Twin Cities Campus

Data Science M.S.

Computer Science and Engineering Administration

College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Data Science Graduate Program, Department of Computer Science and Engineering, University of Minnesota, 4-192 Keller Hall, 200 Union Street S.E., Minneapolis, MN 55455 (612- 625-4002; fax: 612-625-0572).
Email: datascience@umn.edu
Website: http://datascience.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2017
- Length of program in credits: 31
- 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.

The M.S. in Data Science program provides a strong foundation in the science of Big Data and its analysis by gathering in a single program the knowledge, expertise, and educational assets in data collection and management, data analytics, scalable data-driven pattern discovery, and the fundamental concepts behind these methods.

Students who graduate from this regular 2 year master's program will learn the state-of-the-art methods for treating Big Data, be exposed to the cutting edge methods and theory forming the basis for the next generation of Big Data technology, and will complete a project demonstrating that they can use the fundamental concepts to design innovative methods for new application areas arising from business, government, security, medicine, biology, physical sciences, and the environment.

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.

A bachelor's degree from an accredited college or university in computer science, math, statistics, engineering, natural sciences, or a related field.

Other requirements to be completed before admission:
The undergraduate degree must include statistics, calculus, multivariable calculus, linear algebra, and mathematical software environments such as Matlab or R or the equivalent, programming languages such as C+, C++, Java, programming experience including algorithms and data structures normally taught in beginning computer science courses either as part of the undergraduate degree or subsequent work experience.

Special Application Requirements:
Admission application deadlines: February 1st international applicants, March 1st domestic applicants. Applicants are only considered for fall admission and decisions are made after all applications are received following the close of the application cycle. Application instructions can be found here: https://datascience.umn.edu/admissions

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

- GRE

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

- TOEFL
  - Internet Based - Writing Score: 23
  - Internet Based - Reading Score: 23
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5

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- MELAB
  - Part 1 (Composition) score: 80

Key to test abbreviations(GRE, TOEFL, 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 B: Plan B requires 31 major credits and up to null credits outside the major.The final exam is written and oral. A capstone project is required.
Capstone Project: Students must complete 6 credit hours of capstone project coursework supervised by a faculty member.

The final examination for the Capstone Project may be oral, written, or both. The format of the final exam is decided between the student, the adviser, and the director of graduate studies, and is based on what is most appropriate for the students project. The final oral examination, if it is used, is a closed examination open only to the final oral examination committee and the student.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

The program requires a total of 31 credits consisting of 6 credits each from the three emphasis areas: statistics, algorithms, and infrastructure and large scale computing; 6 credits in approved electives or in a minor; 1 credit of research colloquium; and 6 credits for the capstone project.

Statistics

Short List

Take one course from the short list and one additional statistics course from any in this emphasis for a total of 6 or more credits.
Take 2 or more course(s) totaling 6 or more credit(s) from the following:

- STAT 5101 - Theory of Statistics I (4.0 cr)
- STAT 5102 - Theory of Statistics II (4.0 cr)
- STAT 5302 - Applied Regression Analysis (4.0 cr)
- STAT 5401 - Applied Multivariate Methods (3.0 cr)
- STAT 5511 - Time Series Analysis (3.0 cr)
- STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)
- PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)

Additional Courses

Take 0 or more course(s) totaling 0 or more credit(s) from the following:

- PUBH 8401 - Linear Models (3.0 cr)
- PUBH 8432 - Probability Models for Biostatistics (3.0 cr)
- PUBH 7405 - Biostatistical Inference I (4.0 cr)
- PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
- PUBH 8442 - Bayesian Decision Theory and Data Analysis (3.0 cr)
- EE 5531 - Probability and Stochastic Processes (3.0 cr)
- EE 5571 - Statistical Learning and Inference (3.0 cr)

Algorithmics

Short List

Take one course from the short list and one additional course from any in this emphasis for a total of 6 or more credits.
Take 2 or more course(s) totaling 6 or more credit(s) from the following:

- CSCI 5521 - Machine Learning Fundamentals (3.0 cr)
- CSCI 5523 - Introduction to Data Mining (3.0 cr)
- CSCI 5525 - Machine Learning: Analysis and Methods (3.0 cr)
- EE 8591 - Predictive Learning from Data (3.0 cr)
- PUBH 8475 - Statistical Learning and Data Mining (3.0 cr)

Additional Courses

Take 0 or more course(s) totaling 0 or more credit(s) from the following:

- CSCI 5302 - Analysis of Numerical Algorithms (3.0 cr)
- CSCI 5304 - Computational Aspects of Matrix Theory (3.0 cr)
- CSCI 5511 - Artificial Intelligence I (3.0 cr)
- CSCI 5512 - Artificial Intelligence II (3.0 cr)
- CSCI 5609 - Visualization (3.0 cr)
- CSCI 8314 - Sparse Matrix Computations (3.0 cr)

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- EE 5239 - Introduction to Nonlinear Optimization (3.0 cr)
- EE 5251 - Optimal Filtering and Estimation (3.0 cr)
- EE 5542 - Adaptive Digital Signal Processing (3.0 cr)
- EE 8551 - Multirate Signal Processing and Applications (3.0 cr)
- EE 5561 - Image Processing and Applications: From linear filters to artificial intelligence (3.0 cr)
- EE 5581 - Information Theory and Coding (3.0 cr)
- EE 5585 - Data Compression (3.0 cr)
- EE 8231 - Optimization Theory (3.0 cr)
- IE 5531 - Engineering Optimization I (4.0 cr)
- IE 8534 - Advanced Topics in Operations Research (1.0 - 4.0 cr)

Infrastructure and Large Scale Computing

Short List

Take one course from the short list and one additional course from any in this emphasis for a total of 6 or more credits.
Take 2 or more course(s) totaling 6 or more credit(s) from the following:

- CSCI 5105 - Introduction to Distributed Systems (3.0 cr)
- CSCI 5451 - Introduction to Parallel Computing: Architectures, Algorithms, and Programming (3.0 cr)
- CSCI 5707 - Principles of Database Systems (3.0 cr)
- CSCI 8980 - Special Advanced Topics in Computer Science (1.0 - 3.0 cr)
- EE 5351 - Applied Parallel Programming (3.0 cr)
- EE 8367 - Parallel Computer Organization (3.0 cr)
- CSCI 5708 - Architecture and Implementation of Database Management Systems (3.0 cr)

Additional Courses

Take 0 or more course(s) totaling 0 or more credit(s) from the following:

- CSCI 5211 - Data Communications and Computer Networks (3.0 cr)
- CSCI 5231 *{Inactive}*(3.0 cr)
- CSCI 5271 - Introduction to Computer Security (3.0 cr)
- CSCI 5715 - From GPS, Google Maps, and Uber to Spatial Data Science (3.0 cr)
- CSCI 8701 - Overview of Database Research (3.0 cr)
- CSCI 8715 - Spatial Data Science Research (3.0 cr)
- EE 5371 - Computer Systems Performance Measurement and Evaluation (3.0 cr)
- EE 5381 *{Inactive}*(3.0 cr)
- EE 5501 - Digital Communication (3.0 cr)

Electives

Take 2 elective courses. Students may choose courses from this list or consult with their adviser for further options. Examples include 5xxx & 8xxx special topics classes in CSCI, EE, STAT, & PUBH (Biostat).
Take 2 or more course(s) totaling 6 or more credit(s) from the following:

- CSCI 5461 - Functional Genomics, Systems Biology, and Bioinformatics (3.0 cr)
- CSCI 5561 - Computer Vision (3.0 cr)
- CSCI 8271 - Security and Privacy in Computing (3.0 cr)
- CSCI 8363 - Numerical Linear Algebra in Data Exploration (3.0 cr)
- CSCI 8715 - Spatial Data Science Research (3.0 cr)
- CSCI 8725 - Databases for Bioinformatics (3.0 cr)
- PUBH 8445 - Statistics for Human Genetics and Molecular Biology (3.0 cr)
- PUBH 8446 - Advanced Statistical Genetics and Genomics (3.0 cr)
- PUBH 8472 - Spatial Biostatistics (3.0 cr)
- MATH 5467 - Introduction to the Mathematics of Image and Data Analysis (4.0 cr)

Research Colloquium

DSCI 8970 - Data Science M.S. Colloquium (1.0 cr)

Capstone Course

Take twice for a total of 6 credits.
DSCI 8760 - Data Science M.S. Plan B Project (3.0 cr)

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