Duluth Campus

Computer Science M.S.

Computer Science

Swenson College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Computer Science, University of Minnesota Duluth, 1114 Kirby Drive, 320 Heller Hall, Duluth, MN 55812 (218-726-7607; fax: 218-726-8240)
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Website: https://scse.d.umn.edu/about/departments-and-programs/computer-science-department/graduate-programs

- Program Type: Master's
- Requirements for this program are current for Fall 2023
- Length of program in credits: 30 to 32
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Computer science is a discipline that involves understanding the design of computers and computational processes. Study in the field ranges from the theoretical study of algorithms to the design and implementation of software at the systems and applications levels.

The Master of Science is a 2-year program that provides the necessary foundational studies for graduates planning to pursue either a doctorate in computer science or a career as a computer scientist in business or industry.

Program Delivery

This program is available:

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

Prerequisites for Admission

The preferred undergraduate GPA for admittance to the program is 3.00.

The program is designed for students with undergraduate degrees in computer science or a related field.

Other requirements to be completed before admission:
Students with undergraduate degrees in fields other than computer science or related areas may be considered for admittance if they have completed the following courses or their equivalents: CS 1511-1521 - Computer Science I-II; CS 2511 - Software Analysis and Design; CS 2521 - Computer Organization and Architecture; MATH 3355 - Discrete Mathematics or CS 2531 - Discrete Structures for Computer Science' CS 3531 Automata & Formal Languages; and at least three of CS 4312 - Operating Systems, CS 4332 - Computer Security, CS 4422 - Computer Networks, CS 4122 - Advanced Data Structures and Algorithms, CS 4212 - Computer Graphics, CS 4322 - Database Management Systems. The appropriate math prerequisites, namely MATH 1296 - Calculus I and STAT 3611 - Introduction to Probability and Statistics, are also required.

Special Application Requirements:
Admission is for fall semester only.

International and domestic applicants whose first language is not English must submit current score(s) from one of the following tests:

Applicants must submit their test score(s) from the following:

- GRE

International applicants must submit score(s) from one of the following tests:

- IELTS
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5
- MELAB
  - Final score: 80

Information current as of March 29, 2024

Key to test abbreviations(GRE, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 20 major credits, 0 credits outside the major, and 10 thesis credits.The final exam is oral.

Plan B: Plan B requires 32 major credits and 0 credits outside the major.The final exam is oral. A capstone project is required.
Capstone Project: The Plan B project, completed in consultation with the advisor, comprises significant programming research. The project is often based on an extended 5XXX-level course assignment.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Computer Science Coursework (12 credits)
Select 12 credits from the following in consultation with the advisor:
CS 5112 - Advanced Theory of Computation (4.0 cr)
CS 5122 - Advanced Algorithms and Data Structures (4.0 cr)
CS 5212 - Computer Graphics (4.0 cr)
CS 5222 - Artificial Intelligence (4.0 cr)
CS 5232 - Introduction to Machine Learning and Data Mining (4.0 cr)
CS 5242 - Natural Language Processing (4.0 cr)
CS 5312 - Operating Systems (4.0 cr)
CS 5322 - Database Management Systems (4.0 cr)
CS 5332 - Computer Security (4.0 cr)
CS 5342 - Compiler Design (4.0 cr)
CS 5412 - Computer Architecture (4.0 cr)
CS 5422 - Computer Networks (4.0 cr)
CS 5432 - Sensors and Internet of Things (4.0 cr)
CS 5642 - Advanced Natural Language Processing (4.0 cr)
CS 5732 - Advanced Computer Security (4.0 cr)

Graduate Seminar (2 credits)
Take 1 credit the first fall semester, and 1 credit the second fall semester of the following:
CS 8993 - Seminar (1.0 cr)

Electives (6 credits)
Select 6 credits from the following in consultation with the advisor. Other 5xxx-level or higher coursework can be chosen with approval of the advisor and director of graduate studies.
CHE 5011 - Process Optimization: Lean Six Sigma (3.0 cr)
CS 5732 - Advanced Computer Security (4.0 cr)
CS 5995 - Special Topics: (Various Titles to be Assigned) (1.0 - 4.0 cr)
EDSE 5000 - Introduction to Post-Secondary Teaching (2.0 cr)
EDUC 5413 - Teaching With Technology (4.0 cr)
EDUC 7002 - Diversity and Social Justice (3.0 cr)
EE 5151 - Digital Control System Design (3.0 cr)
EE 5161 - Linear State-Space Control Systems (3.0 cr)
EE 5311 - Design of VLSI Circuits (4.0 cr)
EE 5315 - Multiprocessor-Based System Design (3.0 cr)
EE 5171 - Introduction to Robotics and Mobile Robot Control Architectures (3.0 cr)
EE 5477 - Antennas and Transmission Lines (3.0 cr)
EE 5479 - Antennas and Transmission Lines Laboratory (1.0 cr)
EE 5501 - Energy Conversion System (3.0 cr)
EE 5522 - Power Electronics I (3.0 cr)
EE 5533 - Grid- Resiliency, Efficiency and Technology (3.0 cr)
EE 5621 - Microelectronics Technology (3.0 cr)
EE 5741 - Digital Signal Processing (3.0 cr)
EE 5745 - Medical Imaging (3.0 cr)

EE 5765 - Modern Communication (4.0 cr)
EE 5801 - Introduction to Artificial Neural Networks (3.0 cr)
EE 8151 - Optimal Control Systems (3.0 cr)
EE 8741 - Digital Image Processing (4.0 cr)
EE 8765 *{Inactive}*(3.0 cr)
ENGL 5802 - English Language for Educators (4.0 cr)
MATH 5201 - Real Variables (4.0 cr)
MATH 5202 - Applied Functional Analysis (3.0 cr)
MATH 5233 - Mathematical Foundations of Bioinformatics (3.0 cr)
MATH 5260 - Dynamical Systems (3.0 cr)
MATH 5270 - Modeling with Dynamical Systems (3.0 cr)
MATH 5280 - Partial Differential Equations (3.0 cr)
MATH 5327 - Advanced Linear Algebra (3.0 cr)
MATH 5330 - Theory of Numbers (3.0 cr)
MATH 5347 - Applied Algebra and Cryptology (3.0 cr)
MATH 5365 - Graph Theory (3.0 cr)
MATH 5366 - Enumerative Combinatorics (3.0 cr)
MATH 5371 - Abstract Algebra I (3.0 cr)
MATH 5372 - Abstract Algebra II (3.0 cr)
MATH 5810 - Linear Programming (3.0 cr)
MATH 5830 - Numerical Analysis: Approximation and Quadrature (4.0 cr)
MATH 5840 *{Inactive}*(4.0 cr)
MATH 5850 - Numerical Differential Equations (4.0 cr)
MATH 8201 - Real Analysis (3.0 cr)
MIS 5241 - Data Analytics for Managerial Decision Making (3.0 cr)
PHYS 5053 - Data Analysis Methods in Physics (3.0 cr)
PSY 5621 - Cognition and Emotion (3.0 cr)
STAT 5411 - Analysis of Variance (3.0 cr)
STAT 5511 - Regression Analysis (3.0 cr)
STAT 5515 - Multivariate Statistics (3.0 cr)
STAT 5521 - Applied Time Series Analysis (3.0 cr)
STAT 5531 - Probability Models (4.0 cr)
STAT 5571 - Probability (4.0 cr)
STAT 5572 - Statistical Inference (4.0 cr)
STAT 8611 - Linear Models (3.0 cr)

Plan Options

Plan A

Thesis Credits

Take 10 master's thesis credits.

CS 8777 - Thesis Credits: Master's (1.0 - 24.0 cr)

-OR-

Plan B

Plan B Project (4 credits)

Take 4 credits of the following in consultation with the advisor:

CS 8794 - Project Credits: Master's (1.0 - 4.0 cr)

Additional Coursework (8 credits)

Select 8 credits from the lists above in consultation with the advisor to complete the 32-credit requirement. Other courses can be chosen with advisor approval.