

***Electrical and Computer Engineering with Concentration in Computer Vision, Machine Learning, and Algorithms, MSECE (Boston)***

For program contact information, please visit this website (<https://ece.northeastern.edu/academics/graduate-studies/ms-elee/>).

The master's degree program in electrical and computer engineering offers in-depth 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 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 (<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 computer vision, machine learning, and algorithms 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 Computer Vision, Machine Learning, and Algorithms. 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%7C869786b563fc4a47d3f108dd1a14fefc%7Caeecc281aaa34daeac9b9a398b9215e7%7C0%7C0%7C638695399708426107%7CUnknown%7CTWFPgbGZsb3d8eyJFbXB0eU1hcGkiOnRydWUsIlYiOiIwLjAuMDAwMCIlIAiOiJXaW4zMilskFOljoitWFpbClslldUljoyQ%3D%3D%7C0%7C%7C%7C&sdata=XtG563pylBB6%2BaEOO0VogeSlrFYCBqqGfO8r13hR1RU%3D&reserved=0) (<https://nam12.safelinks.protection.outlook.com/?url=https%3A%2F%2Fgalante.sites.northeastern.edu%2F&data=05%7C02%7Cp.krafka%40northeastern.edu%7C869786b563fc4a47d3f108dd1a14fefc%7Caeecc281aaa34daeac9b9a398b9215e7%7C0%7C0%7C638695399708426107%7CUnknown%7CTWFPgbGZsb3d8eyJFbXB0eU1hcGkiOnRydWUsIlYiOiIwLjAuMDAwMCIlIAiOiJXaW4zMilskFOljoitWFpbClslldUljoyQ%3D%3D%7C0%7C%7C%7C&sdata=XtG563pylBB6%2BaEOO0VogeSlrFYCBqqGfO8r13hR1RU%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/) (<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) (<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 5554	Robotics Sensing and Navigation	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	

EECE 7205	Fundamentals of Computer Engineering
EECE 7352	Computer Architecture

## Options

Complete one of the following options:

### COURSEWORK OPTION

Code	Title	Hours
<b>Concentration Courses</b>		
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
<b>Electives</b>		
Complete 8 semester hours from either concentration courses or from other concentrations.		8

### THESIS OPTION

Code	Title	Hours
<b>Thesis</b>		
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.		
<b>Concentration Courses</b>		
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
<b>Electives</b>		
Complete 8 semester hours from either concentration courses or from other concentrations.		8

## Option 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

A maximum of three courses may be taken outside of electrical and computer engineering.

### CONCENTRATION COURSES

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 7800	Advanced Algorithms	
DS 5110	Essentials of Data Science	
DS 5983	Topics in Data Science	
EECE 5360	Combinatorial Optimization	
EECE 5550	Mobile Robotics	
EECE 5554	Robotics Sensing and Navigation	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	
EECE 5614	Reinforcement Learning and Decision Making Under Uncertainty	
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 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 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 7223	Riemannian Optimization
EECE 7311	Two Dimensional Signal and Image Processing
EECE 7315	Digital Image Processing
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 7370	Advanced Computer Vision
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 for Embedded Systems)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Distributed Intelligence)
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 Agents)
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 (Security in Large-Scale Learning-Enabled Systems)
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)
MATH 7233	Graph Theory

**EXCLUDED COURSES FOR ALL MSECE CONCENTRATIONS**

Please see your college administrator for more information.

Code	Title	Hours
Courses from the following subject areas may not count toward any concentration within the MSECE program:		
CSYE, 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