

Software Engineering Systems, MS (Boston)

Website (<http://www.coe.neu.edu/degrees/ms-cse/>)

The software engineering systems program takes a sociotechnical, engineering approach to software. This engineering foundation is designed to enable students to embrace real-world complexity as a golden opportunity, especially for the more technically advanced student. We are committed to shaping our students to be intuitive problem solvers, experienced engineering architects, and result leaders who will have a great impact at the exciting three-way intersection of computer science, engineering, and ethics.

Our program offers a multitude of courses in Big Data engineering and analytics in addition to supplementary courses that are required to deliver the data analytics results in a meaningful way to management. We cover data management, advanced data management, business intelligence, column databases, data science, and Big Data engineering. We offer advanced functional programming using the powerful Scala language and a course on advanced data science as well as cloud computing. Multithread concurrent computing is also offered as it is important for synchronizing a huge set of servers working in parallel to do large-scale analytics to make things run faster by a hundredfold increase in speed. Due to the high-level mathematical operations required to run these programs, only software engineers have the capacity to work in such complicated areas. Only they can make the necessary mathematical algorithms execute quickly enough to get the finest results.

Our engineers become fluent in data science for the sake of building the actual system. They study how to write machine-learning algorithms on top of statistical packages.

- Students study the fundamentals of logical computing formulation and program construction as well as the mathematical modeling and analysis of algorithms—an essential aspect of data science analytics.
- Students study clustering techniques, along with topic modeling and classification and logical regression techniques, as well as Bayesian statistics.
- Students study how to configure and operate a Hadoop environment (large clusters of commodity hardware) and in the process how to integrate data from diverse sources to move and manage data through Big Data platforms (in-house or in the cloud). Data ingestion, the filtering and firing of millions of operations to run over large clusters of commodity hardware, is a software engineering technique that we teach our students how to perform through Scala, multithreading, Spark programming, and “map-reduce” techniques.
- We show students how to make the business case for analytics projects and how to follow an execution road map that involves understanding the architectures underpinning such gigantic platforms as well as the resourcing and cost issues.

Degree Requirements

Students in the program must complete 32 semester hours of approved coursework with a minimum grade-point average of 3.000. Students can complete a master's degree by pursuing any of one of the three options: coursework, project, or thesis.

Master's project and thesis options must be carried out under the supervision of a professor and must have prior approval of the program director. Proposals for a master's project or a thesis need to be submitted at least one month before the start of the semester.

Graduate Certificate Options

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Software Engineering Systems with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Software Engineering 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 32-semester-hour degree and certificate will require 16 hours of advisor-approved software design engineering technical courses. For students who concurrently enroll in the Graduate Certificate in Engineering Leadership, 16 semester hours of the certificate coursework may be applied to this program's elective requirements.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

| Code | Title | Hours |
|-----------|------------------------------------|-------|
| CSYE 6200 | Concepts of Object-Oriented Design | 4 |
| INFO 6205 | Program Structure and Algorithms | 4 |

Options

Complete one of the following options:

COURSEWORK OPTION

| Code | Title | Hours |
|--|-------|-------|
| Complete 12 semester hours from the restricted electives course list below. (p. 2) | | 12 |
| Complete 12 semester hours from the other electives course list below. (p. 2) | | 12 |

PROJECT OPTION

| Code | Title | Hours |
|---|------------------|-------|
| CSYE 7945 | Master's Project | 4 |
| Complete 8 semester hours from the restricted electives course list below. (p. 2) | | 8 |
| Complete 12 semester hours from the other electives course list below. (p. 2) | | 12 |

THESIS OPTION

| Code | Title | Hours |
|---|------------------|-------|
| CSYE 7945 | Master's Project | 4 |
| CSYE 7990 | Thesis | 4 |
| Complete 4 semester hours from the restricted electives course list below. (p. 2) | | 4 |
| Complete 12 semester hours from the other electives course list below. (p. 2) | | 12 |

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.

Optional Co-op Experience

| Code | Title | Hours |
|--|--|-------|
| Complete the following (students must complete ENCP 6000 to qualify for co-op experience): | | |
| ENCP 6000 | Career Management for Engineers | 1 |
| ENCP 6964 | Co-op Work Experience | 0 |
| 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 | |

Program Credit/GPA Requirements

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

Restricted Electives

| Code | Title | Hours |
|---|-------|-------|
| Complete courses from the following subject code: | | |
| CSYE | | |

Other Electives

| Code | Title | Hours |
|---|-------|-------|
| Complete courses from any of the following subject codes: | | |
| CSYE | | |
| DAMG | | |
| INFO (INFO 6250 excluded) | | |
| TELE | | |