

MAJOR IN DATA SCIENCE, GENERAL CONCENTRATION

Data Science is the discovery of knowledge and insight through the analysis of data. As such, it draws on the study of algorithms and their implementation from computer science, the power of abstraction and of geometric and topological formalism from mathematics, and the modeling and analysis of data from statistics. It has emerged as a separate field in response to the avalanche of data from web enabled sensors and instrumentation, mobile devices, web logs and transactions, and the availability of computing power for data storage and analysis. Modern data is challenging not only due to its large scale, but also because it is increasingly heterogeneous and unstructured. Information gleaned from this data none-the-less is revolutionizing diverse areas of human endeavor from health policy to high energy physics.

Learning Objectives

Upon successful completion of this program, students will be able to:

1. Determine which data analysis methods are appropriate in a wide variety of contexts, build and assess statistical models, perform the analyses and report the results.
2. Use graphical, oral, and written means to effectively and fluently communicate analysis results and ideas.
3. Interact and communicate with collaborators in a wide range of fields.
4. Function effectively in teams to accomplish a common goal.

Requirements Effective Fall 2026

Freshman

		AUCC	Credits
CO 150	College Composition (GT-CO2)	1A	3
CS 150B	Culture and Coding: Python	3B	3
CS 164	CS1--Computational Thinking with Java		4
DSCI 100	First Year Seminar in Data Science		1
DSCI 369	Linear Algebra for Data Science		4
MATH 156 ¹	Mathematics for Computational Science I (GT-MA1)	1B	4
STAT 158	Introduction to R Programming		1
STAT 315	Intro to Theory and Practice of Statistics		3
1C (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#aucc)		1C	3
Biological and Physical Sciences (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#biological-physical-sciences)		3A	4
Total Credits			30

Sophomore

CS 165	CS2--Data Structures		4
CS 201/PHIL 201	Ethical Computing Systems	3B	3
CS 220	Discrete Structures		4
DSCI 235	Data Wrangling		2
MATH 151	Mathematical Algorithms in Matlab I		1
MATH 256 ¹	Mathematics for Computational Science II		4
STAT 341	Statistical Data Analysis I		3
STAT 342	Statistical Data Analysis II		3
Biological and Physical Sciences (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#biological-physical-sciences)		3A	3
Social and Behavioral Sciences (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#social-behavioral-sciences)		3C	3
Total Credits			30

Junior

DSCI 320/MATH 320	Optimization Methods in Data Science		3
DSCI 335	Inferential Reasoning in Data Analysis		3
DSCI 336	Data Graphics and Visualization		1
Select one course from the following:			3
CO 300	Writing Arguments (GT-CO3)	2	

CO 301B	Writing in the Disciplines: Sciences (GT-CO3)	2	
CO 302	Writing in Digital Environments (GT-CO3)	2	
JTC 300	Strategic Writing and Communication (GT-CO3)	2	
Data Science Electives ²			6
Minor or Second Major ³			12
Historical Perspectives (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#historical-perspectives)		3D	3
Total Credits			31
Senior			
DSCI 445	Statistical Machine Learning	4B	3
DSCI 478	Capstone Group Project in Data Science	4A,4C	4
Data Science Electives ²			6
Minor or Second Major ³			9
Electives ⁴			7
Total Credits			29
Program Total Credits:			120

Data Science Electives List ²

Code	Title	AUCC	Credits
Select a minimum of 12 total credits from the list below:			
CS 214	Software Development		3
CS 250	Computer Systems Foundations		4
CS 270	Computer Organization		4
CS 314	Software Engineering		3
CS 320	Algorithms--Theory and Practice		3
CS 370	Operating Systems		3
CS 435	Introduction to Big Data		4
CS 440	Introduction to Artificial Intelligence		4
CT 301	C++ Fundamentals		2
DSCI 473	Introduction to Geometric Data Analysis		2
DSCI 475	Topological Data Analysis		2
ECON 202	Principles of Microeconomics (GT-SS1)	3C	3
ECON 204	Principles of Macroeconomics (GT-SS1)	3C	3
ECON 304	Intermediate Macroeconomics		3
ECON 306	Intermediate Microeconomics		3
ECON 435	Intermediate Econometrics		3
MATH 301	Introduction to Combinatorial Theory		3
MATH 317	Advanced Calculus of One Variable		3
MATH 331	Introduction to Mathematical Modeling		3
MATH 332	Partial Differential Equations		3
MATH 345	Differential Equations		4
MATH 360	Mathematics of Information Security		3
MATH 450	Introduction to Numerical Analysis I		3
MATH 451	Introduction to Numerical Analysis II		3
STAT 305	Sampling Techniques		3
STAT 331	Intermediate Applied Statistical Methods		3

STAT 351	Sports Statistics and Analytics I	3
STAT 400	Statistical Computing	3
STAT 420	Probability and Mathematical Statistics I	3
STAT 421	Introduction to Stochastic Processes	3
STAT 430	Probability and Mathematical Statistics II	3
STAT 440	Bayesian Data Analysis	3
STAT 451	Sports Statistics and Analytics II	3
STAT 460	Applied Multivariate Analysis	3
STAT 472	Statistical Research--Design, Data, Methods	3

¹ The calculus requirement for the major may alternatively be satisfied by completion of MATH 160, MATH 161, and MATH 261; or by completion of MATH 155 and MATH 255.

² A minimum of 12 total credits must be selected from the Data Science Electives. Courses used to satisfy the requirement of the minor/second major/interdisciplinary minor may not double-count towards the Data Science Electives requirement.

³ Students must complete a minor, second major, or interdisciplinary minor, excluding the following: Minor in Computer Science, Minor in

Data Science, Minor in Economics, Minor in Statistics, Minor in Applied Statistics, Minor in Mathematics, Minor in Bioinformatics.

⁴ Select enough elective credits to bring the program total to a minimum of 120 credits, of which at least 42 must be upper-division (300- to 400-level).

Major Completion Map

Freshman

Semester 1		Critical	Recommended	AUCC	Credits
CS 150B	Culture and Coding: Python	X		3B	3
DSCI 100	First Year Seminar in Data Science	X			1
MATH 156	Mathematics for Computational Science I (GT-MA1)	X		1B	4
1C	(https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#aucc)		X	1C	3
	Biological and Physical Sciences (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#biological-physical-sciences)		X	3A	4
Total Credits					15

Semester 2		Critical	Recommended	AUCC	Credits
CO 150	College Composition (GT-CO2)	X		1A	3
CS 164	CS1--Computational Thinking with Java	X			4
DSCI 369	Linear Algebra for Data Science	X			4
STAT 158	Introduction to R Programming	X			1
STAT 315	Intro to Theory and Practice of Statistics	X			3
Total Credits					15

Sophomore

Semester 3		Critical	Recommended	AUCC	Credits
CS 165	CS2--Data Structures	X			4
CS 201/PHIL 201	Ethical Computing Systems	X		3B	3
STAT 341	Statistical Data Analysis I	X			3
	Biological and Physical Sciences (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#biological-physical-sciences)		X	3A	3
	Social and Behavioral Sciences (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#social-behavioral-sciences)		X	3C	3
Total Credits					16

Semester 4		Critical	Recommended	AUCC	Credits
CS 220	Discrete Structures	X			4
DSCI 235	Data Wrangling	X			2

MATH 151	Mathematical Algorithms in Matlab I	X			1
MATH 256	Mathematics for Computational Science II	X			4
STAT 342	Statistical Data Analysis II	X			3
Total Credits					14
Junior					
Semester 5		Critical	Recommended	AUCC	Credits
DSCI 320/ MATH 320	Optimization Methods in Data Science	X			3
Select one course from the following:		X			3
CO 300	Writing Arguments (GT-CO3)			2	
CO 301B	Writing in the Disciplines: Sciences (GT-CO3)			2	
CO 302	Writing in Digital Environments (GT-CO3)			2	
JTC 300	Strategic Writing and Communication (GT-CO3)			2	
Minor or Second Major		X			6
Historical Perspectives (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#historical-perspectives)			X	3D	3
Total Credits					15
Semester 6		Critical	Recommended	AUCC	Credits
DSCI 335	Inferential Reasoning in Data Analysis	X			3
DSCI 336	Data Graphics and Visualization	X			1
Data Science Electives			X		6
Minor or Second Major		X			6
Total Credits					16
Senior					
Semester 7		Critical	Recommended	AUCC	Credits
DSCI 445	Statistical Machine Learning	X		4B	3
Data Science Elective			X		3
Elective			X		3
Minor or Second Major					6
Total Credits					15
Semester 8		Critical	Recommended	AUCC	Credits
DSCI 478	Capstone Group Project in Data Science	X		4A,4C	4
Data Science Elective		X			3
Electives		X			4
Minor or Second Major					3
The benchmark courses for the 8th semester are the remaining courses in the entire program of study.		X			
Total Credits					14
Program Total Credits:					120