



Crookston Campus

Software Engineering B.S.

Math, Science and Technology

Academic Affairs

- Program Type: Baccalaureate
- Requirements for this program are current for Fall 2018
- Required credits to graduate with this degree: 120
- Required credits within the major: 64
- This program requires summer terms.
- Degree: Bachelor of Science

As technology penetrates every sector of the economy, software needs are becoming increasingly complex. This need has seen the evolution of a relatively new area of study, software engineering. The US Department of Labor, Bureau of Labor Statistics state that computer software engineering will be among the fastest growing occupations for the next 10 years.

The software engineering program combines the theory behind good software engineering practices along with applied projects throughout the IEEE standardized curriculum. This approach provides graduates the knowledge and skills to be successful in the workplace or in graduate studies.

Program outcomes: graduates will

Show mastery of the software engineering knowledge and skills and professional issues necessary to begin practice as a software engineer.

Work as an individual and as part of a team to develop and deliver quality software artifacts.

Reconcile conflicting project objectives, finding acceptable compromises within limitations of cost, time, knowledge, existing systems, and organizations.

Design appropriate solutions in one or more application domains using software engineering approaches that integrate ethical, social, legal, and economic concerns.

Demonstrate an understanding of and apply current theories, models, and techniques that provide a basis for problem identification and analysis, software design, development, implementation, verification, and documentation.

Demonstrate an understanding and appreciation for the importance of negotiation, effective work habits, leadership, and good communication with stakeholders in a typical software development environment.

Learn new models, techniques, and technologies as they emerge and appreciate the necessity of such continuing professional development.

Program Delivery

This program is available:

- via classroom (the majority of instruction is face-to-face)

Admission Requirements

For information about University of Minnesota admission requirements, visit the [Office of Admissions website](#).

General Requirements

All students are required to complete general University and college requirements. For more information, see the [graduation requirements](#).

Program Requirements

Students must complete 40 upper division credits.

Liberal Education Requirements

A minimum of 40 liberal education credits required. Students must complete the 10 goal areas of the Minnesota Transfer Curriculum with the following specific liberal education courses required:

[BIOL 1009](#) - General Biology [BIOL SCI, PEOPLE/ENV] (4.0 cr)

[COMP 1011](#) - Composition I [COMMUNICAT] (3.0 cr)

[COMP 1013](#) - Composition II [COMMUNICAT] (3.0 cr)

[MATH 1150](#) - Introduction to Statistics [MATH THINK] (3.0 cr)

[MATH 1271](#) - Calculus I [MATH THINK] (4.0 cr)

[PHYS 1101](#) - Introductory College Physics I [PHYS SCI] (4.0 cr)

Chose one of the following



COMM 1101 - Public Speaking [COMMUNICAT] (3.0 cr)
or COMM 2002 - Interpersonal Communication [COMMUNICAT] (3.0 cr)

Technology Requirement

Students must take 3 credits from the following courses:

CA 1040 - Web Site Development (3.0 cr)
or SE 4100 - Introduction to 3D Simulation Programming (3.0 cr)
or SE 4110 - Simulation and Game Development (3.0 cr)

Core Program Requirements

A maximum of two D grades are allowed for courses required in the program and technology requirements. This includes grades earned at UMC or transferred in from another institution.

Required Courses - 64 credits

ITM 3110 - Microcomputer Operating Systems (3.0 cr)
MATH 1272 - Calculus II (4.0 cr)
MATH 2010 - Discrete Mathematics (4.0 cr)
NT 3120 - Networking Standards and Protocols (3.0 cr)
SE 2050 - Introduction to Programming I (3.0 cr)
SE 2070 - Introduction to Programming II (3.0 cr)
SE 2090 - Data Structures and Algorithms (3.0 cr)
SE 2100 - Microcomputer Systems Architecture (3.0 cr)
SE 2200 - Introduction to Software Engineering (3.0 cr)
SE 2300 - Software Construction (3.0 cr)
SE 2400 - Software Engineering Approach to Human Computer Interaction (3.0 cr)
SE 3050 - Database Management Systems (3.0 cr)
SE 3100 - Object-Oriented Programming (3.0 cr)
SE 3200 - Software Design and Architecture (3.0 cr)
SE 3300 - Software Quality Assurance and Testing (3.0 cr)
SE 3150 - Software Requirements Analysis (3.0 cr)
SE 4200 - Software Project Management (3.0 cr)
SE 3900 - Internship (3.0 cr)
SE 4050 - Advanced Web Application Development (3.0 cr)
SE 4500 - Senior Project I (3.0 cr)
SE 4510 - Senior Project II (3.0 cr)

Open Electives. Students must take enough credits to meet the 120 credit graduation requirement.

Specialization options are listed below:

Recommended Electives for Financial/ E-Commerce Systems Specialization - up to 18 credits

ACCT 2101
FIN 3100
MGMT 3200
MGMT 3270
NT 3215
SE 3060

Recommended Electives for Network-Centric Systems Specialization - up to 18 credits

ITM 3130
MGMT 3200
NT 3215
SE 3060
SE 3820
SE 4100

Recommended Electives for Gaming, 3D Modeling & Simulation - up to 19 credits

MGMT 3200
Phys 1301
SE 3820
SE 4100
SE 4110