# DATA SCIENCES MINOR

# Introduction

Please click here (http://catalog.ucdenver.edu/cu-denver/undergraduate/ schools-colleges-departments/college-liberal-arts-sciences/ mathematical-statistical-sciences/) to see Mathematical and Statistical department information.

The demand for employees trained in data science has grown considerably in recent years. This minor will serve students by offering them specific training in data science.

Data science training should include components related to statistics, computing, and preferably, a specific field of application (e.g., business, biology, health, etc.). The minor is flexible in that it allows a student to get core training in data science programming and statistics, while allowing students to develop additional data science-related skills from other disciplines, or to focus on specific skills within data science.

These program requirements are subject to periodic revision by the academic department, and the College of Liberal Arts and Sciences reserves the right to make exceptions and substitutions as judged necessary in individual cases. Therefore, the College strongly urges students to consult regularly with their major, minor and CLAS advisors to confirm the best plans of study before finalizing them.

## **Program Delivery**

• This is an on-campus program.

#### **Declaring This Minor**

- Please see your CLAS advisor.
- Click here (http://catalog.ucdenver.edu/cu-denver/undergraduate/ schools-colleges-departments/college-liberal-arts-sciences/ #policiestext) to go to information about declaring a major/minor.

## **General Requirements**

Students must satisfy all requirements as outlined below and by the department offering the minor.

 Click here (http://catalog.ucdenver.edu/cu-denver/undergraduate/ academic-policies-procedures/) for information about Academic Policies

# **Program Requirements**

- 1. Students must complete a minimum of 18 credit hours, including a minimum of 9 MATH credit hours.
- 2. Students must complete a minimum of 12 upper-division (3000-level and above) credit hours, including a minimum of six upper-division MATH credits. Most upper-division courses have lower-division prerequisites.
- 3. Students must earn a minimum grade of C- (1.7) in all courses that apply to the minor and must achieve a minimum cumulative minor GPA of 2.0. Courses taken using P+/P/F or S/U grading cannot apply to minor requirements.
- 4. Students must complete a minimum of six upper-division level MATH credit hours with CU Denver faculty.

# **Program Restrictions, Allowances and Recommendations**

- 1. Be aware of no co-credit policies. Here is a non-exclusive list of our most common no co-credit policies: no co-credit between:
  - MATH 3800 Probability and Statistics for Engineers and MATH 3810 Introduction to Probability,
  - MATH 3195 Linear Algebra and Differential Equations and MATH 3200 Elementary Differential Equations,
  - MATH 3191 Applied Linear Algebra and MATH 3195 Linear Algebra and Differential Equations,
  - MATH 4387 Applied Regression Analysis and MATH 4830 Applied Statistics.

Code	Title	Hours
Complete the follow	ving required courses:	12
MATH 1376	Programming for Data Science	
or CSCI 1410	Fundamentals of Computing and Fundamentals of Computing Laboratory	
& CSCI 1411		
or ISMG 440	Programming Fundamentals with Python	
MATH 2830	Introductory Statistics	
or MATH 33	SS tatistical Theory	
or MATH 38	OPProbability and Statistics for Engineers	
MATH 3376	Data Wrangling & Visualization	
MATH 4830	Applied Statistics	
or MATH 438	BApplied Regression Analysis	
Complete six credit courses:	t hours of electives from the following list of approve	ed 6
MATH 3191	Applied Linear Algebra	
MATH 3195	Linear Algebra and Differential Equations	
MATH 3200	Elementary Differential Equations	
MATH 3301	Introduction to Optimization	
MATH 3810	Introduction to Probability	
MATH 4337	Intro to Statistical and Machine Learning	
MATH 4388	Machine Learning Methods	
MATH 4390	Game Theory	
MATH 4408	Applied Graph Theory	
MATH 4650	Numerical Analysis I	
MATH 4660	Numerical Analysis II	
MATH 4733	Partial Differential Equations	
MATH 4792	Probabilistic Modeling	
MATH 6330	Workshop in Statistical Consulting	
ECON 4030	Data Analysis with SAS	
ECON 4811	Introduction to Econometrics	
CHEM 4521	Physical Chemistry: Quantum and Spectroscopy	
CHEM 4580	Molecular Informatics	
CHEM 4640	Artificial Intelligence in Chemistry and Biochemistry	
CHEM 4845	Molecular Modeling and Drug Design	
CSCI 3287	Database System Concepts	
CSCI 3963	Network Structures	
CSCI 4455	Data Mining	
CSCI 4580	Data Science	

Total Hours	;	1	8
ISMG 35	00 Busin	ess Data and Database Management	
ISMG 30	00 Techn	ology In Business	
GEOG 42	35 GIS A	pplications in the Health Sciences	
GEOG 40	95 Deplo	ying GIS Functionality on the Web	
GEOG 40	92 GIS Pr	ogramming and Automation	
GEOG 40	91 Open	Source Software for Geospatial Applications	
GEOG 40	90 Enviro Inform	nmental Modeling with Geographic nation Systems	
GEOG 40	085 GIS Ap	pplications for the Urban Environment	
GEOG 40	)81 Cartog	Jraphy	
GEOG 40	80 Introd	uction to GIS	
GEOG 40	70 Remo	te Sensing II: Advanced Remote Sensing	
CSCI 495	51 Big Da	ta Systems	
CSCI 493	B1 Deep	_earning	
CSCI 493	30 Machi	ne Learning	
CSCI 478	38 Bioinf	ormatics	

To learn more about the Student Learning Outcomes for this program, please visit our website (https://clas.ucdenver.edu/mathematical-and-statistical-sciences/undergraduate-goals-and-objectives/).