

Graduate Coordinator Fanis

Undergraduate Advisor Thompson

STATISTICS

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.

DEGREES/MAJORS/CERTIFICATES

- Statistics, B.A. (p. 1283)
- Statistics, B.S. (p. 1287)

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

STATISTICS, B.A.

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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, student should set up an appointment with a statistics major advisor prior to attaining senior standing (86 credits).

Prospective majors are strongly recommended to have completed the following classes before declaring the major:

- MATH 221 Calculus and Analytic Geometry 1
- MATH 222 Calculus and Analytic Geometry 2
- MATH 234 Calculus—Functions of Several Variables
- STAT 302 Accelerated Introduction to Statistical Methods

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 (p. 22) 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 BREADTH AND 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. View a comparison of the degree requirements here. (<https://pubs.wisc.edu/home/archives/ug15/images/babs2009.pdf>)

BACHELOR OF ARTS DEGREE REQUIREMENTS

Mathematics Fulfilled with completion of University General Education requirements Quantitative Reasoning a (QR A) and Quantitative Reasoning b (QR B) coursework. Please note that some majors may require students to complete additional math coursework beyond the B.A. mathematics requirement.

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

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 one 3+ credit course in the biological sciences; must include one 3+ credit course in the physical sciences

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 30 credits in residence, overall

Experience 30 credits in residence after the 90th credit

Minimum 2.000 in all coursework at UW-Madison

GPA 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

Code	Title	Credits
Math		
MATH 221	Calculus and Analytic Geometry 1 (must be completed with grade of C or higher) ¹	5
MATH 222	Calculus and Analytic Geometry 2 (must be completed with grade of C or higher) ¹	4
MATH 234	Calculus–Functions of Several Variables (must be completed with grade of C or higher) ¹	4
MATH 340	Elementary Matrix and Linear Algebra ¹	3
or MATH 341	Linear Algebra	
Computer Programming		
Select one of the following: ²		3
COMP SCI 200	Programming I	
COMP SCI 300	Programming II	
COMP SCI 301	Introduction to Data Programming	
COMP SCI 400	Programming III	
COMP SCI 412	Introduction to Numerical Methods	
COMP SCI/I SY E/ MATH/STAT 525	Linear Programming Methods	
Statistics Courses		25
<i>Introductory Statistics and Basic Statistical Language</i>		
STAT 302	Accelerated Introduction to Statistical Methods	3
STAT 327	Learning a Statistical Language (Introductory Data Analysis with R)	1
<i>Linear Statistical Models</i>		
STAT 333	Applied Regression Analysis	3
STAT/M E 424	Statistical Experimental Design	3
<i>Mathematical Statistics</i>		
Probability (one course):		3
STAT/MATH 309	Introduction to Probability and Mathematical Statistics I	
STAT 311	Introduction to Theory and Methods of Mathematical Statistics I	
MATH/STAT 431	Introduction to the Theory of Probability	
Inference:		
STAT/MATH 310	Introduction to Probability and Mathematical Statistics II ³	3
<i>Statistics Electives</i>		
STAT electives to reach minimum credits required:		9
STAT 349	Introduction to Time Series	
STAT 351	Introductory Nonparametric Statistics	

STAT 411	An Introduction to Sample Survey Theory and Methods	
STAT 421	Applied Categorical Data Analysis	
STAT 456	Applied Multivariate Analysis	
STAT 461	Financial Statistics	
STAT/COMP SCI 471	Introduction to Computational Statistics	
STAT 479	Special Topics in Statistics ⁴	
STAT 575	Statistical Methods for Spatial Data	
STAT/B M I 641	Statistical Methods for Clinical Trials	
STAT 679	Special Topics in Statistics	
STAT 699	Directed Study ⁵	
Concentration		
Select either Math Concentration or Applied Concentration		6-12
Total Credits		50-56

- ¹ An acceptable equivalent for all four of the required mathematics courses is MATH 275 Topics in Calculus I, MATH 276 Topics in Calculus II, MATH 375 Topics in Multi-Variable Calculus and Linear Algebra, and MATH 376 Topics in Multi-Variable Calculus and Differential Equations. MATH 275 and MATH 276 are acceptable equivalents for MATH 221 Calculus and Analytic Geometry 1 and MATH 222 Calculus and Analytic Geometry 2, respectively. MATH 211 Calculus and MATH 213 Calculus and Introduction to Differential Equations are NOT acceptable equivalents for MATH 221, MATH 222, and MATH 234 Calculus-Functions of Several Variables. (Students who have completed MATH 211 and MATH 213 are encouraged to take the Department of Mathematics' Calculus Exam to determine placement in the MATH 221-MATH 222-MATH 234 sequence).
- ² COMP SCI 300 is highly recommended because it will be particularly beneficial in most future careers. Students who have prior computing experience equivalent to COMP SCI 200 (such as AP computer science) are recommended to take COMP SCI 300, and students who will pursue a second major in computer science must take COMP SCI 300 and COMP SCI 400 to satisfy the computer science major requirements.
- ³ STAT 312 Introduction to Theory and Methods of Mathematical Statistics II will not be accepted in lieu of STAT/MATH 310 Introduction to Probability and Mathematical Statistics II.
- ⁴ STAT 479 Special Topics in Statistics can be repeated for elective credit when enrolled for different topics.
- ⁵ Up to 3 credits of STAT 699 Directed Study can count toward these 9 credits. No course identified in Concentration 1 of the major can count towards these 9 credits.

MATHEMATICS CONCENTRATION

Students intending to pursue graduate study in statistics are strongly advised to take more math classes than the minimum requirements. Linear algebra and real analysis are typically the most important areas of mathematics needed for graduate study in statistics.

Select at least **6 additional credits** of the following:

Code	Title	Credits
MATH 319	Techniques in Ordinary Differential Equations	3

MATH 421	The Theory of Single Variable Calculus	3
MATH 443	Applied Linear Algebra	3
MATH/COMP SCI/STAT 475	Introduction to Combinatorics	3
MATH/COMP SCI 514	Numerical Analysis	3
MATH 521	Analysis I	3
MATH 522	Analysis II	3
MATH 541	Modern Algebra	3
MATH 605	Stochastic Methods for Biology	3
MATH 629	Introduction to Measure and Integration	3
MATH/I SY E/OTM/STAT 632	Introduction to Stochastic Processes	3

APPLIED CONCENTRATION

Select at least **12 credits** of coursework at the 300 level and higher in an area of application of statistical methods as approved by the student's major advisor. This area of application can represent study areas where statistical methods are applied, such as in the natural and social sciences and engineering. This requirement can often be met by the completion of a major in such a study area.

L&S REQUIREMENTS FOR RESIDENCE AND QUALITY OF WORK IN THE MAJOR

1. 2.000 grade point average in all STAT and major courses
2. 2.000 grade point average in 15 credits of upper-level work in the major completed in residence. Courses that count toward this requirement are STAT courses: STAT 302 Accelerated Introduction to Statistical Methods to STAT 699 Directed Study, excluding STAT 324 Introductory Applied Statistics for Engineers, STAT 371 Introductory Applied Statistics for the Life Sciences, STAT 441 Introduction to Biostatistics for Pharmacy, STAT/F&W ECOL/HORT 571 Statistical Methods for Bioscience I, and STAT/F&W ECOL/HORT 572 Statistical Methods for Bioscience II.
3. 15 credits in STAT subject, taken on 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 overall university GPA, and must have completed STAT 302 Accelerated Introduction to Statistical Methods, STAT/MATH 309 Introduction to Probability and Mathematical Statistics I and STAT 333 Applied Regression Analysis with a GPA of 3.500 or higher.

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 overall university GPA
- Earn a 3.500 GPA for all STAT courses
- Complete one of the following:
 - Two courses, taken for Honors, with individual grades of B or better, from Linear Statistical Models, Mathematical Statistics, or Statistics Electives other than STAT 699 Directed Study, or

- Complete an additional course worth 3 credits from the Statistics Electives list (for a total of 12 statistics electives)
- Complete a two-semester Senior Honors Thesis in STAT 681 Senior Honors Thesis and STAT 682 Senior Honors Thesis, for a total of 6 credits, under the supervision of a member of the faculty of the Department of Statistics.

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.

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 proposing the study — 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.

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.

The single, best place to look for statistics jobs is the American Statistical Association Career Center (<http://www.amstat.org/ASA/Your-Career/home.aspx>). Consult with a statistics undergraduate advisor about the best fit for you.

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).

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.

- SuccessWorks (<https://careers.ls.wisc.edu>)
- Set up a career advising appointment (<https://careers.ls.wisc.edu/make-an-appointment>)
- INTER-LS 210 L&S Career Development: Taking Initiative (1 credit, targeted to first- and second-year students)—for more information, see Inter-LS 210: Career Development, Taking Initiative (<https://careers.ls.wisc.edu/inter-ls-210-career-development-taking-initiative>)
- 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

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

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STUDENT SERVICES COORDINATORS

Barnish, Nguyen

STATISTICS, B.S.

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HOW TO GET IN

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

Prospective majors are strongly recommended to have completed the following classes before declaring the major:

- MATH 221 Calculus and Analytic Geometry I
- MATH 222 Calculus and Analytic Geometry 2
- MATH 234 Calculus--Functions of Several Variables
- STAT 302 Accelerated Introduction to Statistical Methods

REQUIREMENTS

UNIVERSITY GENERAL EDUCATION REQUIREMENTS

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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 30 credits in residence after the 90th credit
Minimum GPAs	2.000 in all coursework at UW-Madison 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

Code	Title	Credits
Math		
MATH 221	Calculus and Analytic Geometry 1 (must be completed with grade of C or higher) ¹	5
MATH 222	Calculus and Analytic Geometry 2 (must be completed with grade of C or higher) ¹	4
MATH 234	Calculus--Functions of Several Variables (must be completed with grade of C or higher) ¹	4
MATH 340	Elementary Matrix and Linear Algebra ¹	3
or MATH 341	Linear Algebra	
Computer Programming		
Select one of the following: ²		3
COMP SCI 200	Programming I	
COMP SCI 300	Programming II	
COMP SCI 301	Introduction to Data Programming	
COMP SCI 400	Programming III	
COMP SCI 412	Introduction to Numerical Methods	
COMP SCI/I SY E/ MATH/STAT 525	Linear Programming Methods	
Statistics Courses		
Introductory Statistics and Basic Statistical Language		25
STAT 302	Accelerated Introduction to Statistical Methods	3

STAT 327	Learning a Statistical Language (Introductory Data Analysis with R)	1
<i>Linear Statistical Models</i>		
STAT 333	Applied Regression Analysis	3
STAT/M E 424	Statistical Experimental Design	3
<i>Mathematical Statistics</i>		
Probability (one course):		3
STAT/MATH 309	Introduction to Probability and Mathematical Statistics I	
STAT 311	Introduction to Theory and Methods of Mathematical Statistics I	
MATH/STAT 431	Introduction to the Theory of Probability	
Inference:		
STAT/MATH 310	Introduction to Probability and Mathematical Statistics II ³	3
<i>Statistics Electives</i>		
STAT electives to reach minimum credits required:		9
STAT 349	Introduction to Time Series	
STAT 351	Introductory Nonparametric Statistics	
STAT 411	An Introduction to Sample Survey Theory and Methods	
STAT 421	Applied Categorical Data Analysis	
STAT 456	Applied Multivariate Analysis	
STAT 461	Financial Statistics	
STAT/ COMP SCI 471	Introduction to Computational Statistics	
STAT 479	Special Topics in Statistics ⁴	
STAT 575	Statistical Methods for Spatial Data	
STAT/B M I 641	Statistical Methods for Clinical Trials	
STAT 679	Special Topics in Statistics	
STAT 699	Directed Study ⁵	
Concentration		
Select either Math Concentration or Applied Concentration		6-12
Total Credits		50-56

¹ An acceptable equivalent for all four of the required mathematics courses is MATH 275 Topics in Calculus I, MATH 276 Topics in Calculus II, MATH 375 Topics in Multi-Variable Calculus and Linear Algebra, and MATH 376 Topics in Multi-Variable Calculus and Differential Equations. MATH 275 and MATH 276 are acceptable equivalents for MATH 221 Calculus and Analytic Geometry 1 and MATH 222 Calculus and Analytic Geometry 2, respectively. MATH 211 Calculus and MATH 213 Calculus and Introduction to Differential Equations are NOT acceptable equivalents for MATH 221, MATH 222, and MATH 234 Calculus–Functions of Several Variables. (Students who have completed MATH 211 and MATH 213 are encouraged to take the Department of Mathematics' Calculus Exam to determine placement in the MATH 221–MATH 222–MATH 234 sequence).

² COMP SCI 300 is highly recommended because it will be particularly beneficial in most future careers. Students who have prior computing experience equivalent to COMP SCI 200 (such as AP computer science) are recommended to take COMP SCI 300, and students

who will pursue a second major in computer science must take COMP SCI 300 and COMP SCI 400 to satisfy the computer science major requirements.

3. STAT 312 Introduction to Theory and Methods of Mathematical Statistics II will not be accepted in lieu of STAT/MATH 310 Introduction to Probability and Mathematical Statistics II.
4. STAT 479 Special Topics in Statistics can be repeated for elective credit when enrolled for different topics.
5. Up to 3 credits of STAT 699 Directed Study can count toward these 9 credits. No course identified in Concentration 1 of the major can count towards these 9 credits.

MATHEMATICS CONCENTRATION

Students intending to pursue graduate study in statistics are strongly advised to take more math classes than the minimum requirements. Linear algebra and real analysis are typically the most important areas of mathematics needed for graduate study in statistics.

Select at least 6 additional credits of the following:

Code	Title	Credits
MATH 319	Techniques in Ordinary Differential Equations	3
MATH 421	The Theory of Single Variable Calculus	3
MATH 443	Applied Linear Algebra	3
MATH/COMP SCI/STAT 475	Introduction to Combinatorics	3
MATH/COMP SCI 514	Numerical Analysis	3
MATH 521	Analysis I	3
MATH 522	Analysis II	3
MATH 541	Modern Algebra	3
MATH 605	Stochastic Methods for Biology	3
MATH 629	Introduction to Measure and Integration	3
MATH/I SY E/OTM/STAT 632	Introduction to Stochastic Processes	3

APPLIED CONCENTRATION

Select at least 12 credits of coursework at the 300 level and higher in an area of application of statistical methods as approved by the student's major advisor. This area of application can represent study areas where statistical methods are applied, such as in the natural and social sciences and engineering. This requirement can often be met by the completion of a major in such a study area.

L&S REQUIREMENTS FOR RESIDENCE AND QUALITY OF WORK IN THE MAJOR

1. 2.000 grade point average in all STAT and major courses
2. 2.000 grade point average in 15 credits of upper-level work in the major completed in residence. Courses that count toward this requirement are STAT courses: STAT 302 Accelerated Introduction to Statistical Methods to STAT 699 Directed Study, excluding STAT 324 Introductory Applied Statistics for Engineers, STAT 371 Introductory Applied Statistics for the Life Sciences, STAT 441 Introduction to Biostatistics for Pharmacy, STAT/F&W ECOL/HORT 571 Statistical Methods for Bioscience I, and STAT/F&W ECOL/HORT 572 Statistical Methods for Bioscience II.

3. 15 credits in STAT subject, taken on 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 overall university GPA, and must have completed STAT 302 Accelerated Introduction to Statistical Methods, STAT/MATH 309 Introduction to Probability and Mathematical Statistics I and STAT 333 Applied Regression Analysis with a GPA of 3.500 or higher.

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 overall university GPA
- Earn a 3.500 GPA for all STAT courses
- Complete one of the following:
 - Two courses, taken for Honors, with individual grades of B or better, from Linear Statistical Models, Mathematical Statistics, or Statistics Electives other than STAT 699 Directed Study, or
 - Complete an additional course worth 3 credits from the Statistics Electives list (for a total of 12 statistics electives)
- Complete a two-semester Senior Honors Thesis in STAT 681 Senior Honors Thesis and STAT 682 Senior Honors Thesis, for a total of 6 credits, under the supervision of a member of the faculty of the Department of Statistics.

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.

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 proposing the study — 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.

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.

The single, best place to look for statistics jobs is the American Statistical Association Career Center (<http://www.amstat.org/ASA/Your-Career/home.aspx>). Consult with a statistics undergraduate advisor about the best fit for you.

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).

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.

- SuccessWorks (<https://careers.ls.wisc.edu>)
- Set up a career advising appointment (<https://careers.ls.wisc.edu/make-an-appointment>)
- INTER-LS 210 L&S Career Development: Taking Initiative (1 credit, targeted to first- and second-year students)—for more information, see Inter-LS 210: Career Development, Taking Initiative (<https://careers.ls.wisc.edu/inter-ls-210-career-development-taking-initiative>)
- 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

GAYLORD NELSON INSTITUTE FOR ENVIRONMENTAL STUDIES

The Institute for Environmental Studies was created in 1970 to promote and enhance interdisciplinary environmental instruction, research, and outreach at UW–Madison. In 2002, it was renamed in honor of former Wisconsin governor and U.S. Senator Gaylord Nelson, the founder of Earth Day and a lifelong champion of environmental stewardship.

The program espouses an integrated approach to learning about the environment. Students are encouraged to consider their interests, strengths, and values beyond the context of their courses and connect the subject of the environment to their other courses as well as their extracurricular experiences. The Nelson Institute is a robust environmental community in which students learn about current environmental issues, and more important, how to link environmental science, policy, literature, art, and philosophy to other fields of study. The focus on the intentional integration of their academic endeavors with their interests, skills, and values provides a powerful source of