DATA SCIENCE

Degree: B.S., Mathematics
Department of Mathematics (https://cas.umw.edu/math/)

The concentration in Data Science teaches principles and builds skills in the science of how and why we use data. Decision-making across all levels is increasingly shifting away from subjective human judgment and expert opinion. It is being replaced by superior evidence-based approaches driven by data and analytical models. Data Science is the discipline concerned with gathering and manipulating large volumes of data, developing statistical models to gain critical insights from it, understanding the behavior of complex systems through simulation, and making non-trivial decisions optimally, often in response to quickly changing conditions. The track in Data Science is designed to provide students with the coursework to succeed in this area.

Student Learning Outcomes

1. Students will learn the central ideas and techniques of various areas of mathematics.

2. Students will analyze, construct, and present mathematical and logical arguments.

3. Students will develop problem-solving abilities.

4. Students will discover mathematical patterns and formulate conjectures by exploration and experimentation.

5. Students will represent quantitative information by means of appropriate symbols, graphs, equations, or tables.

Major Requirements

Code	Title	Credits
DATA 101	Introduction to Data Science	3
DATA 219	Foundations for Data Science	3
STAT 180	Introduction to Statistics	3
STAT 280	Statistical Methods	3
STAT 320	Applied Regression Analysis	3
STAT 381	Probability and Statistical Inference	3
CPSC 225	Software Development Tools	1
DATA 350	Applications of Databases	4
MATH 121	Calculus I	4
MATH 122	Calculus II	4
MATH 201	Introduction to Discrete Mathematics	3-4
or CPSC 284	Applied Discrete Mathematics	
MATH 300	Linear Algebra	4
Select one of the following:		**3**
DATA 401	Applied Machine Learning	
or DATA 419	Data Mining	
Select one of the following:		**3**
DATA 370A9	Information Storage and Retrieval Systems	
or DATA 420	Modeling and Simulation	
Select one of the following:		**3**
DATA 402	Analytics Applications and Development	
DATA 470D3	Natural Language Processing	
DATA 470	Advanced Special Topics in Data Science (Course must be at least 3 credits.)	
DATA 470D1	Deep Learning in Python	
DATA 491	Indiv Study in Data Science (Course must be at least 3 credits.)	
STAT 382	Probability and Statistical Inference	
STAT 420	Applied Multivariate Statistics	
STAT 461	Topics in Statistics	
Total Credits		**47-48**

General Education Requirements

The general education requirements for Bachelor of Arts/Bachelor of Science degrees (https://catalog.umw.edu/undergraduate/general-education/requirements-bachelor-arts-bachelor-science-degrees/) apply to all students who are seeking to earn an undergraduate B.A., B.S. or B.S.Ed. degree.

Students seeking a Bachelor of Liberal Studies degree have a separate set of BLS general education requirements (https://catalog.umw.edu/undergraduate/general-education/requirements-bachelor-liberal-studies-degrees/).

Electives

Elective courses are those that are not needed to fulfill a general education requirement or major program requirement but are chosen by the student to complete the 120 credits required for graduation with a B.A./B.S./B.S.Ed. degree or the BLS degree. These courses may be taken graded or pass/fail (or S/U in the case of physical education and 100-level dance). No student in a regular B.A./B.S./B.S.Ed. program may count more than 60 credits in a single discipline toward the 120 credits required for graduation.

Total Credits Required for the Degree: 120 credits

Plan of Study

This suggested plan of study should serve as a guide to assist students when planning their course selections. It is not a substitute for a student's Degree Evaluation or the Program Requirements listed for this major in the catalog. Academic planning is the student's responsibility, and course selections should be finalized only after speaking with an advisor. Students should familiarize themselves with the catalog in effect at the time they matriculated at the University of Mary Washington. Students should also familiarize themselves with general education requirements (https://catalog.umw.edu/undergraduate/general-education/) which can be fulfilled through general electives as well as major/minor course requirements. Course requirements and sequencing may vary with AP, IB, CLEP, Cambridge or previous coursework, transfer courses, or other conditions. To be considered full-time, an undergraduate student must be enrolled in 12 or more credits for the semester.

Course	Title	Credits
Freshman		
Fall		
DATA 101	Introduction to Data Science	3
FSEM 100	First-Year Seminar	3
MATH 121	Calculus I	4
General Education Courses		6
	Credits	**16**
Spring		
MATH 122	Calculus II	4

MATH 201 or CPSC 284	Introduction to Discrete Mathematics or Applied Discrete Mathematics	3
STAT 180	Introduction to Statistics	3
General Education Courses		6
	Credits	**16**
Sophomore		
Fall		
DATA 219	Foundations for Data Science	3
STAT 280	Statistical Methods	3
General Education Courses		9
	Credits	**15**
Spring		
CPSC 220	Computer Programming and Problem Solving	4
MATH 300	Linear Algebra	4
General Education Courses		6
	Credits	**14**
Junior		
Fall		
CPSC 225	Software Development Tools	1
DATA 350	Applications of Databases	4
STAT 381	Probability and Statistical Inference	3
General Education Courses or Electives		9
	Credits	**17**
Spring		
STAT 320	Applied Regression Analysis	3
DATA or STAT 300 or 400-Level Elective		3
General Electives		9
	Credits	**15**
Senior		
Fall		
DATA 370 or DATA 420	Special Topics in Data Science or Modeling and Simulation	3
DATA 401 or DATA 419	Applied Machine Learning or Data Mining	3
General Electives		6
	Credits	**12**
Spring		
MATH 305	Mathematics as a Profession	1
General Electives		14
	Credits	**15**
	Total Credits	**120**

Data Science Program

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Affiliated Faculty

Prashant Chandrasekar, Computer Science
Stephen Davies, Computer Science
Melody B. Denhere, Mathematics
Christopher J. Garcia, Business
Debra L. Hydorn, Mathematics
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