

Electrical and Computer Engineering with Concentration in Communications, Control, and Signal Processing, MSECE

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

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/archive/2021-2022/graduate/engineering/graduate-certificate-programs/>).

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 (<http://catalog.northeastern.edu/archive/2021-2022/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 communications, control, and signal processing technical courses.

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
A maximum of two courses may be taken outside of Electrical and Computer Engineering.		

Depth Courses

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

Breadth Courses

Complete 8 semester hours from the breadth course list below. (p. 2) 8

Note: Depth courses cannot be taken for breadth.

Elective

Complete 4 additional semester hours from either the depth or breadth course lists below. 4

THESIS OPTION

Code	Title	Hours
A maximum of three courses may be taken outside of Electrical and Computer Engineering.		

Thesis

EECE 7990	Thesis	8
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Depth Courses

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

Breadth Courses

Complete 4 semester hours from the breadth course list below. (p. 2) 4

Note: Depth courses cannot be taken for breadth.

Elective

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 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	
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 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 7310	Modern Signal Processing	

2 Electrical and Computer Engineering with Concentration in Communications, Control, and Signal Processing, MSECE

EECE 7311	Two Dimensional Signal and Image Processing	EECE 5649	Design of Analog Integrated Circuits with Complementary Metal-Oxide-Semiconductor Technology
EECE 7323	Numerical Optimization Methods	EECE 5652	Microwave Circuits and Networks
EECE 7336	Digital Communications	EECE 5680 and EECE 5681	Electric Drives and Lab for EECE 5680
EECE 7337	Information Theory	EECE 5682	Power Systems Analysis 1
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization	EECE 5684 and EECE 5685	Power Electronics and Lab for EECE 5684
EECE 7346	Probabilistic System Modeling and Analysis	EECE 5688	Analysis of Unbalanced Power Grids
EECE 7398	Special Topics (Terahertz Communications)	EECE 5697	Acoustics and Sensing
EECE 7398	Special Topics (Legged Robots)	EECE 5698	Special Topics in Electrical and Computer Engineering (Biomedical Microsystems)
EECE 7398	Special Topics (Current Research in NonLinear Systems)	EECE 5698	Special Topics in Electrical and Computer Engineering (Network Programming)
EECE 7398	Special Topics (Introduction to Distributed Intelligence)	EECE 5698	Special Topics in Electrical and Computer Engineering (Networks: Technology, Economics, Social Interactions)
EECE 7399	Preparing High-Stakes Written and Oral Materials (Only for MS Thesis Students)	EECE 5698	Special Topics in Electrical and Computer Engineering (Hardware and System Security)
EECE 7400	Special Problems in Electrical and Computer Engineering	EECE 5698	Special Topics in Electrical and Computer Engineering (Advanced Network Management)
EECE 7674	Master's Project (MS Thesis students cannot take this course)	EECE 5698	Special Topics in Electrical and Computer Engineering (Electromagnetic Devices)

BREADTH COURSES

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	
CS 5200	Database Management Systems	
CS 5600	Computer 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	
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	
EECE 5606	Micro- and Nanofabrication	
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 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	
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 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 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 (Wireless Network Systems and Applications)
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

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 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