DATA SCIENCE AND ANALYTICS, BA

Degree: Bachelor of Arts (BA)
Major: Data Science and Analytics

Program Overview

The Bachelor of Arts degree program in data science and analytics is a combination of a liberal arts program and a data science major. Although it is less technical than the Bachelor of Science degree program in data science and analytics, it is a professional program in the sense that graduates can be employed as data science or computing professionals. The Bachelor of Arts degree program in data science and analytics provides students with foundational skills and experience needed to understand and handle large amounts of data to derive actionable information while also providing students flexibility to pursue a wide range of academic interests. The degree program is particularly suitable for students who want to combine data science with expertise in another discipline. For example, students can major in another discipline in addition to data science and routinely complete all of the requirements for the double major in a four year period, or students can major in data science and take all of the pre-med courses in a four year period. In addition to an excellent technical education, all students in the department are exposed to societal issues, ethics, professionalism, and have the opportunity to develop leadership and creativity skills.

Program Educational Objectives

Graduates of the Bachelor of Arts degree program in data science and analytics will be prepared to:

1. Analyze real-world problems and create data-driven solutions based on the fundamentals of data science and computing.
2. Work effectively, professionally, collaboratively, and ethically.
3. Assume leadership roles in industry, academia, public service, and entrepreneurship.
4. Successfully progress in advanced degree programs in data science, computing, and related fields.

Learning Outcomes

- Students analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
- Students design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
- Students communicate effectively in a variety of professional contexts.
- Students recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
- Students function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
- Students apply theory, techniques, and tools throughout the data analysis life cycle and employ the resulting knowledge to satisfy stakeholders' needs.

Undergraduate Policies

For undergraduate policies and procedures, please review the **Undergraduate Academics** section of the General Bulletin.

Combined Bachelor's/Master's Programs

Undergraduate students may participate in accelerated programs toward graduate or professional degrees. For more information and details of the policies and procedures related to accelerated studies, please visit the **Undergraduate Academics** section of the General Bulletin.

Program Requirements

Students seeking to complete this major and degree program must meet the **general requirements for bachelor's degrees** and the **Unified General Education Requirements**. Students completing this program as a **secondary major** while completing another undergraduate degree program do not need to satisfy the **school-specific requirements** associated with this major.

Required Courses

Code	Title	Credit Hours
MATH 121	Calculus for Science and Engineering I	4
MATH 122	Calculus for Science and Engineering II	4
or MATH 124	Calculus II	
MATH 307	Linear Algebra	3
STAT 301	Introduction to Probability for Statistics	3
or STAT 312	Basic Statistics for Engineering and Science	
or STAT 313	Statistics for Experimenters	
or MATH 380	Introduction to Probability	
CSDS 132	Programming in Java	3
CSDS 133	Introduction to Data Science	3
CSDS 233	Introduction to Data Structures	4
CSDS 234	Structured and Unstructured Data	3
or CSDS 341	Introduction to Database Systems	
CSDS 302	Discrete Mathematics	3
CSDS 310	Algorithms	3
CSDS 312	Introduction to Data Science Systems	3
CSDS 313	Introduction to Data Analysis	3
CSDS 340	Introduction to Machine Learning	3
CSDS 398	Senior Project in Data Science	4
Total Credit Hours		**46**

Data Application Course

Data science majors are exposed to an application area to provide context to the data science activities studied in the required courses. This requirement is achieved by taking at least one course, totaling at least 3 credits from the following list.

Code	Title	Credit Hours
ASTR 222	Galaxies and Cosmology	3
ASTR 306	Astronomical Techniques	3

BAFI 351	Financial Data Science: Data Analytics & Machine Learning Fundamentals	3
BAFI 361	Empirical Analysis in Finance	3
CSDS 458	Introduction to Bioinformatics	3
CSDS 459	Bioinformatics for Systems Biology	3
DSCI 330	Cognition and Computation	3
DSCI 351	Exploratory Data Science	3
ECON 326	Econometrics	4
ECON 327	Advanced Econometrics	3
ECON 380	Computational Methods for Economic Modeling	1.5
ECON 395	Capstone Research in Economics	3
MATH/BIOL/SYBB/ ECSE 319	Applied Probability and Stochastic Processes for Biology	3
MKMR 310	Marketing Analytics	3
MPHP 301	Introduction to Epidemiology	3
MPHP 426	An Introduction to GIS for Health and Social Sciences	3
MPHP 484	Global Health Epidemiology	1-3
OPMT 377A	Business Forecasting	1.5
OPMT 377B	Enterprise Resource Planning in the Supply Chain	1.5
SASS 471	Introduction to Data Science for Social Impact	3
SASS 472	Semester Research Project in Data Science for Social Impact	3
SYBB 311	Technologies in Bioinformatics	3

Technical Electives

Data science majors select at least two technical electives totaling at least 6 credits from the following list. These electives are in addition to the required courses and data application course.

Code	Title	Credit Hours
CSDS 234	Structured and Unstructured Data	3
CSDS 305	Files, Indexes and Access Structures for Big Data	3
CSDS 323	Numerical Algorithms for Machine Learning	3
CSDS 335	Data Mining for Big Data	3
CSDS 341	Introduction to Database Systems	3
CSDS 356	Data Privacy	3
MATH 223	Calculus for Science and Engineering III	3
or MATH 227	Calculus III	
MATH 356	Math in Machine Learning	3
MATH 380	Introduction to Probability	3
MATH 382	High Dimensional Probability	3
MATH 408	Introduction to Cryptology	3
MATH 444	Mathematics of Data Mining and Pattern Recognition	3
Any STAT course at the 300-level or higher		3-4

Sample Plan of Study

First Year		
Fall		**Credit Hours**
CSDS 132	Programming in Java	3
MATH 121	Calculus for Science and Engineering I	4
Academic Inquiry Seminar, Breadth, or Elective course [a]		3
Open Elective		3
Open Elective		3
	Credit Hours	**16**
Spring		
CSDS 133	Introduction to Data Science	3
CSDS 233	Introduction to Data Structures	4
MATH 122 or MATH 124	Calculus for Science and Engineering II or Calculus II	4
Academic Inquiry Seminar, Breadth, or Elective course [a]		3
	Credit Hours	**14**
Second Year		
Fall		
CSDS 302	Discrete Mathematics	3
STAT 301 or STAT 312 or STAT 313 or MATH 380	Introduction to Probability for Statistics or Basic Statistics for Engineering and Science or Statistics for Experimenters or Introduction to Probability	3
Breadth, or Elective course [a]		3
Open Elective		3
Open Elective		3
	Credit Hours	**15**
Spring		
CSDS 234	Structured and Unstructured Data (or Technical Elective)	3
MATH 307	Linear Algebra	3
Breadth, or Elective course [a]		3
Open Elective		3
Open Elective		3
	Credit Hours	**15**
Third Year		
Fall		
CSDS 310	Algorithms	3
CSDS 313	Introduction to Data Analysis	3
Breadth, or Elective course [a]		3
Open Elective		3
Open Elective		3
	Credit Hours	**15**
Spring		
CSDS 312	Introduction to Data Science Systems	3
CSDS 341	Introduction to Database Systems (or Technical Elective)	3
Breadth, or Elective course [a]		3
Open Elective		3
Open Elective		3
	Credit Hours	**15**

Fourth Year		
Fall		
CSDS 340	Introduction to Machine Learning	3
Data Application course		3
Breadth, or Elective course [a]		3
Open Elective		3
Open Elective		3
	Credit Hours	**15**
Spring		
CSDS 398	Senior Project in Data Science	4
Technical Elective		3
Breadth, or Elective course [a]		3
Open Elective		3
Open Elective		2
	Credit Hours	**15**
	Total Credit Hours	**120**

a **Unified General Education Requirement**.