

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 (<http://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. 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 (<http://catalog.northeastern.edu/graduate/engineering/leadership/engineering-leadership-graduate-certificate/#text>)

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
Depth Courses		
Complete 20 semester hours from the depth course list below. (p. 1)		20
Breadth Courses		

Complete 8 semester hours from the breadth course list below or other EECE courses chosen in consultation with a faculty advisor. (p. 2)	8
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Note: Depth courses cannot be taken for breadth.

Elective

Complete 4 semester hours of either depth or breadth courses.	4
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THESIS OPTION

Code	Title	Hours
Thesis		
EECE 7990	Thesis	8

Depth Courses

Complete 12 semester hours from the depth course list below. (p. 1)	12
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Breadth Courses

Complete 4 semester hours from the breadth course list below or other EECE courses chosen in consultation with a faculty advisor. (p. 2)	4
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Note: Depth courses cannot be taken for breadth.

Elective

Complete 8 additional semester hours from either depth or breadth courses.	8
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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 5698	Special Topics in Electrical and Computer Engineering (Networks: Technology, Economics, Social Interactions)
EECE 7400	Special Problems in Electrical and Computer Engineering	EECE 5698	Special Topics in Electrical and Computer Engineering (Hardware and System Security)
CS 5100	Foundations of Artificial Intelligence	EECE 5698	Special Topics in Electrical and Computer Engineering (Advanced Network Management)
CS 6110	Knowledge-Based Systems	EECE 5698	Special Topics in Electrical and Computer Engineering (Electromagnetic Devices)
CS 6200	Information Retrieval	EECE 7105	Optics for Engineers
CS 6220	Data Mining Techniques	EECE 7200	Linear Systems Analysis
CS 7800	Advanced Algorithms	EECE 7201	Solid State Devices
MATH 7233	Graph Theory	EECE 7202	Electromagnetic Theory 1
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 7203	Complex Variable Theory and Differential Equations
EECE 5115	Dynamical Systems in Biological Engineering	EECE 7211	Nonlinear Control
EECE 5161	Thin Film Technologies (Thin Film Technologies -- former special topics course)	EECE 7213	System Identification and Adaptive Control
EECE 5170	Introduction to Multiferroics Materials and Systems	EECE 7214	Optimal and Robust Control
EECE 5552	Assistive Robotics	EECE 7224	Power Systems State Estimation
EECE 5576	Wireless Communication Systems	EECE 7226	Modeling and Simulation of Power System Transients
EECE 5580	Classical Control Systems	EECE 7228	Advanced Power Electronics (Advanced Power Electronics -- former special topics course)
EECE 5606	Micro- and Nanofabrication	EECE 7237	Special Topics in Power Electronics
EECE 5610	Digital Control Systems	EECE 7240 and EECE 7248	Analog Integrated Circuit Design and Lab for EECE 7240
EECE 5627	Arithmetic and Circuit Design for Inexact Computing with Nanoscaled CMOS	EECE 7242	Integrated Circuits for Mixed Signals and Data Communication
EECE 5638	Compilers for Modern Computer Architectures	EECE 7244	Introduction to Microelectromechanical Systems (MEMS)
EECE 5641	Introduction to Software Security	EECE 7245	Microwave Circuit Design for Wireless Communication
EECE 5643	Simulation and Performance Evaluation	EECE 7247	Radio Frequency Integrated Circuit Design
EECE 5647	Nanophotonics	EECE 7250	Power Management Integrated Circuits (Power Management Integrated Circuits -- former special topics course)
EECE 5649	Design of Analog Integrated Circuits with Complementary Metal-Oxide-Semiconductor Technology	EECE 7263	Humanoid Robotics (Humanoid Robotics -- former special topics course)
EECE 5652	Microwave Circuits and Networks	EECE 7270	Electromagnetic Theory 2
EECE 5666	Digital Signal Processing	EECE 7271	Computational Methods in Electromagnetics
EECE 5680 and EECE 5681	Electric Drives and Lab for EECE 5680	EECE 7275	Antennas and Radiation
EECE 5682	Power Systems Analysis 1	EECE 7284	Optical Properties of Matter
EECE 5684 and EECE 5685	Power Electronics and Lab for EECE 5684	EECE 7293	Modern Imaging
EECE 5686	Electrical Machines	EECE 7296	Electronic Materials
EECE 5688	Analysis of Unbalanced Power Grids	EECE 7297	Advanced Magnetic Materials--Magnetic Devices
EECE 5697	Acoustics and Sensing	EECE 7310	Modern Signal Processing
EECE 5698	Special Topics in Electrical and Computer Engineering (Feedback Control Systems: Applications to Unmanned Aerial Vehicles)	EECE 7336	Digital Communications
EECE 5698	Special Topics in Electrical and Computer Engineering (GNSS Signal Processing)		

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

CS 6350	Empirical Research Methods
CS 6710	Wireless Network

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

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	