

DATA SCIENCE, BS

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 (<https://guide.wisc.edu/undergraduate/#requirementsforundergraduatestudytext>) section of the Guide.

General Education	<ul style="list-style-type: none"> • 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 *
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* 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 SCIENCE (BS)

Students pursuing a Bachelor of Science 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 the Bachelor of Arts or the Bachelor of Science degree requirements.

BACHELOR OF SCIENCE DEGREE REQUIREMENTS

Mathematics Complete two courses of 3+ credits at the Intermediate or Advanced level in MATH, COMP SCI, or STAT subjects. A maximum of one course in each of COMP SCI and STAT subjects counts toward this requirement.

Language Complete the third unit of a language other than English.

L&S Breadth Complete:

- 12 credits of Humanities, which must include at least 6 credits of Literature; and
- 12 credits of Social Science; and
- 12 credits of Natural Science, which must include 6 credits of Biological Science and 6 credits of Physical Science.

Liberal Arts and Science Coursework	Complete at least 108 credits.
Depth of Advanced Coursework	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	Complete both: <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 FOUNDATIONAL MATH COURSES

Code	Title	Credits
MATH 221	Calculus and Analytic Geometry 1	5
or MATH 217	Calculus with Algebra and Trigonometry II	
MATH 222	Calculus and Analytic Geometry 2	4
Total Credits		9

FOUNDATIONAL DATA SCIENCE COURSES

Code	Title	Credits
STAT 240	Data Science Modeling I	4
STAT 340	Data Science Modeling II	4
COMP SCI 220	Data Science Programming I	4
or COMP SCI 300	Programming II	
COMP SCI 320	Data Science Programming II	4
L I S 461	Data and Algorithms: Ethics and Policy	3–4
or E C E / I S Y E 570	Ethics of Data for Engineers	
or PHILOS 244	Introductory Artificial Intelligence (AI) and Data Ethics	
Total Credits		19–20

ELECTIVES

Students must complete 18 credits of upper-level major electives, including at least one course from each of the the following

categories: Linear Algebra, Advanced Computing, Statistical Modeling, and Machine Learning, plus additional electives to reach the minimum credits.

Additional courses taken within Advanced Computing, Statistical Modeling, and Machine Learning may count towards other electives.

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, MATH 345, or MATH 375) towards the major.

Linear Algebra

Code	Title	Credits
Choose one from the following:		3
Only one linear algebra course may count towards the data science major		
MATH 320	Linear Algebra and Differential Equations	
MATH 340	Elementary Matrix and Linear Algebra	
MATH 341	Linear Algebra	
MATH 345	Linear Algebra and Optimization	
MATH 375	Topics in Multi-Variable Calculus and Linear Algebra	

Total Credits 3

Advanced Computing

Code	Title	Credits
Complete at least one from the following:		3
COMP SCI 400	Programming III	
COMP SCI 412	Introduction to Numerical Methods	
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 557	Parallel & Throughput- Optimized Programming	
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	
STAT/ COMP SCI 471	Introduction to Computational Statistics	

Total Credits 3

Statistical Modeling

Code	Title	Credits
Complete at least one from the following:		3
ACT SCI 657	Risk Analytics	
CIV ENGR 516	Hydrologic Data Analysis	
ECON 400	Introduction to Applied Econometrics	
ECON 410	Introductory Econometrics	
ECON 460	Economic Forecasting	
GEOG 560	Advanced Quantitative Methods	
GEOG 579	GIS and Spatial Analysis	
I SY E 575	Introduction to Quality Engineering	
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	
STAT/MATH 309	Introduction to Probability and Mathematical Statistics I	
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	
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	

Total Credits 3

Machine Learning

Code	Title	Credits
Complete at least one from the following:		3
BSE 405	Artificial Intelligence in Agriculture	
CHEM 361	Machine Learning in Chemistry	
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	
I SY E 521	Machine Learning in Action for Industrial Engineers	
MATH 535	Mathematical Methods in Data Science	
MATH 616	Data-Driven Dynamical Systems, Stochastic Modeling and Prediction	

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

Total Credits **3**

Other electives

Code	Title	Credits
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For additional electives, complete up to two courses from the list below or additional courses from the required categories above: **6**

ACT SCI 655	Health Analytics
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 541	Theory & Algorithms for Data Science
COMP SCI 559	Computer Graphics
COMP SCI/ B M I 567	Biomedical 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
F&W ECOL 395	Data and GIS Tools for Ecology
F&W ECOL 458	Environmental Data Science
GEN BUS 317	Mathematical Foundations of Business Analytics
GEOG 378	Introduction to Geocomputing
GEOG 572	Graphic Design in Cartography
GEOG 575	Interactive Cartography & Geovisualization
INFO SYS 322	Introduction to Databases
INFO SYS 423	Digital Platform Analytics
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
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
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 **6**

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).

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.