B.S. IN DATA SCIENCE AND ARTIFICIAL INTELLIGENCE

Overview

Data science (DS) is an interdisciplinary field focused on extracting knowledge from large data sets and applying that knowledge to solve problems. Artificial intelligence (AI) is the study of systems that perceive their environment and take actions that maximize their chance of achieving their goals. The two fields are interwoven, with DS systems using AI techniques for knowledge extraction and representation, and AI systems improving by examination of existing performance data. The proposed new major in Data Science and Artificial Intelligence gives students critical skills in both DS and AI, and teaches them about the interplay between the two fields. This knowledge is based on a foundational underpinning of computer science and mathematics, provides a range of electives to develop skills in subareas, and exposes the application of DS and AI in various domains.

Curriculum Requirements for B.S. in Data Science and Artificial Intelligence

Code	Title	Credit Hours
MAJOR REQUIREMENTS		
Core Computer Science Courses		
CSC 113	Data Science for the World (New course: Data Science for Everyone) [1]	4
CSC 120	Computer Programming I	4
CSC 220	Computer Programming II	4
CSC 315	Introduction to Python for Scientists	3
CSC 317	Data Structures and Algorithm Analysis	3
CSC 545	Introduction to Artificial Intelligence	3
CSC 546	Introduction to Machine Learning with Applications	3
Core Mathematics Courses		
MTH 161	Calculus I (Also fulfills Quantitative Proficiency Skills Requirement)	4
MTH 162	Calculus II	4
MTH 210	Introduction to Linear Algebra	3
MTH 224	Introduction to Probability and Statistics	3
MTH 309	Discrete Mathematics I	3
Techniques		**9**
CSC 115	Python Programming for Everyone (only if taken before CSC 120)	
CSC 322	System Programming	
CSC 423	Database Systems	
CSC 506	Logic and Automated Reasoning	
CSC 542	Statistical Learning with Applications	
CIM 563	Design with AI	
ECE 553	Neural Networks	
ECE 574	Agent Technology	
EPS 351	Introduction to Statistics and Research Design	
EPS 401	Advanced statistics: Using regression for predictive modeling	
EPS 402	Statistical Programing in R and SAS	
JMM 331	Introduction to Infographics and Data Visualization	
JMM 429	Advanced Infographics and Data Visualization	
MTH 524	Introduction to Probability	
MTH 525	Introduction to Mathematical Statistics	
MTH 542	Statistical Analysis	
PHI 330	Ethics	
PSY 292	Introduction to Biobehavioral Statistics Section B (not permitted with MTH 524, MTH 525, or MTH 542)	
Applications		**9**
CSC 329	Introduction to Game Programming	
CSC 410	Computer Science Project Planning [2]	
CSC 411	Computer Science Project Implementation	

CSC 412	Computer Science Internship	
CSC 549	Biomedical Data Science	
CSC 550	Computational Neuroscience	
APY 313	Data science of culture and language	
GEG 305	Spatial Data Analysis I	
GEG 310	Geographic Information Systems I	
GEG 405	Spatial Data Analysis II	
GEG 410	Geographic Information Systems II	
PSY 110	Introduction to Psychology	
PSY 290	Introduction to Research Methods	
Additional Required Course for the Major		
PHI 115	Social and Ethical Issues in Computing	3
GENERAL EDUCATION REQUIREMENTS		
Written Communication Skills:		
WRS 105	First-Year Writing I	3
WRS 106	First-Year Writing II	3
or WRS 107	First-Year Writing II: STEM	
or ENG 106	Writing About Literature and Culture	
Quantitative Skills (3 credits) (fulfilled through MTH 161)		
Areas of Knowledge:		
Arts & Humanities Cognate		9
People & Society Cognate		9
STEM Cognate (9 credits) (fulfilled through the major)		
ADDITIONAL REQUIREMENTS FOR THE B.S. DEGREE		
At least 3 credit hours in Natural Science		3
Language Requirement		3-9
Advanced Writing and Communication Requirement [2]		
Electives		22-28
Total Credit Hours		**120**

1 EPS 402 may be accepted as an alternative to CSC 113. However, since EPS 402 is a 3 credit courses, students who take EPS 402 will be required to take additional elective credits to sum 120 for the B.S. degree.

2 To fulfill the Advanced Writing and Communication Skills requirement, students must complete 4 "W" courses including one of the following; CSC 405 Computer Science Seminars, CSC 410 Computer Science Project Planning, CSC 431 Introduction to Software Engineering or WRS 233 Advanced Writing for STEM.

Plan of Study

Freshman Year		
Fall		**Credit Hours**
CSC 115	Python Programming for Everyone	3
CSC 113 Data Science for Everyone		4
MTH 161	Calculus I	4
WRS 105	First-Year Writing I	3
2nd Language		3
	Credit Hours	**17**
Spring		
CSC 120	Computer Programming I	4
MTH 162	Calculus II	4
WRS 106	First-Year Writing II	3
2nd Language		3
	Credit Hours	**14**

Sophomore Year		
Fall		
CSC 220	Computer Programming II	4
MTH 309	Discrete Mathematics I	3
PHI 115	Social and Ethical Issues in Computing	3
P&S Cognate		3
2nd Language		3
	Credit Hours	**16**
Spring		
CSC 317	Data Structures and Algorithm Analysis	3
MTH 224	Introduction to Probability and Statistics	3
P&S Cognate		3
Natural Science		3
Elective		3
	Credit Hours	**15**
Junior Year		
Fall		
CSC 315	Introduction to Python for Scientists	3
MTH 210	Introduction to Linear Algebra	3
P&S Cognate		3
Elective		3
Elective		3
	Credit Hours	**15**
Spring		
CSC 546	Introduction to Machine Learning with Applications	3
Application		3
A&H Cognate		3
Elective		3
Elective		3
	Credit Hours	**15**
Senior Year		
Fall		
CSC 545	Introduction to Artificial Intelligence	3
Application		3
A&H Cognate		3
Elective		3
Elective		3
	Credit Hours	**15**
Spring		
Application		3
A&H Cognate		3
Elective		3
Elective		3
Elective		3
	Credit Hours	**15**
	Total Credit Hours	**122**

Mission

The program aims to prepare students for professional and research careers in DS and AI, by giving them an understanding of both the principles and the practice of the two areas. The core courses will provide common knowledge that is necessary for all aspects of DS and AI; the elective courses will provide advanced knowledge in chosen subareas, and the application courses will illustrate how techniques in DS and AI can be applied in a range of domains. Additionally, the mathematics and statistics courses provide a formal basis for DS and AI techniques, and the ethics courses teach how

DS and AI should be used in modern society. Students with this major in DS and AI will find employment in a range of industries, or to continue into academic or industrial research.

Learning Outcomes

Students will be able to:

- Write efficient computer programs in several programming languages (minimally Python and Java), using appropriate data structures, to solve application problems.
- Use data analysis languages and libraries for the analysis of large data sets.
- Apply basic and advanced techniques of AI.
- Relate mathematical concepts and techniques to programming, data analysis, and AI algorithms.
- Use specialized tools and techniques from DS and AI, for data repositories, statistical analysis, data visualization, machine learning, etc.
- Translate their DS and AI skills to solve problems in application domains beyond computer science and mathematics.
- Use DS and AI in an ethical way.