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 Trent Buskirk, Undergraduate Program Director (tbuskirk@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: MATH 162M required.

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		35-41
Upper Division General Education (met in the major)		
Foundation Courses		
CS 153	Introduction to Programming with Python	4
CS 251	Programming with Java	4
MATH 163	Precalculus II	3
STAT 130M	Elementary Statistics	3
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 Science Research Methods	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 (27-29 credits)		**27-29**
Total Credit Hours		**103-111**

* Writing Intensive: C or better required.

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		
CS 252	Introduction to Unix for Programmers	1
CS 361	Data Structures and Algorithms	3
MATH 211	Calculus I	4
MATH 212	Calculus II	4
BDA 411	Introduction to Machine Learning	3
or CS 422	Introduction to Machine Learning	
CS 480	Introduction to Artificial Intelligence	3
or MSIM 480	Introduction to Artificial Intelligence	
Select three of the following approved area electives:		9
CS 330	Object-Oriented Design and Programming	
CS 432	Web Science	
ECE 407	Introduction to Game Development	
CYSE 420	Applied Machine Learning in Cybersecurity	

ECE 450	Introduction to Machine Learning for Data Analytics Engineering	
Total Credit Hours		**27**

The Data Visualization area requires completion of the following:

Required Courses		
BNAL 206	Business Analytics I	3
BNAL 306	Business Analytics II	3
BNAL 403	Data Visualization and Exploration	3
CS 252	Introduction to Unix for Programmers	1
CS 361	Data Structures and Algorithms	3
ECE 406	Computer Graphics and Visualization	3
GAME 201T	Introduction to Game Studies	3
MATH 211	Calculus I	4
Select two of the following approved area electives:		6
ARTH 320W	History of Graphic Design	
CRJS 344	Social Science and Crime Mapping	
ECE 407	Introduction to Game Development	
ECE 475	Transportation Data Analytics	
GAME 340	Visual Design and Digital Graphics for Games	
GAME 440	Advanced Visual Design and Digital Graphics for Games	
IT 325	Web Site and Web Page Design	
Total Credit Hours		**29**

The Geospatial Information Systems area requires completion of the following:

GEOG 102T	Digital Earth: Geospatial Technology and Society	3
GEOG 402	Geographic Information Systems	3
GEOG 404	Digital Techniques for Remote Sensing	3
GEOG 419	Spatial Analysis of Coastal Environments	3
GEOG 425	Internet Geographic Information Systems	3
GEOG 432	Advanced GIS	3
GEOG 462	Advanced Spatial Analysis	3
GEOG 463	GIS Programming	3
GEOG 473	Geographic Information Systems for Emergency Management	3
Total Credit Hours		**27**

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
Mathematics (MATH 162M required)		3
DASC/SOC 205S	Data, Technology, Society	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
CS 153	Introduction to Programming with Python	4
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
CS 251	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
CS 361	Data Structures and Algorithms	3
CS 480 or MSIM 480	Introduction to Artificial Intelligence or Introduction to Artificial Intelligence	3
Language & Culture II (if needed) or General Elective		3
	Credit Hours	**15**
Spring		
DASC/PHIL 357E	Ethics and Data	3
IT 450	Database Concepts	3
MATH 212	Calculus II	4
BDA 411 or CS 422	Introduction to Machine Learning or Introduction to Machine Learning	3
General Elective		3
	Credit Hours	**16**
Senior		
Fall		
Literature		3

DASC 434	Data Science Research Methods	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: 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
Mathematics (MATH 162M required)		3
DASC/SOC 205S	Data, Technology, Society	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
CS 153	Introduction to Programming with Python	4
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
CS 251	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
CS 361	Data Structures and Algorithms	3
BNAL 206	Business Analytics I	3
Language & Culture II (if needed) or General Elective		3
	Credit Hours	**15**
Spring		
DASC/PHIL 357E	Ethics and Data	3
IT 450	Database Concepts	3
GAME 201T	Introduction to Game Studies	3
BNAL 306	Business Analytics II	3
General Elective		3
	Credit Hours	**15**
Senior		
Fall		
Literature		3
DASC 434	Data Science Research Methods	3
BNAL 403	Data Visualization and Exploration	3
Approved Area Elective		3
General Elective		3
	Credit Hours	**15**
Spring		
Human Creativity		3
DASC 436W	Data Science Capstone Project (C or better required)	3
ECE 406	Computer Graphics and Visualization	3
Approved Area Elective		3
General Elective		3
	Credit Hours	**15**
	Total Credit Hours	**120**

Specialization Area: Geospatial Information Systems

Course	Title	Credit Hours
Freshman		
Fall		
ENGL 110C	English Composition (C or better required)	3
Oral Communication		3
Information Literacy and Research		3
Mathematics (MATH 162M required)		3
DASC/SOC 205S	Data, Technology, Society	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
CS 153	Introduction to Programming with Python	4
STAT 130M	Elementary Statistics	3
GEOG 102T	Digital Earth: Geospatial Technology and Society	3
Elective		1
	Credit Hours	**15**
Spring		
Nature of Science II		4
CS 251	Programming with Java	4
STAT 310	Introductory Data Analysis	3
Elective(s)		4
	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 419	Spatial Analysis of Coastal Environments	3
GEOG 425	Internet Geographic Information Systems	3
Language & Culture II (if needed) or General Elective		3
	Credit Hours	**15**
Senior		
Fall		
Literature		3
DASC 434	Data Science Research Methods	3
GEOG 432	Advanced GIS	3
GEOG 462	Advanced Spatial Analysis	3
Elective		3
	Credit Hours	**15**
Spring		
Human Creativity		3
DASC 436W	Data Science Capstone Project (C or better required)	3
GEOG 463	GIS Programming	3
GEOG 473	Geographic Information Systems for Emergency Management	3
Elective		3
	Credit Hours	**15**
	Total Credit Hours	**120**