

MASTER OF SCIENCE IN DATA SCIENCE AND ARTIFICIAL INTELLIGENCE

The Master of Science in Data Science and Artificial Intelligence (DS&AI) program prepares students for high-demand industry positions in DS&AI and for doctoral programs that require a solid knowledge base in computer science, statistics, machine learning, and artificial intelligence. The program combines a broad and in-depth core curriculum in theory and applications. Students will receive rigorous and hands-on training through high-quality research activities to gain software system-building experiences in interdisciplinary settings. Through this program students with and without a Computer Science background will advance their careers by acquiring computational, statistical and system-building skills in this increasingly data-driven society.

Admission requirements

Successful applicants to the program must

- Hold a baccalaureate degree from a regionally accredited 4-year institution or shall have completed equivalent academic preparation as determined by the appropriate campus authority in a quantitative/computing field, including but not limited to computer science, mathematics, physics, statistics, engineering or relevant fields. Successful applicants are expected to demonstrate knowledge by having satisfactorily completed courses or worked in the information technology industry in the following areas: data structures, programming, analysis of algorithms, database systems, software engineering, calculus, probability, and/or statistics. However, an applicant who is deficient in these areas may be admitted conditionally on passing a set of undergraduate courses during the first calendar year of study.
- Have a 3.0 GPA or higher in their earned undergraduate degree or have earned a post-baccalaureate degree.
- Submit a general GRE score that has been taken within the last 3 years.
- Submit a TOEFL score (minimum 550/80) or IELTS score (minimum 7.0) obtained within the past two years if their undergraduate degree is from a country where the official language is not English.
- Furnish 2 Letters of Recommendation.
- Submit a Statement of Purpose
- Submit a copy of CV or resume.

Culminating Experience Requirements

Each student in this program is required to complete a culminating experience project/thesis by enrolling in either CSC 895 Applied Research Project or CSC 898 Master's Thesis. Under the supervision of a tenured/tenure-track faculty member, a student employs concepts and methods learned in this program to solve a problem of significant importance from a practical or research standpoint. Through this culminating experience project, a student will synthesize and apply concepts and methods learned in more than one course, analyze and compare existing work in the area of study, create a software solution, evaluate this software, and present the major findings in the forms of an oral defense and written thesis/report. CSC 895 and CSC 898 are equivalent options. The project or thesis will also add a prominent component to a student's portfolio

and lay the foundation for a future career in data science and AI, be it a Ph.D. program or a leadership position in the industry.

Each student will work with a tenured/tenure-track faculty member to decide whether to register for CSC 895 or CSC 898. Before enrolling in CSC 895 or CSC 898, the student and his/her faculty advisor will be required to assemble a committee of multiple faculty members to maximize a student's learning outcomes through working on his/her culminating experience project.

A culminating experience project in this program will produce the following three major deliverables: (1) a software system that utilizes relevant data to address an important problem; (2) a written report or Master's thesis; and (3) an oral presentation to argue/explain/demonstrate the software solution and convince the committee of the solution's efficacy and effectiveness.

Written English Proficiency Requirement Level One

A candidate is considered to have fulfilled the Level 1 Writing Proficiency requirement if this candidate has earned a score of 4.0 or above in their recent GRE's analytic writing assessment. In the case a candidate scored below 4.0, this candidate may be conditionally admitted. In such a case, this student is required to successfully finish SCI 614: Graduate Writing Skills (3 units) within one year after starting their studies in this program.

Level Two

The written report or the Master's thesis resulted from a student's culminating experience project will be utilized to determine a student's Level 2 writing proficiency. Each student in this Master's program is required to carry out a culminating experience (CE) project by enrolling in either CSC 895 or CSC 898. To successfully complete one's CE project, each student is in turn required, among several other mandatory requirements, to write a written project report for CSC 895 or a written Master's thesis for CSC 898.

Program Learning Outcomes

- a. Design and develop software systems to tackle problems throughout the life cycle of data science and Artificial Intelligence. Major components in this life cycle include: data collection/acquisition, data storage/management, data preprocessing, data modeling and machine learning, and visualization.
- b. Obtain an in-depth understanding of a host of machine learning/data mining algorithms; apply, implement, and evaluate such algorithms to extract knowledge from both structured and unstructured data.
- c. Utilize distributed and parallel computing platforms that are capable of managing and processing big data using computing facilities on premise or in the cloud.
- d. Analyze potentially unethical practices in data science and AI and adopt best practices to become a socially and ethically responsible professional.
- e. Communicate the data systems effectively with multidisciplinary audiences using verbal, written, and visual forms.

Master of Science in Data Science and Artificial Intelligence – 30-33 units

Students may count a maximum of three paired courses (9 units) towards these degree requirements. A paired course is a graduate course paired with an undergraduate course covering similar content and are identified in the course description, e.g., "CSC 865/665 is a paired course offering."

Algorithms, AI & Machine Learning (6-9 units)

Select one:

Code	Title	Units
CSC 849	Search Engines	3
CSC 865	Artificial Intelligence	3
CSC 869	Data Mining	3
CSC 872	Pattern Analysis and Machine Intelligence	3

Select one or two:

Code	Title	Units
CSC 810	Analysis of Algorithms II	3
CSC 849	Search Engines	3
CSC 865	Artificial Intelligence	3
CSC 869	Data Mining	3
CSC 871	Deep Learning	3
CSC 872	Pattern Analysis and Machine Intelligence	3
CSC 876	Soft Computing and Decision Support Systems	3

Big Data Platforms & Systems (3 units)

Select one:

Code	Title	Units
CSC 848	Software Engineering	3
CSC 864	Multimedia Systems	3
CSC 874	Topics in Big Data Analysis	3
CSC 875		3
CSC 878	Big Data Platforms and Systems	3

Probability, Statistics, and Statistical Learning (6 units)

Code	Title	Units
MATH 440	Probability and Statistics I	3
MATH 448	Introduction to Statistical Learning and Data Mining	3

Data Visualization and Visual Data Analytics (3 units)

Code	Title	Units
CSC 805	Data Visualization: Concepts, Tools, Techniques, and Paradigms	3

Applications and Best Practices (3-6 units)

Select one or two:

Code	Title	Units
CSC 820	Natural Language Technologies	3
CSC 821	Biomedical Imaging and Analysis	3
CSC 842	Human-Computer Interaction	3
CSC 847	Cloud and Distributed Computing: Concepts and Applications	3
CSC 852	Introduction to Security and Data Privacy	3
CSC 857	Bioinformatics Computing	3
CSC 859	AI Explainability and Ethics	3
CSC 890	Graduate Seminar	3
CSC 897	Research	3-6
CSC 899	Independent Study	1-3

ISYS 850	Seminar in Business Intelligence	3
MATH 741	Probability and Statistics II	3
MGMT 850	Ethics and Compliance in Business	3
MKTG 886	Seminar in Marketing Analytics	3

Supervised Research and Culminating Experience (6 units)

Code	Title	Units
Select One:		3
CSC 895	Applied Research Project	
CSC 898	Master's Thesis	
Select One:		3
CSC 897	Research	
CSC 899	Independent Study	

Optional: Supervised Industrial Research (1-3 units)

Code	Title	Units
CSC 893	Supervised Industrial Research	1