Statistics, BS

Learning Outcomes

Students will:

- be able to distinguish between observational studies and designed experiments and understand the issues related to the data collection method, including sampling bias, sampling error, sample size determination, statistical power, association versus causation, and the design and analysis of randomized experiments;
- use critical thinking skills to translate substantive questions into well-defined statistical problems and choose appropriate statistical methods and graphical summaries for a given problem;
- use computer software to manage data, carry out exploratory data analyses and computer simulations, produce numerical and graphical summaries of data, and apply basic statistical methodology;
- be able to clearly communicate study results to non-statisticians, and write accurate and meaningful reports that describe the statistical analyses and summarize important findings; and
- understand the mathematical tools underlying statistical methods, including distribution theory, uncertainty quantification via probability, estimation theory, and the probabilistic basis of formal statistical inference.

Requirements

The Bachelor of Science with a major in statistics requires a minimum of 120 s.h., including at least 51 s.h. of work for the major. Students must maintain a grade-point average of at least 2.00 in all courses for the major and in all UI courses for the major. They also must complete the College of Liberal Arts and Sciences GE CLAS Core.

Students who earn the major in statistics may not earn the major in data science.

Students complete 10 core courses that provide essential instruction in statistical methods, applications, and theory. In addition, they may concentrate on an interest area by selecting appropriate elective courses.

The BS with a major in statistics requires the following coursework.

Requirements	Hours
Core Courses	36
Electives	15

Core Courses

All students complete the following 10 core courses.

Course #	Title	Hours
STAT:2010	Statistical Methods and Computing	3
STAT:3100/ IGPI:3100	Introduction to Mathematical Statistics I	4
STAT:3101/ IGPI:3101	Introduction to Mathematical Statistics II	3
STAT:3200/ DATA:3200/ IGPI:3200/ISE:3760	Applied Linear Regression	3
STAT:3210	Experimental Design and Analysis	3
CS:1210	Computer Science I: Fundamentals	4
MATH:1850	Calculus I	4
MATH:1860	Calculus II	4
MATH:2700	Introduction to Linear Algebra	4
MATH:2850	Calculus III	4

Electives

Students complete 15 s.h. of electives with a maximum of 6 s.h. coming from domain electives.

Course #	Title	Hours
9-15 s.h. from these:		
STAT:1015/ DATA:1015	Introduction to Data Science	3
STAT:3620/ CEE:3142/ISE:3600	Quality Control	3
STAT:4100/ IGPI:4100	Statistical Inference I	3
STAT:4101/ IGPI:4101	Statistical Inference II	3
STAT:4520/ IGPI:4522/ PSQF:4520	Bayesian Statistics	3
STAT:4540/ DATA:4540/ BAIS:4540/ IGPI:4540	Statistical Learning	3
STAT:4580/ DATA:4580/ IGPI:4580	Data Visualization and Data Technologies	3
STAT:4750/ DATA:4750	Probabilistic Statistical Learning	3
STAT:5400/ DATA:5400/ IGPI:5400	Computing in Statistics	3
STAT:6220/ DATA:6220	Consulting and Communication With Data	3
STAT:6300	Probability and Stochastic Processes I	3
STAT:6301	Probability and Stochastic Processes II	3
STAT:6530/ IGPI:6530	Environmental and Spatial Statistics	3
STAT:6550/ BIOS:6310/ IGPI:6310	Introductory Longitudinal Data Analysis	3
STAT:6560	Applied Time Series Analysis	3
ACTS:4150	Fundamentals of Short-Term Actuarial Mathematics	3
BIOS:5130/ IGPI:5130	Applied Categorical Data Analysis	3
DATA:4600/ STAT:4600	Causal Inference for Data Science	3
DATA:4610	Data Acquisition and Management	3
DATA:4620	Text Data Analysis	3

Up to two courses from these domain electives:

STAT:5120	Mathematical Methods for Statistics	3
ACTS:3080	Mathematics of Finance I	3
ACTS:4130	Quantitative Methods for Actuaries	3
CS:2210	Discrete Structures	3
CS:2230	Computer Science II: Data Structures	4
MATH:3770	Foundations of Analysis	4
MATH:3800/ CS:3700	Introduction to Numerical Methods	3
MATH:4820/ CS:4720	Optimization Techniques	3
MATH:4840	Mathematics of Machine Learning	3

Combined Programs

BS/MS in Statistics

The combined Bachelor of Science/Master of Science in statistics is for eligible students who seek to complete both the BS and the MS at the University of Iowa in five years. Students in the combined program must complete all requirements for each degree. A traditional MS in statistics requires completion of 32 s.h. of graduate-level coursework. The BS/MS program permits students to count 12 s.h. of credit (four courses) toward the requirements for both degrees. To complete the MS, an additional 20 s.h. of coursework is required. The four courses that count toward both degrees must be taken during the fourth year of undergraduate study, after admission to the combined program, and must satisfy degree requirements of both the BS and the MS in statistics.

BS/MPH (Biostatistics Subprogram)

Students majoring in statistics who are interested in earning a Master of Public Health degree with a biostatistics subprogram may apply to the combined BS/MPH program offered by the College of Liberal Arts and Sciences and the College of Public Health. The program permits students to count 15 s.h. of credit toward the requirements for both degrees, enabling them to begin the study of public health before they complete the bachelor's degree. For information about the public health program, see the Master of Public Health, MPH (biostatistics subprogram) section of the catalog.

BS/MS in Biostatistics

The combined BS in statistics/MS in biostatistics enables Bachelor of Science students majoring in statistics to begin work toward the MS while completing the bachelor's degree. Students admitted to the program may count 12 s.h. of credit toward both the BS and the MS degree requirements. The combined program is offered by the Graduate College, the College of Liberal Arts and Sciences, and the College of Public Health; see the MS in biostatistics in the catalog.

Honors

Honors in the Major

Students majoring in statistics have the opportunity to graduate with honors in the major. Departmental honors students must maintain a grade-point average (GPA) of at least 3.67 in their major and a cumulative University of Iowa GPA of at least 3.33.

To graduate with honors in the statistics major, students must complete an honors project or a suitable alternative. Statistics honors students should consult with the statistics undergraduate advisor.

University of Iowa Honors Program

In addition to honors in the major, students have opportunities for honors study and activities through membership in the University of Iowa Honors Program. Visit Honors at Iowa to learn about the university's honors program.

Membership in the UI Honors Program is not required to earn honors in the statistics major.

Career Advancement

Statistics and probability are vital to many fields, so the demand for well-trained statisticians is strong. Statisticians work in medicine, engineering, law, public policy making, marketing, manufacturing, engineering, agriculture, varied social and natural sciences, and numerous other areas.

When students graduate, they will be prepared to fill entry-level positions as statisticians or go on to graduate school. An advisor assists students in locating internship opportunities as well as the best-fitting graduate programs.

To learn more about job opportunities, see Your Career on the American Statistical Association website.

The Pomerantz Career Center offers multiple resources to help students find internships and jobs.

Academic Plans

Four-Year Graduation Plan

The following checkpoints list the minimum requirements students must complete by certain semesters in order to stay on the university's Four-Year Graduation Plan. Courses in the major are those required to complete the major; they may be offered by departments other than the major department.

Much of the coursework in statistics is sequential, so students must begin requirements for the major as soon as possible. Individual study plans must be made carefully. Students who first enroll for a spring semester must consult their advisor to confirm a four-year plan.

Courses must be taken in sequence, so students must begin work early.

Before the fifth semester begins: at least four courses in the major, including MATH:1850 Calculus I, MATH:1860 Calculus II, and STAT:2010 Statistical Methods and Computing.

Before the seventh semester begins: seven or eight courses in the major and at least 90 s.h. earned toward the degree.

Before the eighth semester begins: nine or ten courses in the major.

During the eighth semester: enrollment in all remaining coursework in the major, all remaining GE CLAS Core courses, and a sufficient number of semester hours to graduate.

Sample Plans of Study

Sample plans represent one way to complete a program of study. Actual course selection and sequence will vary and should be discussed with an academic advisor. For additional sample plans, see MyUI.

Statistics, BS

Mathematical Statistics Track

This sample plan is currently being reviewed and will be added at a later date.

Statistical Computing and Data Science Track

This sample plan is currently being reviewed and will be added at a later date.

Statistics in Business, Industry, Government and Research Track

This sample plan is currently being reviewed and will be added at a later date.