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/#requirementsforundergraduatethestudtext) 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 (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

- 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

- 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.

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.

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

- 30 credits in residence, overall; and
- 30 credits in residence after the 86th credit.

Quality of Work

- 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

Students must complete at least one course from each of the four following categories and then additional electives to reach the minimum credits. Additional courses taken within each category may count towards other electives.

Machine Learning

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

Requirements for the Major

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>MATH 221</td>
<td>Calculus and Analytic Geometry 1</td>
<td>5</td>
</tr>
<tr>
<td>or MATH 217</td>
<td>Calculus with Algebra and Trigonometry II</td>
<td></td>
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<tr>
<td>or MATH 275</td>
<td>Topics in Calculus I</td>
<td></td>
</tr>
<tr>
<td>MATH 222</td>
<td>Calculus and Analytic Geometry 2</td>
<td>4</td>
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<tr>
<td>or MATH 276</td>
<td>Topics in Calculus II</td>
<td></td>
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<tr>
<td>STAT 240</td>
<td>Introduction to Data Modeling I</td>
<td>4</td>
</tr>
<tr>
<td>STAT 340</td>
<td>Introduction to Data Modeling II</td>
<td>4</td>
</tr>
<tr>
<td>COMP SCI 220</td>
<td>Data Science Programming I</td>
<td></td>
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<tr>
<td>or COMP SCI 300</td>
<td>Programming II</td>
<td></td>
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<tr>
<td>COMP SCI 320</td>
<td>Data Science Programming II</td>
<td>4</td>
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<tr>
<td>LIS 461</td>
<td>Data and Algorithms: Ethics and Policy</td>
<td>3-4</td>
</tr>
</tbody>
</table>

Electives

Students must complete at least 18 credits of electives.
### Mathematical Methods in Data Science
- **MATH 535**

### Introduction to Machine Learning and Statistical Pattern Classification
- **STAT 451**

### Introduction to Deep Learning and Generative Models
- **STAT 453**

#### Advanced Computing
3 credits

**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/ECE/ISY E 524** Introduction to Optimization
- **COMP SCI 564** Database Management Systems: Design and Implementation
- **GEOG 573** Advanced Geocomputing and Geospatial Big Data Analytics
- **GEOG 574** Geospatial Database Design and Development

#### Statistical Modeling
3 credits

**Complete one of the following:**
- **ECON 400** Introduction to Applied Econometrics
- **ECON 410** Introductory Econometrics
- **STAT/MATH 309** Introduction to Probability and Mathematical Statistics I
- **STAT/MATH 310** Introduction to Probability and Mathematical Statistics II
- **STAT 311** Introduction to Theory and Methods of Mathematical Statistics I
- **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/MATH 431** Introduction to the Theory of Probability
- **STAT 443** Classification and Regression Trees
- **STAT 456** Applied Multivariate Analysis
- **STAT 461** Financial Statistics
- **MATH 531** Probability Theory
- **MATH/I SYE/OTM/STAT 632** Introduction to Stochastic Processes
- **MATH 635** An Introduction to Brownian Motion and Stochastic Calculus

### Other Electives
6-9 credits

**For additional electives students may complete courses from the list below or additional courses from the required categories above:**
- **ECE 203** Signals, Information, and Computation
- **ECON 570** Fundamentals of Data Analytics for Economists
- **GEOG 570** Graphic Design in Cartography
- **GEOG 575** Interactive Cartography & Geovisualization
- **ISY E 323** Operations Research-Deterministic Modeling
- **ISY E 412** Fundamentals of Industrial Data Analytics
- **ISY E/M E 512** Inspection, Quality Control and Reliability
- **ISY E 575** Introduction to Quality Engineering
- **ISY E 612** Information Sensing and Analysis for Manufacturing Processes
- **COMP SCI/ISY E/MATH 425** Introduction to Combinatorial Optimization
- **COMP SCI/ISY E/MATH/STAT 525** Linear Optimization
- **COMP SCI/ECE 533** Image Processing
- **COMP SCI 559** Computer Graphics
- **COMP SCI/BMI 567** Medical Image Analysis
- **COMP SCI 577** Introduction to Bioinformatics
- **COMP SCI/BMI 576** Introduction to Algorithms
- **SOC 351** Introduction to Survey Methods for Social Research
- **SOC/C&E SOC 693** Practicum in Analysis and Research
- **STAT 433** Data Science with R

### Residence & Quality of Work
- 2.000 GPA in all major courses
- 2.000 GPA in all upper level work in the major
- 15 credits in the major, taken on the UW-Madison campus

### Footnotes
Students who take COMP SCI/ECE/M E 532 may count the course towards both their linear algebra and machine learning requirements.
However, students should be aware that some elective courses, in MATH in particular, require linear algebra courses as a prerequisite.

Upper-level in the major includes LIS 461 and all courses listed in the Data Science Electives (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.