

DATA SCIENCE, BA

REQUIREMENTS

UNIVERSITY GENERAL EDUCATION REQUIREMENTS

All undergraduate students at the University of Wisconsin–Madison are required to fulfill a minimum set of common university general education requirements to ensure that every graduate acquires the essential core of an undergraduate education. This core establishes a foundation for living a productive life, being a citizen of the world, appreciating aesthetic values, and engaging in lifelong learning in a continually changing world. Various schools and colleges will have requirements in addition to the requirements listed below. Consult your advisor for assistance, as needed. For additional information, see the university Undergraduate General Education Requirements (<http://guide.wisc.edu/undergraduate/#requirementsforundergraduatestudytext>) section of the *Guide*.

General Education	• Breadth–Humanities/Literature/Arts: 6 credits
	• Breadth–Natural Science: 4 to 6 credits, consisting of one 4- or 5-credit course with a laboratory component; or two courses providing a total of 6 credits
	• Breadth–Social Studies: 3 credits
	• Communication Part A & Part B *
	• Ethnic Studies *
	• Quantitative Reasoning Part A & Part B *

* The mortarboard symbol appears before the title of any course that fulfills one of the Communication Part A or Part B, Ethnic Studies, or Quantitative Reasoning Part A or Part B requirements.

COLLEGE OF LETTERS & SCIENCE DEGREE REQUIREMENTS: BACHELOR OF ARTS (BA)

Students pursuing a bachelor of arts degree in the College of Letters & Science must complete all of the requirements below. The College of Letters & Science allows this major to be paired with either a bachelor of arts or a bachelor of science curriculum.

BACHELOR OF ARTS DEGREE REQUIREMENTS

Mathematics Complete the University General Education Requirements for Quantitative Reasoning A (QR-A) and Quantitative Reasoning B (QR-B) coursework.

Language	• Complete the fourth unit of a language other than English; OR
	• Complete the third unit of a language and the second unit of an additional language other than English.

L&S Breadth	• 12 credits of Humanities, which must include 6 credits of literature; and
	• 12 credits of Social Science; and
	• 12 credits of Natural Science, which must include one 3+ credit Biological Science course and one 3+ credit Physical Science course.

Liberal Arts and Science Coursework	Complete at least 108 credits.
Depth of Intermediate/Advanced work	Complete at least 60 credits at the intermediate or advanced level.
Major	Declare and complete at least one major.
Total Credits	Complete at least 120 credits.
UW–Madison Experience	<ul style="list-style-type: none"> • 30 credits in residence, overall; and • 30 credits in residence after the 86th credit.
Quality of Work	<ul style="list-style-type: none"> • 2.000 in all coursework at UW–Madison • 2.000 in Intermediate/Advanced level coursework at UW–Madison

NON–L&S STUDENTS PURSUING AN L&S MAJOR

Non–L&S students who have permission from their school/college to pursue an additional major within L&S only need to fulfill the major requirements. They do not need to complete the L&S Degree Requirements above.

REQUIREMENTS FOR THE MAJOR

Code	Title	Credits
Foundational Math Courses		
MATH 221 or MATH 217	Calculus and Analytic Geometry 1 Calculus with Algebra and Trigonometry II	5
MATH 222	Calculus and Analytic Geometry 2	4
Total Credits		9
Code	Title	Credits
Foundational Data Science Courses		
STAT 240	Data Science Modeling I	4
STAT 340	Data Science Modeling II	4
COMP SCI 220 or COMP SCI 300	Data Science Programming I Programming II	4
COMP SCI 320	Data Science Programming II	4
L I S 461 or E C E/ I SY E 570	Data and Algorithms: Ethics and Policy (4-credit Communication B section optional) Ethics of Data for Engineers	3–4
Total Credits		19–20

Code	Title	Credits
Electives		
Students must complete at least one course from each of the four following categories, plus additional electives to reach the minimum credits. Additional courses taken within each category (except for linear algebra) may count towards other electives. ²		
<i>Machine Learning</i>		3
Complete one of the following:		
COMP SCI/E C E/ M E 532	Matrix Methods in Machine Learning	
COMP SCI/E C E/ M E 539	Introduction to Artificial Neural Networks	
COMP SCI 540	Introduction to Artificial Intelligence	
GEN BUS 656	Machine Learning for Business Analytics	
I SY E 521	Machine Learning in Action for Industrial Engineers	
MATH 535	Mathematical Methods in Data Science	
PHYSICS 361	Machine Learning in Physics	
STAT 451	Introduction to Machine Learning and Statistical Pattern Classification	
STAT 453	Introduction to Deep Learning and Generative Models	
<i>Advanced Computing</i>		3
Complete one of the following:		
COMP SCI 400	Programming III	
COMP SCI 412	Introduction to Numerical Methods	
COMP SCI/ STAT 471	Introduction to Computational Statistics	
COMP SCI/ MATH 513	Numerical Linear Algebra	
COMP SCI/ MATH 514	Numerical Analysis	
COMP SCI/E C E/ I SY E 524	Introduction to Optimization	
COMP SCI 544	Introduction to Big Data Systems	
COMP SCI 564	Database Management Systems: Design and Implementation	
COMP SCI 565	Introduction to Data Visualization	
COMP SCI/ B M I 576	Introduction to Bioinformatics	
GEOG 573	Advanced Geocomputing and Geospatial Big Data Analytics	
GEOG 574	Geospatial Database Design and Development	
MATH 444	Graphs and Networks in Data Science	
<i>Statistical Modeling</i>		3
Complete one of the following:		
ECON 400	Introduction to Applied Econometrics	
ECON 410	Introductory Econometrics	
ECON 460	Economic Forecasting	

GEOG 579	GIS and Spatial Analysis	
I SY E 575	Introduction to Quality Engineering	
STAT/MATH 309	Introduction to Probability and Mathematical Statistics I ²	
or STAT 311	Introduction to Theory and Methods of Mathematical Statistics I	
or MATH/STAT 431	Introduction to the Theory of Probability	
STAT/MATH 310	Introduction to Probability and Mathematical Statistics II ²	
or STAT 312	Introduction to Theory and Methods of Mathematical Statistics II	
STAT 349	Introduction to Time Series	
STAT 351	Introductory Nonparametric Statistics	
STAT 421	Applied Categorical Data Analysis	
STAT/M E 424	Statistical Experimental Design	
STAT 436	Statistical Data Visualization	
STAT 443	Classification and Regression Trees	
STAT 456	Applied Multivariate Analysis	
STAT 461	Financial Statistics	
STAT 575	Statistical Methods for Spatial Data	
MATH 531	Probability Theory	
MATH/I SY E/OTM/STAT 632	Introduction to Stochastic Processes	
MATH 635	An Introduction to Brownian Motion and Stochastic Calculus	
Linear Algebra		3
Complete one from the following. Only one course from the linear algebra list can be used towards the major: ²		
MATH 320	Linear Algebra and Differential Equations	
MATH 340	Elementary Matrix and Linear Algebra	
MATH 341	Linear Algebra	
MATH 375	Topics in Multi-Variable Calculus and Linear Algebra	
Other Electives		6
For additional electives students may complete courses from the list below or additional courses from the required categories above: ²		
COMP SCI/I SY E/ MATH 425	Introduction to Combinatorial Optimization	
COMP SCI/I SY E/ MATH/STAT 525	Linear Optimization	
COMP SCI/ E C E 533	Image Processing	
COMP SCI 559	Computer Graphics	
COMP SCI/ B M I 567	Medical Image Analysis	
COMP SCI 577	Introduction to Algorithms	
E C E 203	Signals, Information, and Computation	
ECON 315	Data Visualization for Economists	

ECON 570	Fundamentals of Data Analytics for Economists
ECON 695	Topics in Economic Data Analysis
GEOG 378	Introduction to Geocomputing
GEOG 572	Graphic Design in Cartography
GEOG 575	Interactive Cartography & Geovisualization
I SY E 323	Operations Research–Deterministic Modeling
I SY E 412	Fundamentals of Industrial Data Analytics
I SY E/M E 512	Inspection, Quality Control and Reliability
I SY E 612	Information Sensing and Analysis for Manufacturing Processes
INFO SYS 322	Introduction to Databases
L I S 407	Data Storytelling with Visualization
L I S 440	Navigating the Data Revolution: Concepts of Data & Information Science
L I S 464	Applied Database Design
L I S 501	Introduction to Text Mining
LSC 460	Social Media Analytics
LSC 660	Data Analysis in Communications Research
MATH 331	Introductory Probability ²
SOC 351	Introduction to Survey Methods for Social Research
SOC/ C&E SOC 618	Social Network Analysis
SOC/ C&E SOC 693	Practicum in Analysis and Research
SOIL SCI 585	Using R for Soil and Environmental Sciences
STAT 405	Data Science Computing Project
STAT 433	Data Science with R

Total Credits **18**

UNIVERSITY DEGREE REQUIREMENTS

Total Degree To receive a bachelor's degree from UW–Madison, students must earn a minimum of 120 degree credits. The requirements for some programs may exceed 120 degree credits. Students should consult with their college or department advisor for information on specific credit requirements.

Residency Degree candidates are required to earn a minimum of 30 credits in residence at UW–Madison. "In residence" means on the UW–Madison campus with an undergraduate degree classification. "In residence" credit also includes UW–Madison courses offered in distance or online formats and credits earned in UW–Madison Study Abroad/Study Away programs.

Quality of Work Undergraduate students must maintain the minimum grade point average specified by the school, college, or academic program to remain in good academic standing. Students whose academic performance drops below these minimum thresholds will be placed on academic probation.

RESIDENCE & QUALITY OF WORK

- 2.000 GPA in all major courses
- 2.000 GPA in all upper level work in the major¹
- 15 credits in the major, taken on the UW–Madison campus

FOOTNOTES

¹ Upper-level in the major includes L I S 461 and all courses counting towards the Electives requirement (i.e. Machine Learning, Advanced Computing, Statistical Modeling, Linear Algebra, and Other Electives).

² Students are only allowed to count one course from each of **probability** (MATH 331, STAT/MATH 309, STAT 311, or STAT/MATH 431), **inference** (STAT/MATH 310 or STAT 312), and **linear algebra** (MATH 320, MATH 340, MATH 341, or MATH 375) towards the major.