Bachelor of Science

Data Science (BS)

Web Site: https://www.odu.edu/datascience (https://www.odu.edu/datascience/)

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The increased amount of available data has escalated the demand for data science professionals. The purpose of the BS in Data Science program is to provide students with foundational knowledge in the core competency areas of data science. Students will learn to use data to identify trends and patterns, solve problems, communicate results, and recommend solutions. The program will provide opportunities for students to practice these skills across application areas from different domains (e.g., geography, business, education). Graduates of this program will have the computer science, mathematics and statistics, and data analytics knowledge, skills, and abilities to work as data professionals.

For more information about the program contact Dana Willner, Undergraduate Program Director (dwillner@odu.edu).

Requirements

Lower-Division General Education

Written Communication (http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#written)	6
Oral Communication (http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#oral)	3
Mathematics (http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#math)	3
Language and Culture (http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#language)	0-6
Information Literacy and Research (http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#information)	3
Human Behavior (http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#behavior)	3
Human Creativity (http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#creativity)	3
Interpreting the Past (http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#interpret)	3
Literature (http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#literature)	3
Philosophy and Ethics (http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#philosophy)	3
The Nature of Science (http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#nature)	8
Impact of Technology (http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#impact)	3

Mathematics: Met with STAT 130M in Foundations.

Human Behavior: May not be met with DASC 205S or SOC 205S.

Philosophy and Ethics: Met with DASC 357E/PHIL 357E in the major.

Impact of Technology: Met with BDA 200T in the major.

Upper-Division General Education

Met in the major.

Requirements for Graduation

Requirements for graduation include the following:

- Minimum of 120 credit hours.
- Minimum of 30 credit hours overall and 12 credit hours of upper-level courses in the major program from Old Dominion University.
- Minimum overall cumulative grade point average of C (2.00) in all courses taken.
- Minimum overall cumulative grade point average of C (2.00) in all courses taken toward the major.
- Minimum overall cumulative grade point average of C (2.00) in all courses taken toward a minor.
- Completion of ENGL 110C, ENGL 211C or ENGL 231C, and the writing intensive (W) course in the major with a grade of C or better. The W course must be taken at Old Dominion University.
- Completion of Senior Assessment.

Data Science Major

General Education		
Complete lower-division requirements		32-38
Upper Division General Education (met in the major)		
Foundation Courses		
MATH 163	Precalculus II **	3
STAT 130M	Elementary Statistics	3
Select one of the following programming options:		8
DASC 157 & DASC 257	Introduction to Data Science Programming and Data Science Programming	
CS 153 & DASC 255	Introduction to Programming with Python and Data Processing with Python	
CS 153 & CS 251	Introduction to Programming with Python and Programming with Java	
Core Requirements		
BDA 200T	Elements of Data Science	3
DASC/SOC 205S	Data, Technology, Society	3
DASC 300	Foundations of Data Science	3
DASC/PHIL 357E	Ethics and Data	3
DASC 434	Data Curation and Management	3
IT 360T	Principles of Information Technology	3
IT 450	Database Concepts	3
STAT 310	Introductory Data Analysis	3
DASC 436W	Data Science Capstone Project *	3
Complete an area of specialization (27-30 credits)		**27-30**
Total Credit Hours		**100-109**

* Writing Intensive: C or better required.

** MATH 162M may be needed as a prerequisite. Recommend taking as an elective if needed.

No more than two classes, or six credits, may be counted for both the major and a minor. Some minors may allow fewer credits to share.

Data Science Areas of Specialization

Students in the Bachelor of Science in Data Science degree program must focus their studies in one of the specialized areas listed below.

The Artificial Intelligence and Machine Learning area requires completion of the following:

Required Courses		
MATH 211	Calculus I	4
MATH 212	Calculus II	4
MATH 316	Introductory Linear Algebra	3
CS 252	Introduction to Unix for Programmers	1
CS 422	Introduction to Machine Learning	3
Select five of the following approved area electives:		15
BDA 431	Modern Statistical Methods for Big Data Analytics	
BDA 432	Introduction to Optimization in Data Science	
CS 361	Data Structures and Algorithms	

CS 432	Web Science
CS 469	Data Analytics for Cybersecurity
CS 480	Introduction to Artificial Intelligence
CYSE 420	Applied Machine Learning in Cybersecurity
DASC 324	Introduction to Data Visualization
DASC 424	Data Storytelling
ECE 407	Introduction to Game Development
GEOG 402	Geographic Information Systems
IT 452	Cloud Database
IT 453	Advanced Database Concepts
STAT 331	Theory of Probability
STAT 405	Introduction to Data Handling
STAT 437	Applied Regression and Time Series Analysis

Total Credit Hours	**30**

The Data Visualization area requires completion of the following:

Required Courses		
COMM 260	Understanding Media	3
COMM 303	Introduction to Strategic Communications	3
DASC 324	Introduction to Data Visualization	3
DASC 424	Data Storytelling	3
IT 150G	Basic Information Literacy and Research	3
IT 325	Web Site and Web Page Design	3
Select four of the following approved area electives:		12
BNAL 206	Business Analytics I	
BNAL 306	Business Analytics II	
BNAL 403	Data Visualization and Exploration	
COMM 402	Communicating Data	
CRJS 344	Social Science and Crime Mapping	
CS 361	Data Structures and Algorithms	
CS 432	Web Science	
DASC 312	The Art of Data Visualization	
ECE 406	Computer Graphics and Visualization	
ECE 407	Introduction to Game Development	
ENGL 307T	Digital Writing	
or ENGL 334W	Technical Writing	
GAME 201T	Introduction to Game Studies	
GAME 340	Visual Design and Digital Graphics for Games	
GAME 440	Advanced Visual Design and Digital Graphics for Games	
GEOG 300	Maps and Geographic Information	
or GEOG 402	Geographic Information Systems	
IT 452	Cloud Database	
IT 453	Advanced Database Concepts	
Total Credit Hours		**30**

The Geospatial Analytics area requires completion of the following:

Required courses		
GEOG 102T	Digital Earth: Geospatial Technology and Society	3
GEOG 402	Geographic Information Systems	3
GEOG 404	Digital Techniques for Remote Sensing	3
GEOG 425	Internet Geographic Information Systems	3
GEOG 432	Advanced GIS	3
GEOG 462	Advanced Spatial Analysis	3
Select three of the following approved area electives:		9
CRJS 344	Social Science and Crime Mapping	
CS 361	Data Structures and Algorithms	
CS 422	Introduction to Machine Learning	
CS 432	Web Science	
CS 480	Introduction to Artificial Intelligence	
DASC 324	Introduction to Data Visualization	
DASC 424	Data Storytelling	
GEOG 300	Maps and Geographic Information	
GEOG 463	GIS Programming	
IT 452	Cloud Database	
IT 453	Advanced Database Concepts	

Electives

Elective credit may be needed to meet the minimum of 120 hours required for the degree.

Degree Program Guide

The Degree Program Guide is a suggested curriculum to complete this degree program in four years. It is just one of several plans that will work and is presented only as broad guidance to students. Each student is strongly encouraged to develop a customized plan in consultation with their academic advisor. Additional information can also be found in Degree Works.

Specialization Area: Artificial Intelligence and Machine Learning

Course	Title	Credit Hours
Freshman		
Fall		
ENGL 110C	English Composition (C or better required)	3
Oral Communication		3
Information Literacy and Research		3
DASC/SOC 205S	Data, Technology, Society	3
General Elective (or MATH 162M)		3
	Credit Hours	**15**
Spring		
ENGL 211C or ENGL 231C	Writing, Rhetoric, and Research (C or better required) or Writing, Rhetoric, and Research: Special Topics	3
Interpreting the Past		3
Human Behavior (may not use DASC 205S or SOC 205S)		3
MATH 163	Precalculus II	3
BDA 200T	Elements of Data Science	3
	Credit Hours	**15**
Sophomore		
Fall		
Nature of Science I		4
DASC 157 or CS 153	Introduction to Data Science Programming or Introduction to Programming with Python	4
STAT 130M	Elementary Statistics	3
CS 252	Introduction to Unix for Programmers	1
Language & Culture I (if needed) or General Elective		3
	Credit Hours	**15**
Spring		
Nature of Science II		4

DASC 255 or DASC 257 or CS 251	Data Processing with Python or Data Science Programming or Programming with Java	4
MATH 211	Calculus I	4
STAT 310	Introductory Data Analysis	3
	Credit Hours	**15**
Junior		
Fall		
DASC 300	Foundations of Data Science	3
IT 360T	Principles of Information Technology	3
MATH 212	Calculus II	4
Language & Culture II (if needed) or General Elective		3
Approved Area Elective		3
	Credit Hours	**16**
Spring		
DASC/PHIL 357E	Ethics and Data	3
IT 450	Database Concepts	3
MATH 316	Introductory Linear Algebra	3
General Elective		3
Approved Area Elective		3
	Credit Hours	**15**
Senior		
Fall		
Literature		3
CS 422	Introduction to Machine Learning	3
DASC 434	Data Curation and Management	3
Approved Area Electives		6
	Credit Hours	**15**
Spring		
Human Creativity		3
DASC 436W	Data Science Capstone Project (C or better required)	3
Approved Area Elective		3
General Electives		5
	Credit Hours	**14**
	Total Credit Hours	**120**

Specialization Area: Data Visualization

Course	Title	Credit Hours
Freshman		
Fall		
ENGL 110C	English Composition (C or better required)	3
Oral Communication		3
Information Literacy and Research		3
DASC/SOC 205S	Data, Technology, Society	3
General Elective (or MATH 162M)		3
	Credit Hours	**15**
Spring		
ENGL 211C or ENGL 231C	Writing, Rhetoric, and Research (C or better required) or Writing, Rhetoric, and Research: Special Topics	3
Interpreting the Past		3
Human Behavior (may not use DASC 205S or SOC 205S)		3
MATH 163	Precalculus II	3
BDA 200T	Elements of Data Science	3
	Credit Hours	**15**
Sophomore		
Fall		
Nature of Science I		4
STAT 130M	Elementary Statistics	3
DASC 157 or CS 153	Introduction to Data Science Programming or Introduction to Programming with Python	4
Language & Culture I (if needed) or General Elective		3
	Credit Hours	**14**
Spring		
DASC 255 or DASC 257 or CS 251	Data Processing with Python or Data Science Programming or Programming with Java	4
IT 150G	Basic Information Literacy and Research	3
DASC 300	Foundations of Data Science	3
COMM 260	Understanding Media	3
Language & Culture II (if needed) or General Elective		3
	Credit Hours	**16**
Junior		
Fall		
Nature of Science II		4
IT 360T	Principles of Information Technology	3
DASC 324	Introduction to Data Visualization	3
COMM 303	Introduction to Strategic Communications	3
Approved Area Elective		3
	Credit Hours	**16**
Spring		
DASC/PHIL 357E	Ethics and Data	3
IT 450	Database Concepts	3
DASC 424	Data Storytelling	3
IT 325	Web Site and Web Page Design	3
STAT 310	Introductory Data Analysis	3
	Credit Hours	**15**
Senior		
Fall		
Literature		3
DASC 434	Data Curation and Management	3
Approved Area Electives		6

General Elective		3
	Credit Hours	**15**
Spring		
Human Creativity		3
DASC 436W	Data Science Capstone Project (C or better required)	3
Approved Area Elective		3
General Electives		5
	Credit Hours	**14**
	Total Credit Hours	**120**

Specialization Area: Geospatial Analytics

Course	Title	Credit Hours
Freshman		
Fall		
ENGL 110C	English Composition (C or better required)	3
Oral Communication		3
Information Literacy and Research		3
DASC/SOC 205S	Data, Technology, Society	3
General Elective (or MATH 162M)		3
	Credit Hours	**15**
Spring		
ENGL 211C or ENGL 231C	Writing, Rhetoric, and Research (C or better required) or Writing, Rhetoric, and Research: Special Topics	3
Interpreting the Past		3
Human Behavior (may not use DASC 205S or SOC 205S)		3
MATH 163	Precalculus II	3
BDA 200T	Elements of Data Science	3
	Credit Hours	**15**
Sophomore		
Fall		
Nature of Science I		4
STAT 130M	Elementary Statistics	3
DASC 157 or CS 153	Introduction to Data Science Programming or Introduction to Programming with Python	4
GEOG 102T	Digital Earth: Geospatial Technology and Society	3
General Elective		1
	Credit Hours	**15**
Spring		
Nature of Science II		4
DASC 255 or DASC 257 or CS 251	Data Processing with Python or Data Science Programming or Programming with Java	4
STAT 310	Introductory Data Analysis	3
Approved Area Elective		3
General Elective		1
	Credit Hours	**15**
Junior		
Fall		
DASC 300	Foundations of Data Science	3
IT 360T	Principles of Information Technology	3
GEOG 402	Geographic Information Systems	3
GEOG 404	Digital Techniques for Remote Sensing	3
Language & Culture I (if needed) or General Elective		3
	Credit Hours	**15**
Spring		
DASC/PHIL 357E	Ethics and Data	3
IT 450	Database Concepts	3
GEOG 425	Internet Geographic Information Systems	3
Approved Area Elective		3
Language & Culture II (if needed) or General Elective		3
	Credit Hours	**15**
Senior		
Fall		
Literature		3
DASC 434	Data Curation and Management	3
GEOG 432	Advanced GIS	3
GEOG 462	Advanced Spatial Analysis	3
General Elective		3
	Credit Hours	**15**
Spring		
Human Creativity		3
DASC 436W	Data Science Capstone Project (C or better required)	3
Approved Area Elective		3
General Electives		6
	Credit Hours	**15**
	Total Credit Hours	**120**