

DATA SCIENCE, B.A.

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 | <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 * |
|-------------------|--|

* 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 (B.A.)

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.

- | | |
|------------------|--|
| Foreign Language | <ul style="list-style-type: none"> • Complete the fourth unit of a foreign language; OR • Complete the third unit of a foreign language and the second unit of an additional foreign language. |
|------------------|--|

- | | |
|-------------|--|
| L&S Breadth | <ul style="list-style-type: none"> • 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 or MATH 275	Calculus and Analytic Geometry 1 Calculus with Algebra and Trigonometry II Topics in Calculus I	5
MATH 222 or MATH 276	Calculus and Analytic Geometry 2 Topics in Calculus II	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	Data and Algorithms: Ethics and Policy	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

Machine Learning 3

Complete one of the following:

COMP SCI/E C E/ Matrix Methods in Machine Learning
M E 532

COMP SCI/E C E/ Introduction to Artificial Neural
M E 539 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

STAT 451 Introduction to Machine Learning and Statistical Pattern Classification

STAT 453 Introduction to Deep Learning and Generative Models

Advanced Computing 3

Complete one of the following:

COMP SCI 400 Programming III

COMP SCI 412 Introduction to Numerical Methods

COMP SCI/ Introduction to Computational
STAT 471 Statistics

COMP SCI/ Numerical Linear Algebra
MATH 513

COMP SCI/ Numerical Analysis
MATH 514

COMP SCI/E C E/ Introduction to Optimization
I SY E 524

COMP SCI 544 Introduction to Big Data Systems

COMP SCI 564 Database Management Systems:
Design and Implementation

COMP SCI/ Introduction to Bioinformatics
B M I 576

GEOG 573 Advanced Geocomputing and Geospatial Big Data Analytics

GEOG 574 Geospatial Database Design and Development

Statistical Modeling 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 I²

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 II²

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

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/ Introduction to Combinatorial
MATH 425 Optimization

COMP SCI/I SY E/ Linear Optimization
MATH/STAT 525

COMP SCI/ Image Processing
E C E 533

COMP SCI 559 Computer Graphics

COMP SCI/ Medical Image Analysis
B M I 567

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 464	Applied Database Design
L I S 501	Introduction to Text Mining
SOC 351	Introduction to Survey Methods for Social Research
SOC/ C&E SOC 693	Practicum in Analysis and Research
STAT 405	Data Science Computing Project
STAT 433	Data Science with R

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.

Total Credits **18**

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 listed in the Data Science Electives (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** (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.

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.