

Statistics, MS

Learning Outcomes

Graduates will be able to:

- understand the mathematical and statistical theory that underlies commonly used statistical methods;
- choose appropriate statistical methods for data analysis;
- correctly and effectively implement descriptive and inferential statistical methods;
- identify and criticize inappropriate use of statistics;
- consult with non-statisticians to help collect and analyze data; and
- acquire effective communication skills for disseminating statistical findings.

Requirements

The Master of Science in statistics requires 32 s.h. of graduate credit. Students must earn a minimum Graduate College major program grade-point average of 3.00. It includes a solid foundation in statistical computing, statistical modeling, experimental design, and mathematical statistics plus electives in statistical methods and/or theory. Students have the opportunity to concentrate on theory or applications or a combination of the two.

Students must take a computer programming proficiency test during the first semester of study; those who display inadequate programming skills are assigned activities to build their proficiency. In addition to required coursework, students must pass a two-part graduate final examination.

All coursework must be taken on an A-F graded basis, with the exception of STAT:5090 and STAT:6990.

The MS in statistics requires the following coursework.

| Requirements | Hours |
|-------------------------|-------|
| Core Statistics Courses | 23 |
| Elective Courses | 9 |
| Final Examination | |

Core Statistics Courses

| Course # | Title | Hours |
|---------------------------------------|--|-------|
| All of these: | | |
| STAT:5090 | ALPHA Seminar | 1 |
| STAT:5100 | Statistical Inference I | 3 |
| STAT:5101 | Statistical Inference II | 3 |
| STAT:5200/ IGPI:5199 | Applied Statistics I | 4 |
| STAT:5201 | Applied Statistics II | 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 |

Elective Courses

Students complete at least 9 s.h. in elective courses. A maximum of one course numbered 7000-7999 is permitted to apply toward the MS.

| Course # | Title | Hours |
|---|--|-------|
| STAT:4540/ BAIS:4540/ DATA: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:5120 | Mathematical Methods for Statistics | 3 |
| STAT:6301 | Probability and Stochastic Processes II | 3 |
| STAT:6530/ IGPI:6530 | Environmental and Spatial Statistics | 3 |
| STAT:6547/ PSQF:6247 | Nonparametric Statistical Methods | 3 |
| STAT:6560 | Applied Time Series Analysis | 3 |
| STAT:6970 | Topics in Statistics | 3 |
| STAT:6990 | Readings in Statistics (if taken, two enrollments of 1 s.h. each required) | 2 |
| STAT:7100 | Advanced Inference I | 3 |
| STAT:7101 | Advanced Inference II | 3 |
| STAT:7190 | Seminar: Mathematical Statistics | arr. |
| STAT:7200 | Linear Models | 4 |
| STAT:7290 | Seminar: Applied Statistics | arr. |
| STAT:7300 | Advanced Probability | 3 |
| STAT:7390 | Seminar: Probability | arr. |
| STAT:7400/ DATA:7400/ IGPI:7400 | Computer Intensive Statistics | 3 |
| STAT:7500/ BAIS:7500 | Statistical Machine Learning | 3 |
| STAT:7510/ BIOS:7410 | Analysis of Categorical Data | 3 |
| STAT:7520 | Bayesian Analysis | 3 |
| STAT:7560 | Time Series Analysis | 3 |
| STAT:7570/ BIOS:7210/ IGPI:7210 | Survival Data Analysis | 3 |

Readings in Statistics

All students are encouraged to complete 2 s.h. in STAT:6990 Readings in Statistics, engaging in a project that aligns with their application and career interests. Students typically register for the course in the fall and spring semesters of the second year for 1 s.h. each; they may complete it earlier if ready. Students must present orally in a Statistics Student Organization meeting and earn a satisfactory grade from the advisor's evaluation of the work and presentation.

If a student wishes to pursue the PhD in statistics, this course must be completed within one calendar year of passing the

MS final examination. It is highly advantageous that the advisor for this course becomes the PhD advisor.

PhD Preparation

Students interested in pursuing the PhD in statistics are encouraged to include STAT:5120 Mathematical Methods for Statistics, 2 s.h. of STAT:6990 Readings in Statistics, and one statistics course (prefix STAT) numbered 7000 or higher in their course selections. See the PhD in statistics in this section of the catalog for more information.

Final Examination

The final examination consists of two parts. One covers the topics presented in STAT:5100 Statistical Inference I and STAT:5101 Statistical Inference II; the other covers the topics presented in STAT:5200/IGPI:5199 Applied Statistics I, STAT:5201 Applied Statistics II, and STAT:5400/DATA:5400/IGPI:5400 Computing in Statistics. Each part includes a few problems that test readiness for the PhD program.

Final examinations are offered the week before the fall semester begins in August. Study guides are available in the department office. Students who do not succeed the first time they take the exam may repeat it once, the week before the spring semester begins in January.

Students must complete all requirements and be granted the Master of Science degree within one calendar year of passing the MS final examination; those who do not meet this deadline are required to take the exam again.

Students entering the PhD program, who will choose either biostatistics, probability/mathematical statistics, or data science as their concentration area, and who already have taken the equivalent of the first-year courses, may take the MS final examination in statistics before beginning further studies.

Admission

Applicants must meet the admission requirements of the Graduate College; see the Manual of Rules and Regulations on the Graduate College website.

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.

The MS program prepares students for careers as professional statisticians or for entry into a PhD program. 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

Sample Plan 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, MS

| Course | Title | Hours |
|---|--|-----------|
| Academic Career | | |
| Any Semester | | |
| 32 s.h. must be graduate level coursework; graduate transfer credits allowed upon approval. More information is included in the General Catalog and on department website. ^a | | |
| Hours | | 0 |
| First Year | | |
| Fall | | |
| STAT:5090 | ALPHA Seminar | 1 |
| STAT:5100 | Statistical Inference I | 3 |
| STAT:5200 | Applied Statistics I | 4 |
| STAT:5400 | Computing in Statistics | 3 |
| Hours | | 11 |
| Spring | | |
| STAT:5101 | Statistical Inference II | 3 |
| STAT:5201 | Applied Statistics II | 3 |
| Elective course ^b | | 3 |
| Hours | | 9 |
| Second Year | | |
| Fall | | |
| Exam: Master's Final Exam ^c | | |
| STAT:6300 | Probability and Stochastic Processes I | 3 |
| STAT:6990 | Readings in Statistics ^{b, d} | 1 |
| Elective course ^b | | 2 |
| Hours | | 6 |
| Spring | | |
| STAT:6220 | Consulting and Communication With Data | 3 |
| STAT:6990 | Readings in Statistics ^{b, d} | 1 |
| Elective course ^b | | 2 |
| Hours | | 6 |
| Total Hours | | 32 |

a Students must complete specific requirements in the University of Iowa Graduate College after program admission. Refer to the Graduate College website and the Manual of Rules and Regulations for more information.

b Students must complete at least 9 s.h. in elective courses. A maximum of one course numbered 7000-7999 is permitted to apply toward the MS. See the General Catalog for list of approved courses.

c The two-part written final examination is offered the week before classes begin in August; it covers the material presented in STAT:5100, STAT:5101, STAT:5200, STAT:5201, and STAT:5400. Students who do not succeed the first time they take the exam may repeat it once the week before the spring semester begins in January.

d All students are encouraged to complete 2 s.h. in STAT:6990, engaging in a project that aligns with their

application and career interests. Students typically register for the course in the fall and spring semesters of the second year for 1 s.h. each.