College of Liberal Arts and Sciences
UNIVERSITY OF COLORADO **DENVER**

DATA SCIENCE

Bachelor of Science (B.S.) – Catalog Year Fall 2023

PROGRAM OVERVIEW

The explosive growth in data collection over the past 10 years is unlikely to slow any time soon. This has created a dramatic increase in demand for individuals who can understand how to make decisions and predictions in the context of uncertainty through use of experimental design, statistical methods, and programming, especially in the context of large data sets. This need spans many fields such as environmental applications of climate modeling over space and time, medical and genomic applications that use electronic medical records to correlate demographics, genetic data, and clinical outcomes over millions of individuals, national security applications (including real-time monitoring of internet trends), and manufacturing with real-time monitoring of features over a variety of processes to both troubleshoot and optimize manufacturing. Graduates of the BS in Data Science will be well-positioned to meet this need.

ACADEMIC ADVISING

The College of Liberal Arts and Sciences (CLAS) supports students to graduation using a shared advising system. CLAS students have two academic advisors with whom they should meet regularly to discuss academic and degree progress: a CLAS Academic Advisor and a major advisor.

For questions related to CU Denver Core Curriculum, CLAS, general graduation requirements, university/college academic policies, or campus resources contact:

CLAS Academic Advising
clas_advising@ucdenver.edu
Visit the CLAS Advising website here
North Classroom (NC) 1030
303-315-7100

For questions related to major requirements, major course prerequisites, or evaluation of transfer coursework in your major contact:

Data Science Major Advising
CLAS Major Advisor Contact Information
Student Commons Building (SCB) 4213
303-315-1700

GENERAL GRADUATION REQUIREMENTS & POLICIES

All CU Denver students are required to complete the following minimum general graduation requirements to be eligible to apply for graduation:

1. Complete a minimum of 120 credit hours
2. Achieve a minimum 2.0 CU cumulative grade point average (GPA)
3. Complete a minimum of 30 credit hours at CU Denver
4. Complete all CU Denver Core and major requirements

The following are **maximum** *credit hours that can apply toward the minimum 120 hours required for graduation:*

- 16 credit hours Pass/Fail
- 12 credit hours of Independent Study/Directed Research
- 12 credit hours of internship credit
- 8 credit hours of physical education credit

PROGRAM REQUIREMENTS & POLICIES

Students are responsible for meeting with the major advisor to confirm major requirements. In addition to completing all CU Denver Core requirements, students completing the Data Science B.S. Degree are required to complete the following minimum program requirements:

1. Students must complete a total of 87 major credit hours, from approved courses.
2. Students must complete at least 30 upper-division (3000-level and above) credit hours in the major.
3. Students must earn a minimum grade of C- (1.7) in all courses that apply to the major and must achieve a minimum cumulative major GPA of 2.25. All graded attempts in required and elective courses are calculated in the major GPA. Courses taken using P+/P/F or S/U grading cannot apply to major requirements.
4. Students must complete a minimum of 15 upper-division (3000- to 4000-level) credit hours with CU Denver faculty.
5. Courses are under development and may be subject to change. Students should meet with their advisor to check and confirm course registration.

LYNXCONNECT RESOURCES

Are you interested in learning about internship, study abroad, career, and research opportunities for this major? Visit the CU Denver LynxConnect, located in Tivoli Student Union (TV) Suite 339, and browse the LynxConnect website for more information.

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Degree Requirements	Credits	Notes
* Course prerequisites change regularly. Students are responsible for consulting advisors and the class schedule in the student portal for prerequisite information. *		
CU Denver Core Curriculum Requirements	34 - 40	*CU Denver Core Curriculum Requirements*
Data Science Major Requirements	87	*30 credit hours must be upper-division*
Complete the following BUSN courses:		
BMIN 1000 Introduction to Business	3	
BMIN 2200 Career and Professional Development	3	
ISMG 3100 Data Governance and Ethics	3	
BANA 4110 Business Analytics Processes	3	**Prerequisite: BANA 2010*
BANA 4120 Forecasting Techniques	3	**Prerequisite: BANA 2010*
Complete the following CSCI courses:		
CSCI 2400 Data Structures and Program Design for Data Science	3	
CSCI 2800 Special Topics (Data Science Thinking)	3	
CSCI 3400 Databases for Data Science	3	
CSCI 3450 Algorithms for Data Science	3	
CSCI 4455 Data Mining	3	*Prerequisite: Grade of C- or higher in MATH 3195 (or both MATH 3191 and MATH 3200), CSCI 3287 and CSCI 3412.
CSCI 4580 Data Science	3	*Prerequisite: Grade of C- or higher in MATH 3195 (or both MATH 3191 and MATH 3200), CSCI 3287 and CSCI 3412
CSCI 4930 Machine Learning	3	* Prerequisite: Grade of C- or higher in the following courses: MATH 3195 (or both MATH 3191 and MATH 3200) & CSCI 3412
CSCI 4931 Deep Learning	3	* Prerequisite: Grade of C- or higher in the following courses: MATH 3195 (or both MATH 3191 and MATH 3200) & CSCI 3412
CSCI 4951 Big Data Systems	3	* Prerequisite: Grade of C- or higher in MATH 3195 (or both MATH 3191 and MATH 3200), CSCI 3287 and CSCI 3412
Complete the following MATH courses:		**Check prerequisites for individual courses*
MATH 1376 Programming for Data Science	3	**Prerequisite: C- or higher in MATH 1109 or MATH 1110 or MATH 1120 or MATH 1130 or MATH 1401 or MATH 2830 OR entry into the MA30 or MA01 Student Group OR ALEKS PPL score 61-100 (for MATH 1376)*
MATH 1401 Calculus I	4	**Prerequisite: C- or higher in MATH 1109, 1070, or 1110 and MATH 1120; or C- or higher in MATH 1130; or C- or higher in MATH 1401; or entry into the MA01 Student Group OR ALEKS PPL score 76-100.* *Course can fulfill CU Denver Core Mathematics*
MATH 2411 Calculus II	4	**Prerequisite: C- or better in MATH 1401* *Course can fulfill CU Denver Core Mathematics*
MATH 2421 Calculus III	4	**Prerequisite: C- or better in MATH 2411* *Course can fulfill CU Denver Core Mathematics*
MATH 2700 Data Analysis with R and Other Tools	3	
MATH 2830 Introductory Statistics	3	
MATH 3191 Applied Linear Algebra	3	**Prerequisite: C- or better in MATH 1401*
MATH 3376 Data Wrangling & Visualization	3	**Prerequisite: C- higher in MATH 1376 or MATH 4387 or CSCI1410/1411 and C- or higher in MATH 2830 or MATH 3382*
MATH 3382 Statistical Theory	3	**Prerequisite: C- or better in MATH 2421*
MATH 3810 Introduction to Probability	3	*Corequisite: MATH 2421*
MATH 4387 Applied Regression Analysis	3	**Prerequisite: C- or better MATH 3191 and MATH 3382, 3800, or 4820*
Complete nine credits of 4000-level application domain electives	9	**See major advisor for approved courses*
Estimated General Electives	0	*General Elective credit hours will vary based on Core & CLAS Requirements. Consult with CLAS Advisor.*

Total Minimum Credit Hours:	121	*45 credit hours must be upper-division*

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SAMPLE ACADEMIC PLAN OF STUDY

The following academic plan is a *sample* pathway to completing degree requirements for this major. Students should tailor this plan based on previously completed college coursework (e.g., AP, IB, CLEP, dual/concurrent enrollment, and transfer credit), course availability, and individual preferences related to course load, schedules, or add-on programs such as minors or double-majors. Students should also work with their CLAS and major advisors to modify this sample academic plan based on their math readiness and placement. Additional sample plans based on varying math placements are available here.

Year One

Fall	CRS
BMIN 1000 Introduction to Business	3
ENGL 1020 Core Composition I [C]	3
MATH 1376 Programming for Data Science [PE]	3
MATH 1401 Calculus I [PE C]	4
CU Denver Core Arts / First-Year Seminar	3
Total Credit Hours	**16**

Spring	CRS
ENGL 2030 – Core Composition II [C]	3
CSCI 2800 Special Topics (Data Science Thinking)	3
MATH 2830 Introductory Statistics [C]	3
MATH 2411 Calculus II [PE C]	4
CU Denver Core Humanities	3
Total Credit Hours	**16**

Year Two

Fall	CRS
BMIN 2200 Career and Professional Development	3
CSCI 2400 Data Structures and Program Design for Data Science	3
ISMG 3100 Data Governance and Ethics	3
MATH 2421 Calculus III [PE C]	4
CU Denver Core Social Sciences	3
Total Credit Hours	**16**

Spring	CRS
CU Denver Core Behavioral Sciences	3
CU Denver Core Natural and Physical Sciences with a lab	4-5
CSCI 3400 Databases for Data Science	3
MATH 2700 Data Analysis with R	3
MATH 3376 Data Wrangling & Visualization [PE]	3
Total Credit Hours	**16-17**

Year Three

Fall	CRS
CU Denver Core International Perspectives	3
MATH 3810 Introduction to Probability	3
CSCI 3450 Algorithms for Data Science	3
MATH 3191 Applied Linear Algebra [PE]	3
BANA 2010 Business Statistics *(if needed – see major advisor)*	3
Total Credit Hours	**15**

Spring	CRS
Application Domain Elective	3
CU Denver Core Cultural Diversity	3
BANA 4110 Business Analytics Processes	3
CSCI 4580 Data Science [PE]	3
MATH 3382 Statistical Theory [PE]	3
Total Credit Hours	**15**

Year Four

Fall	CRS
Application Domain Elective	3
BANA 4120 Forecasting Techniques	3
CSCI 4455 Data Mining [PE]	3
CSCI 4931 Deep Learning [PE]	3
General Elective	3
Total Credit Hours	**15**

Spring	CRS
Application Domain Elective	3
CSCI 4930 Machine Learning [PE]	3
CSCI 4951 Big Data Systems [PE]	3
MATH 4387 Applied Regression Analysis [PE]	3
Total Credit Hours	**12**

[M] *Major Course Available* [C] *CU Denver Core Course* [PE] *Prerequisite Enforced* [PR] *Prerequisite Recommended*