400	Advanced Special Problems in Electrical and Computer Engineering (*For PhD-AE students only)
IE 5360	Digital Manufacturing
MATH 7233	Graph Theory
PHIL 5010	AI Ethics

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, DAMG, INFO, TELE		
The following CS courses may not count toward any concentration within the MSECE program:		
CS 5010	Programming Design Paradigm	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5520	Mobile Application Development	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 5800	Algorithms	

CS 6140	Machine Learning
CS 6350	Empirical Research Methods

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)
Minimum 3.000 GPA required