DATA SCIENCE, B.S.

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 SCIENCE (B.S.)

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.

Foreign Language
Complete the third unit of a foreign language.

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 Intermediate/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:
- 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

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

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<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>
</tr>
<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>4</td>
</tr>
<tr>
<td>or COMP SCI 300</td>
<td>Programming II</td>
<td></td>
</tr>
<tr>
<td>COMP SCI 320</td>
<td>Data Science Programming II</td>
<td>4</td>
</tr>
<tr>
<td>L I S 461</td>
<td>Data and Algorithms: Ethics and Policy</td>
<td>3-4</td>
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</tbody>
</table>

Electives
Complete one of the following:
- 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.

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
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>MATH 535</td>
<td>Mathematical Methods in Data Science</td>
</tr>
<tr>
<td>STAT 451</td>
<td>Introduction to Machine Learning and Statistical Pattern Classification</td>
</tr>
<tr>
<td>STAT 453</td>
<td>Introduction to Deep Learning and Generative Models</td>
</tr>
</tbody>
</table>

**Advanced Computing** 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/ECE/M 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

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/ME 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
- 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
- COMP SCI/ECE/M 532 Matrix Methods in Machine Learning

**Other Electives** 6-9

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
- GEOG 570 Fundamentals of Data Analytics for Economists
- GEOG 572 Graphic Design in Cartography
- GEOG 575 Interactive Cartography & Geovisualization
- I SYE 323 Operations Research-Deterministic Modeling
- I SYE 412 Fundamentals of Industrial Data Analytics
- I SYE/M 512 Inspection, Quality Control and Reliability
- I SYE 575 Introduction to Quality Engineering
- I SYE 612 Information Sensing and Analysis for Manufacturing Processes
- COMP SCI/I SYE/MATH 425 Introduction to Combinatorial Optimization
- COMP SCI/I SYE/MATH/STAT 525 Linear Optimization
- COMP SCI/ECE 533 Image Processing
- COMP SCI 559 Computer Graphics
- COMP SCI/BME 567 Medical Image Analysis
- COMP SCI 577 Introduction to Algorithms
- SOC 351 Introduction to Survey Methods for Social Research
- CSE SOC 693 Practicum in Analysis and Research
- STAT 433 Data Science with R

**RESIDENCE & QUALITY OF WORK**

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

**FOOTNOTES**

1. Students who take COMP SCI/ECE/M 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 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).

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
dergree 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.