

Civil Engineering with Concentration in Data and Systems, MSCivE (Boston)

This program is designed for students with career goals that require application of data and systems analysis to challenges across any discipline of civil and environmental engineering. The degree requirements include core courses (total of 20 semester hours) in data analysis and computing, systems and sensors, and data and systems topics in civil and environmental engineering, complemented by electives across multiple departments including mathematics, computer science, engineering, economics, and policy.

Degree Requirements	With Project	With Thesis	Coursework Only
Required core courses	20 SH	20 SH	20 SH
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 (<https://catalog.northeastern.edu/graduate/engineering/graduate-certificate-programs/>).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Civil Engineering with Concentration in Data and Systems with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Civil Engineering with Concentration in Data and Systems 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 36-semester-hour degree and certificate will require 20 hours of advisor-approved data and systems engineering technical courses. For students who concurrently enroll in the Graduate Certificate in Engineering Leadership, 12 semester hours of the certificate coursework may be applied to the elective requirements of this program's coursework option.

The Department of Civil and Environmental Engineering encourages students pursuing a GIEL certificate to complete their MS coursework requirements in their first year and their GIEL certificate requirements in their second year. Students who prefer to complete their GIEL certificate requirements in their first year are asked to speak with their MS degree advisor beforehand.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated. At least 20 semester hours (of the 32 semester hours) must be listed as CIVE or SBSY and must form a cohesive advisor-approved program.

Core Requirements

Code	Title	Hours
Complete 20 semester hours from the following course lists:		20
Data and Computing		
Complete at least 4 semester hours from the following:		4
CIVE 5280	Remote Sensing of the Environment	
CIVE 7100	Time Series and Geospatial Data Sciences	
or ENVR 6500	Biostatistics	
or IE 6200	Engineering Probability and Statistics	
or IE 7280	Statistical Methods in Engineering	
or INSH 5301	Introduction to Computational Statistics	
or MATH 7343	Applied Statistics	
CIVE 7150	Data-Driven Decision Support for Civil and Environmental Engineering	
CIVE 7151	Urban Informatics and Processing	
or PPUA 5262	Big Data for Cities	
DAMG 6105	Data Science Engineering with Python	
DAMG 6210	Data Management and Database Design	
ENVR 5260	Geographical Information Systems	
IE 5640	Data Mining for Engineering Applications	

or IE 7275

Data Mining in Engineering

Systems and Sensors

Complete at least 4 semester hours from the following:

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CIVE 5261	Dynamic Modeling for Environmental Investment and Policymaking
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure
CIVE 5524	Vibration-Based Structural Health Monitoring
CIVE 7155	Dynamics and Control of Infrastructure Systems
EECE 5155	Wireless Sensor Networks and the Internet of Things
IE 5500	Systems Engineering in Public Programs
OR 6205	Deterministic Operations Research
OR 7230	Probabilistic Operation Research
OR 7245	Network Analysis and Advanced Optimization
PHYS 5116	Network Science I
PPUA 6502	Economic Analysis for Policy and Planning
PPUA 7237	Advanced Spatial Analysis of Urban Systems

Civil and Environmental Systems

Complete at least 8 semester hours from the following:

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CIVE 5281	Coastal Dynamics and Design
CIVE 5363	Climate Science, Engineering Adaptation, and Policy
CIVE 5373	Transportation Systems: Analysis and Planning
CIVE 5522	Structural Systems Modeling
or CIVE 7330	Advanced Structural Analysis
CIVE 5536	Hydrologic and Hydraulic Design
CIVE 7110	Critical Infrastructure Resilience
CIVE 7341	Structural Reliability
CIVE 7342	System Identification
CIVE 7380	Performance Models and Simulation of Transportation Networks
CIVE 7381	Transportation Demand Forecasting and Model Estimation
CIVE 7385	Public Transportation
IE 7200	Supply Chain Engineering
OR 7310	Logistics, Warehousing, and Scheduling
SBSY 5100	Sustainable Design and Technologies in Construction
SBSY 5200	Sustainable Engineering Systems for Buildings
SBSY 5250	Building Performance Simulation

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete the remaining semester hours from the electives list below. (p. 3)		12

REPORT OPTION

Code	Title	Hours
CIVE 7945	Master's Project	4
Complete the remaining semester hours from the electives list below. (p. 3)		8

THESIS OPTION

Code	Title	Hours
CIVE 7945	Master's Project	4
CIVE 7990	Thesis	4

Complete the remaining semester hours from the electives list below. (p. 3)

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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.

Electives List

Code	Title	Hours
Any core course not used to meet the core course requirements can be used as an elective.		
CIVE 5368	Air Quality Management	
CIVE 6566	Sustainable Urban Transportation: Netherlands	
CIVE 7220	Construction Management	
CIVE 7250	Environmental Chemistry	
CIVE 7251	Environmental Biological Processes	
CIVE 7255	Environmental Physical/Chemical Processes	
CIVE 7260	Hydrologic Modeling	
CIVE 7382	Advanced Traffic Control and Simulation	
EECE 5642	Data Visualization	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7204	Applied Probability and Stochastic Processes	
IE 5617	Lean Concepts and Applications	
IE 7215	Simulation Analysis	
SBSY 5300	Information Systems for Integrated Project Delivery	

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	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	

Program Credit/GPA Requirements

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

Minimum 3.000 GPA required