Statistics

Degrees Offered

- Master of Science

Nature of the Program

The Department of Statistics offers a Master of Science (M.S.) in Statistics. The M.S. degree is intended to qualify the student to assume a professional role in educational, industrial, or governmental research projects; to teach in a college; or to undertake advanced training toward a doctorate in statistics or one of the quantitative fields of science.

Because many students receive baccalaureate degrees from colleges that do not offer undergraduate programs in statistics, and because historically statistics has been primarily a field of graduate education, a student does not need a degree in statistics to enter the degree program. A good background in mathematics, science, or engineering is reasonable preparation for graduate work in statistics.

The Department of Statistics also participates in the Combinatorial Computing and Discrete Mathematics (CCDM) Area of Emphasis within the Computer and Information Science Ph.D. Program or the Mathematics Ph.D. Program.

The Department of Statistics offers a Certificate in Applied Statistics for professionals or students who want to take applied statistics courses to enhance their quantitative skills and job opportunities.

FACULTY

CHAIR

- Michael Mays - Ph.D. (Penn State University)

PROFESSORS

- Erdogan Gunel - Ph.D. (State University of New York, Buffalo)
  Bayesian Inference, Biostatistics, Categorical Data Analysis
- Robert Mnatsakanov - Ph.D. (Moscow State Institute of Electronics and Mathematics)
  Nonparametric statistics, Statistical Inverse Problems, Mixture Models, Change-set Problems

ASSOCIATE PROFESSORS

- Mark V. Culp - Ph.D. (University of Michigan)
  Statistical Machine Learning, Computational Statistics, Semi-supervised and Multi-view Learning, Biometrics
- Kenneth J. Ryan - Ph.D. (Iowa State University)
  Experimental Design, Statistical Machine Learning, Biometrics

TEACHING ASSOCIATE PROFESSOR

- Huey Miin Lee - Ph.D. (Johns Hopkins University)
  Bioinformatics, Statistical Education

ASSISTANT PROFESSORS

- Stacey Culp - Ph.D. (University of Michigan)
  Statistics Education and Statistical Consulting
- Casey Jelsema - Ph.D. (Western Michigan University)
  Spatial statistics, mixed effects models, Bayesian hierarchical modeling, constrained inference, bootstrap methods, environmental statistics, microbiome, statistical computation.
- Erin R. Leatherman - Ph.D. (Ohio State)
  Prediction and Design for Computer and Physical Experiments.

TEACHING INSTRUCTOR

- Anthony Billings - M.S. (West Virginia University, A.B.D. (Carnegie Mellon University)
  Statistical Computing, Statistical Modeling, Robust Estimation, Nonlinear Dynamic Systems, Statistical Education

PROFESSOR EMERITUS

- William V. Thayne - Ph.D. (University of Illinois)
  Experimental Design, Statistical Genetics, Regression Analysis
- E. James Harner - Ph.D. (Cornell University)
  Dynamic graphics, Statistical computing and modeling, Statistical education.
Statistics

- Edwin C. Townsend - Ph.D. (Cornell University)
  Experimental Design, Regression Analysis

ASSOCIATE PROFESSOR EMERITUS
- Daniel M. Chilko - M.S. (Rutgers University)
  Statistical Computing, Computer Graphics
- Gerald R. Hobbs Jr. - Ph.D. (Kansas State University)
  Biostatistics, Nonparametric Statistics, Regression Analysis

ADMISSIONS AND PREREQUISITES FOR MASTER OF SCIENCE IN STATISTICS

Students are expected to know the material contained in the following courses or areas upon admission to the program. Otherwise, these deficiencies must be removed as early as possible in the student’s degree program under the terms specified by the Admissions and Standards Committee.

- Single and multivariable calculus (MATH 155, MATH 156, MATH 251, or equivalent)
- Linear or matrix algebra (MATH 441 or equivalent)
- Probability and statistics (STAT 215 or equivalent)
- Knowledge of a high-level programming language

ADMISSIONS AND PREREQUISITES FOR THE CERTIFICATE IN APPLIED STATISTICS

Admission to the Certificate of Applied Statistics (CAS) may be done at any time. Students who are currently admitted to or enrolled in a graduate degree program that want to earn the CAS should contact the Statistics Department to enroll in the certificate program. Students who want to pursue the CAS independent of a graduate degree program must be admitted as a non-degree graduate student prior to registering for the certificate program.

Those seeking admission to the CAS must have a minimum GPA of 2.75, have graduated from and accredited institution with a minimum of a Baccalaureate degree and successfully completed College Algebra. Single and Multi-variable Calculus are recommended.

The GRE General Test is not required for admission.

To obtain a Master of Science in Statistics, the student must complete the course and comprehensive examination requirements. The student must maintain a minimum GPA of 3.0 and earn a grade of C- or better in all courses counting toward the degree.

Master of Science

MAJOR REQUIREMENTS

To obtain a Master of Science in Statistics, the student must complete the course and comprehensive examination requirements.

Minimum cumulative GPA of 3.0 is required.

Minimum grade of C- in all courses applied toward the degree

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>STAT 512</td>
<td>Statistical Methods 2</td>
<td>3</td>
</tr>
<tr>
<td>STAT 513</td>
<td>Design of Experiments</td>
<td>3</td>
</tr>
<tr>
<td>STAT 545</td>
<td>Applied Regression Analysis</td>
<td>3</td>
</tr>
<tr>
<td>STAT 555</td>
<td>Categorical Data Analysis</td>
<td>3</td>
</tr>
<tr>
<td>STAT 561</td>
<td>Theory of Statistics 1</td>
<td>3</td>
</tr>
<tr>
<td>STAT 562</td>
<td>Theory of Statistics 2</td>
<td>3</td>
</tr>
<tr>
<td>Electives (STAT 462, any 500-, 600-, or 700-level STAT courses except STAT 511 or STAT 516)</td>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>

Select either the non-thesis or thesis option

Non-Thesis Option:

Electives (STAT 462, any 500-, 600-, or 700-level STAT courses except STAT 511 or STAT 516)

Thesis Option:

<table>
<thead>
<tr>
<th>Course</th>
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<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT 697</td>
<td>Research</td>
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<tr>
<td>Thesis</td>
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<tr>
<td>Thesis Defense</td>
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<tr>
<td>Comprehensive Examination</td>
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</tbody>
</table>

Total Hours 33

* Non-STAT electives require departmental consent.
EXAMINATIONS
Students must pass a written comprehensive examination on foundational material. The examination covers the theory taught in STAT 461 and STAT 462 and the applications taught in STAT 512, STAT 513, and STAT 545. The exam is given twice a year on the Thursday during the second full week following spring semester final exams and on the third Saturday in October. Students have a maximum of three attempts for this exam.

Certificate in Applied Statistics
CERTIFICATE CODE - CG29
The Certificate in Applied Statistics (CAS) is designed for professionals or students who what to take applied statistics courses to enhance their quantitative skills and job opportunities. The certificate will provide students with a solid foundation in statistical methodology, and depending on the elective courses selected, predictive analytics, statistical computing, or statistical theory. The flexibility in the certificate course work is intended to allow the student to select courses that will meet their needs, whether enhancing professional quantitative skills or research productivity.

Admissions to the CAS may be done at any time. Students who are currently admitted to or enrolled in a graduate degree program that are wishing to earn the CAS should contact the Statistics Department to enroll in the CAS. Students who wish to pursue the CAS independent of a graduate degree program must be admitted as a non-degree graduate student prior to registering their intent to earn the certificate.

Students must earn a grade of C- in all courses applied to the CAS, and must earn at least an overall 3.0 GPA in the courses counted toward the certificate.

REQUIRED COURSES:
Students in the certificate program will complete a minimum of 15 credit hours of graduate level Statistics courses. The courses required for the completion of the CAS are defined below.

Students must earn a grade of C- in all courses applied to the CAS.
Students must earn at least an overall 3.0 GPA in the courses counted toward the certificate.

<table>
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<tr>
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<td>(500, 600, 700-level STAT Courses)</td>
<td>9</td>
</tr>
<tr>
<td><strong>Total Hours</strong></td>
<td></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

* Credit towards the Certificate is also given for STAT 461 and STAT 462.
** All courses applied to the certificate must be Statistics (STAT) courses; courses listed as equivalent to Statistics courses in the Catalog may not be counted.

Major Learning Goals

STATISTICS
Graduate courses in statistics, and sequences of statistics courses leading to a Master of Science in Statistics or a Certificate in Applied Statistics, provide a foundation of statistical literacy, statistical reasoning, and statistical thinking. Our aim is for all of our students to be challenged and encouraged in their statistical course work. In particular, we enable our students to

- Appreciate the inherent variation and uncertainty of information, and understand that statistics can be a resource for improved decision making;
- Develop critical thinking skills for application of statistics;
- Effectively communicate the results of statistical analysis;
- Become responsible and competent practitioners of statistics in order to attain personal goals, either in a profession or in further educational experiences.