

Data Science, MS

Learning Outcomes

Graduates will be able to:

- understand the fundamental concepts in probability and statistics that underlie commonly used data science algorithms;
- write efficient Python and R codes for data processing and data wrangling (data storage, access, and management) and computing for data analysis and modeling;
- use visualization techniques to display salient data features;
- use data technologies to process complex data;
- correctly and effectively implement appropriate algorithms for learning with data;
- identify and criticize inappropriate/unethical uses of data and/or algorithms;
- acquire effective communication skills for disseminating findings; and
- work with data stakeholders to help collect and analyze data.

The program aims to train the next generation of data scientists with the analytical and technical skills to explore, formulate, and solve complex data-driven problems in science, industry, business, and government. The program focuses on the theory, methodology, application, and ethics for working with and learning from data. Students acquire the ability to develop and implement new or special-purpose analysis and visualization tools, and a fundamental understanding of how to quantify uncertainty in data-driven decision-making.

Requirements

The Master of Science program in data science requires 30 s.h. of graduate credit. Students must maintain a grade-point average of at least 3.00 in all work toward the degree and in additional relevant coursework.

Coursework includes core courses covering the fundamentals of data science including probability and statistics; data storage, access, and management; and data visualization, exploration, modeling, analysis, and uncertainty quantification. Students acquire hands-on experience in solving real-world problems, communication skills, and data ethics via a required capstone project. Students choose electives from a wide variety of courses on specialized data science topics offered by the departments of Statistics and Actuarial Science, Computer Science, Business Analytics, and Biostatistics to enhance their skill sets based on their interests and career goals.

The MS with a major in data science requires the following coursework.

Required Courses

Course #	Title	Hours
All of these:		
DATA:3120/ IGPI:3120/ STAT:3120	Probability and Statistics	4

DATA:3200/ IGPI:3200/ISE:3760/ STAT:3200	Applied Linear Regression	3
DATA:4540/ BAIS:4540/ IGPI:4540/ STAT:4540	Statistical Learning	3
DATA:4580/ IGPI:4580/ STAT:4580	Data Visualization and Data Technologies	3
DATA:4600/ STAT:4600	Causal Inference for Data Science	3
DATA:4750/ STAT:4750	Probabilistic Statistical Learning	3
DATA:5400/ IGPI:5400/ STAT:5400	Computing in Statistics	3
DATA:6220/ STAT:6220	Consulting and Communication with Data	3
DATA:7400/ IGPI:7400/ STAT:7400	Computer Intensive Statistics	3
One of these:		
DATA:4890	Data Science Practicum	3
DATA:5890	MS Data Science Practicum	2

Elective Courses

Course #	Title	Hours
BAIS:6100	Text Analytics	3
BAIS:6130	Applied Optimization	3
BAIS:6210	Data Leadership and Management	3
BIOS:4510	Data Science Foundations in R	2
BIOS:6720	Statistical Machine Learning for Biomedical and Public Health Data	3
CS:4310	Design and Implementation of Algorithms	3
CS:4400	Database Systems	3
CS:4420	Artificial Intelligence	3
CS:4470	Health Data Analytics	3
CS:5110/IGPI:5110	Introduction to Informatics	3
CS:5430	Machine Learning	3
CS:5630	Cloud Computing Technology	3
DATA:4880	Data Science Creative Component	1
DATA:6200/ ACTS:6200/ STAT:6200	Predictive Analytics	3
MATH:4840	Mathematics of Machine Learning	3
STAT:3210	Experimental Design and Analysis	3
STAT:4520/ IGPI:4522/ PSQF:4520	Bayesian Statistics	3
STAT:4560	Statistics for Risk Modeling I	3
STAT:6530/ IGPI:6530	Environmental and Spatial Statistics	3

STAT:6550/ BIOS:6310/ IGPI:6310	Introductory Longitudinal Data Analysis	3
STAT:6560	Applied Time Series Analysis	3

Admission

Applicants must meet the admission requirements of the Graduate College; see the Manual of Rules and Regulations on the Graduate College website.

Career Advancement

The program prepares graduates for careers in academia , industry, business, or government that involve data visualization and modeling, managing reproducible data analysis workflows, and collaborating and communicating with scientists and other data stakeholders.

Academic Plans

Sample Plan of Study

Sample plans represent one way to complete a program of study. Actual course selection and sequence will vary and should be discussed with an academic advisor. For additional sample plans, see MyUI.

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This plan is being reviewed and will be added at a later date.