STATISTICS, B.S.

Modern statistics is an exciting subject that affects most aspects of modern living. It has been developed to deal rationally and objectively with the uncertainty that accompanies variation in phenomena as highly complex as the interplay of the many factors that affect our environment. It derives vitality in coping with practical problems arising in all fields of scientific activity, including the social, business, biological, agricultural, medical, natural, and engineering sciences. Investigators’ efforts to learn about a specific phenomenon, be it the response of a patient to a certain medical treatment or the effectiveness of a particular instructional program on a student’s learning, are impacted by the presence of natural variation. The field of statistics is concerned with valid and efficient ways to learn more about these phenomena in the presence of such variation. It is an inductive science in which information is extracted from sample data in order to draw inferences. This process most often involves planning experiments or designing studies to ensure that valid answers to questions are obtained from the sample.

HOW TO GET IN

To declare the statistics major, students should schedule an appointment with a statistics major advisor prior to attaining senior standing (86 credits).

To declare the statistics major, students should schedule an appointment with a statistics major advisor prior to attaining senior standing (86 credits). Please visit our website https://www.stat.wisc.edu/ to find a link to Statistics Department Undergraduate Advising.

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

BREADTH AND 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 a bachelor of arts or a bachelor of science curriculum. View a comparison of the degree requirements here. (https://pubs.wisc.edu/home/archives/ug15/images/babs2009.pdf)

BACHELOR OF SCIENCE DEGREE REQUIREMENTS

Mathematics

Two (2) 3+ credits of intermediate/advanced level MATH, COMP SCI, STAT
Limit one each: COMP SCI, STAT

Foreign Language

Complete the third unit of a foreign language
Note: A unit is one year of high school work or one semester/term of college work.

L&S Breadth

- Humanities, 12 credits: 6 of the 12 credits must be in literature
- Social Sciences, 12 credits
- Natural Sciences, 12 credits: must include 6 credits in biological science; and must include 6 credits in physical science

Liberal Arts and Science Coursework

108 credits

Depth of Intermediate/Advanced work

60 intermediate or advanced credits

Major

Declare and complete at least one (1) major

Total Credits

120 credits

UW-Madison Experience

30 credits in residence, overall

Minimum

2,000 in all coursework at UW–Madison

GPAs

2,000 in intermediate/advanced 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 and do not need to complete the L&S breadth and
degree requirements above. Please note that the following special degree programs are not considered majors so are not available to non-L&S-degree-seeking candidates:

- Applied Mathematics, Engineering and Physics (Bachelor of Science–Applied Mathematics, Engineering and Physics)
- Journalism (Bachelor of Arts–Journalism; Bachelor of Science–Journalism)
- Music (Bachelor of Music)
- Social Work (Bachelor of Social Work)

REQUIREMENTS FOR THE MAJOR

MATHEMATICS

<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>1</td>
</tr>
<tr>
<td>MATH 171</td>
<td>Calculus with Algebra and Trigonometry I</td>
<td>1</td>
</tr>
<tr>
<td>MATH 217</td>
<td>and Calculus with Algebra and Trigonometry II</td>
<td>1</td>
</tr>
<tr>
<td>MATH 275</td>
<td>Topics in Calculus I</td>
<td>1</td>
</tr>
<tr>
<td>MATH 222</td>
<td>Calculus and Analytic Geometry 2</td>
<td>1</td>
</tr>
<tr>
<td>MATH 276</td>
<td>Topics in Calculus II</td>
<td>1</td>
</tr>
<tr>
<td>MATH 234</td>
<td>Calculus--Functions of Several Variables</td>
<td>1</td>
</tr>
<tr>
<td>MATH 375</td>
<td>Topics in Multi-Variable Calculus and Linear Algebra</td>
<td>1</td>
</tr>
<tr>
<td>MATH 340</td>
<td>Elementary Matrix and Linear Algebra (preferred)</td>
<td>1</td>
</tr>
<tr>
<td>MATH 320</td>
<td>Linear Algebra and Differential Equations</td>
<td>1</td>
</tr>
<tr>
<td>MATH 341</td>
<td>Linear Algebra</td>
<td>1</td>
</tr>
<tr>
<td>MATH 376</td>
<td>Topics in Multi-Variable Calculus and Differential Equations</td>
<td>1</td>
</tr>
</tbody>
</table>

Total Credits: 16-25

1 A grade of C or higher is required for this course to meet the requirement.

COMPUTER PROGRAMMING

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP SCI 200</td>
<td>Programming I</td>
<td>3</td>
</tr>
<tr>
<td>COMP SCI 300</td>
<td>Programming II (preferred)</td>
<td>3</td>
</tr>
<tr>
<td>COMP SCI 301</td>
<td>Introduction to Data Programming</td>
<td>3</td>
</tr>
<tr>
<td>COMP SCI 400</td>
<td>Programming III</td>
<td>3</td>
</tr>
<tr>
<td>COMP SCI 412</td>
<td>Introduction to Numerical Methods</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Credits: 31
2 STAT 479 and STAT 679 can be repeated for elective credit when enrolled for different topics.

**RESIDENCE & QUALITY OF WORK IN THE MAJOR**

- 2.000 GPA in all STAT and major courses
- 2.000 GPA on 15 Upper-Level Major credits, taken in Residence
- 15 credits in STAT courses, taken on the UW-Madison campus

**HONORS IN THE MAJOR**

Students may declare Honors in the Statistics Major in consultation with the Statistics major advisor(s). To be admitted to the Honors Program in Statistics, students must have declared Statistics, must have a 3.500 University GPA, and must have completed STAT 302, STAT/MATH 309, and STAT 333 (or other courses with the approval of the advisor) with a GPA of 3.500 or higher in these three classes.

**HONORS IN THE STATISTICS MAJOR: REQUIREMENTS**

To earn Honors in the Major in Statistics, students must satisfy both the requirements for the major (above) and the following additional requirements:

- Earn a 3.500 University GPA
- Earn a 3.500 GPA for all STAT courses
- Complete two STAT major courses (excluding 699) for Honors credit (http://honors.ls.wisc.edu/SiteContent.aspx?prev=1&id=370) or take an additional 3-credit STAT elective course
- STAT 681 - STAT 682, for a total of 6 credits, under the supervision of a member of the Statistics faculty.

**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.

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**LEARNING OUTCOMES**

1. Frame a scientific question with the appropriate mode of data analysis, to analyze such data correctly, and to summarize and interpret the results in a useful manner. Master a number of key statistical techniques, certainly including significance testing, goodness-of-fit testing, and regression analysis, which are common tools in analyzing data. This will include a careful checking of assumptions that underlie the techniques.

2. Design experiments/studies — in conjunction with scientists — that will lead in an efficient manner to the collection of data that can be properly analyzed. Design studies with multiple factors taking variable reduction techniques into account. Interpret and critique designs they encounter in analyzing data.

3. Use tools from mathematical statistics and probability to assess the quality of point estimators, confidence intervals, and hypothesis tests. Demonstrate the skills to connect methods of application to their theoretical underpinnings.

4. Use a statistical language (with emphasis on R) to manipulate data and perform exploratory data analysis using basic statistical methods. Write structured R programs using conditional expressions, loops, and functions and to use regular expressions to extract data from text and make high-level visualizations.

5. Evaluate critically articles that use statistical argumentation. Assess whether or not the statistical arguments have been developed properly and the conclusions are reliable. If the arguments are not properly developed, they will be able to provide specific evidence for this.

**FOUR-YEAR PLAN**

### First Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication A</td>
<td>3</td>
<td>MATH 222</td>
<td>4</td>
</tr>
<tr>
<td>MATH 221</td>
<td></td>
<td>5 COMP SCI 300</td>
<td>3</td>
</tr>
<tr>
<td>Foreign Language</td>
<td>4</td>
<td>Ethnic Studies course</td>
<td>4</td>
</tr>
<tr>
<td>Physical Science Breadth</td>
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<td>Foreign Language</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>15</td>
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</table>

### Second Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>MATH 234</td>
<td>4</td>
<td>STAT 303</td>
<td>1</td>
</tr>
<tr>
<td>STAT 302</td>
<td>3</td>
<td>STAT 333</td>
<td>3</td>
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<tr>
<td>Communications B</td>
<td>3</td>
<td>MATH 340</td>
<td>3</td>
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<tr>
<td>Social Science Breadth</td>
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<td>INTER-LS 210</td>
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<tr>
<td>Humanities Breadth</td>
<td>3</td>
<td>Biological Science Breadth</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Literature Breadth</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>16</td>
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</table>

### Third Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>Declare the Major</td>
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<td>STAT/MATH 310</td>
<td>3</td>
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<tr>
<td>STAT/MATH 309</td>
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<td>STAT elective course</td>
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<tr>
<td>STAT/MATH 424</td>
<td>3</td>
<td>Literature Breadth</td>
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<tr>
<td>Social Science Breadth</td>
<td>3</td>
<td>Social Science Breadth</td>
<td>3</td>
</tr>
</tbody>
</table>

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**Notes:**

1. 
2. 
3. STAT courses numbered 302 to 699 (excluding STAT 324, 371, 441, 571, and 572) are Upper-Level in the major.
Statistics, B.S.

<table>
<thead>
<tr>
<th>Humanities Breadth</th>
<th>3 Elective</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</table>

**Fourth Year**

<table>
<thead>
<tr>
<th>Credits</th>
<th>Fall</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>STAT elective course</td>
<td>STAT elective credits</td>
</tr>
<tr>
<td>L&amp;S Breadth</td>
<td>6 L&amp;S Breadth</td>
<td>6</td>
</tr>
<tr>
<td>Elective</td>
<td>3 Elective</td>
<td>3</td>
</tr>
<tr>
<td>15</td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>

Total Credits 120

**ADVISING AND CAREERS**

Looking for statistics advising?

Students who are interested in statistics academic advising for the statistics major should contact the advisor group by email: advising@stat.wisc.edu.

So what can you do with a statistics major after you graduate?

Well-trained statisticians are in strong demand and have excellent employment prospects. Statisticians work in industry and business, in government, and in universities and other research institutions.

In most cases an undergraduate major in statistics can find employment as a quantitative analyst or other “generalist” position. A number of our graduates have been successful following this path. However, in most cases, positions aimed at “professional statisticians” require a master’s (or Ph.D.) degree. As a professional statistician, typical employment in industry might be as a statistical consultant to biologists, engineers, and/or other scientists in a research and development branch of a large company.


Statistical training is seen as very desirable in many other areas (e.g., agricultural, biological, engineering, and social sciences, business, and economics) where the primary activity may not be statistics. In view of this, statistics may often be a strong choice for a second or additional major.

**L&S CAREER RESOURCES**

SuccessWorks at the College of Letters & Science helps students leverage the academic skills learned in their major, certificates, and liberal arts degree; explore and try out different career paths; participate in internships; prepare for the job search and/or graduate school applications; and network with professionals in the field (alumni and employers). In short, SuccessWorks helps students in the College of Letters & Science discover themselves, find opportunities, and develop the skills they need for success after graduation.

SuccessWorks can also assist students in career advising, résumé and cover letter writing, networking opportunities, and interview skills, as well as course offerings for undergraduates to begin their career exploration early in their undergraduate career.

Students should set up their profiles in Handshake (https://careers.ls.wisc.edu/handshake) to take care of everything they need to explore career events, manage their campus interviews, and apply to jobs and internships from 200,000+ employers around the country.

- SuccessWorks (https://careers.ls.wisc.edu)
- Set up a career advising appointment (https://careers.ls.wisc.edu/make-an-appointment)
- INTER-LS 215 Communicating About Careers (3 credits, fulfills Com B General Education Requirement)
- Handshake (https://careers.ls.wisc.edu/handshake)
- Learn how we’re transforming career preparation: L&S Career Initiative (http://ls.wisc.edu/lsci)

**PEOPLE**

**FACULTY**

Ané, Chappell, Clayton, Kang, Keles, Larget, Loh, Newton, Qian, Raskutti, Rohe, Shao, Tsui, Wahba, S. Wang, Y. Wang (chair), Yandell, Yuan, C. Zhang, Z. Zhang, A. Zhang, Zhu

**EMERITUS**

Bates, Draper, Johnson, Nordheim, Wardrop, and Doksum (retired)

**TEACHING STAFF**

Bean, Fischer, Gillett, Keuler, Li, Xia, Yang

**ADMINISTRATIVE STAFF**

Brinkerhoff (curricular coordinator), Runyan (department administrator)

**IT STAFF**

Beebe, Brabender, Cammilleri (director)

**STUDENT SERVICES COORDINATORS**

Barnish, Nguyen