STATISTICS, BS

Banner Code: VS-BS-STIC

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Students may be admitted into this program beginning Spring 2018.

The Bachelor of Science in Statistics is designed to provide a framework for students to develop connections between statistical concepts and theories and their applications to statistical practice. It will prepare statisticians who can use modern statistical techniques to design studies, collect data, analyze and visualize high dimensional data sets, and draw valid conclusions in an increasingly data-centric world. In this program, students will meld the time-tested concepts and theories of statistics with modern methods of analysis, in order to interpret the data that is collected in nearly every discipline and every sector of industry and government.

The BS in Statistics requires a total of 120 credit hours, including major core requirements, concentration requirements, and Mason Core requirements. The program’s major core curriculum provides students with a firm foundation in statistics, mathematics, and computing. Selection of a concentration allows a student to specialize in applied, theoretical, or computational aspects of statistical practice. Students will select one of three concentrations: Applied Statistics, Mathematical Statistics, or Statistical Analytics. The Applied Statistics concentration focuses on developing proficiency in analytical methods applicable to a specific discipline of the student’s choosing. This is accomplished through the requirement to complete a minor in a field that makes substantial use of data analysis. The Mathematical Statistics concentration is designed for students interested in mastering the theoretical underpinnings of statistics and probability; this concentration is recommended for students who intend to continue graduate studies in statistics or whose main focus is on research. The Statistical Analytics concentration blends the disciplines of computer science and statistics in a very modern way and is designed for students interested in applying concepts from statistics and computer science to the analysis of massive data sets.

Graduates of this program can look forward to careers in local, state, and federal government, and in the many industries that conduct scientific research, collect, and analyze data. They will enter the workforce with the ability to impact science, public policy, technology, and industry in a positive way through their expertise in data collection, analysis, synthesis, and interpretation, each with the highest ethical standards. Graduates will also be well prepared to continue their studies in graduate schools if they so desire.

Admissions & Policies

Advanced Placement, Credit by Exam
A score of 5 on the Advanced Placement (AP) statistics exam qualifies students for credit in STAT 260.

Change of Major
Students considering changing their major to Statistics should consult with the Volgenau School of Engineering Coordinator of Undergraduate Advising, 2500 Nguyen Engineering Building. These students must have a cumulative GPA of at least 2.75 and completed MATH 114 with a grade of C or better. See Change of Major for more information.

Grades
Students must earn a C or better in Major Core Requirement courses as well as in courses required to satisfy prerequisites.

Termination from major
No math, science, or Volgenau School of Engineering course that is required for the major may be attempted more than three times. Those students who do not successfully complete such a course within three attempts will be terminated from the major. Undeclared students in the Volgenau School who do not successfully complete a course required for a Volgenau School major within three attempts will also be terminated. For more information, see AP.5.2.4 Termination from the Major.

Once a student has attempted one of these courses twice unsuccessfully, the third attempt must be no later than the next semester of enrollment, excluding summers. Failure to take the course at that time will result in termination from the major. If the student is unable to take the course when required, the student may request an extension to a future semester; extensions require approval of the student’s advisor, their department, and the Associate Dean for Undergraduate Programs. The deadline for extension requests is the add deadline for the semester in which the course is required.

Students who have been terminated from a Volgenau School of Engineering major may not register for a Volgenau School course without permission of the department offering the course. This applies to all undergraduate courses offered by the Volgenau School except IT 104 Introduction to Computing (Mason Core) and STAT 250 Introductory Statistics I (Mason Core).

A student may not declare any major in the Volgenau School of Engineering if the student has previously met the termination criteria for that major at any time, regardless of what the student’s major was at the time the courses were taken.

Requirements

Degree Requirements
Total credits: 120

Major Core
Statistics Core
<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT 260</td>
<td>Introduction to Statistical Practice</td>
<td>3</td>
</tr>
<tr>
<td>STAT 334</td>
<td>Introduction to Probability Models and Simulation</td>
<td>3</td>
</tr>
<tr>
<td>or STAT 346</td>
<td>Probability for Engineers</td>
<td>3</td>
</tr>
<tr>
<td>STAT 354</td>
<td>Probability and Statistics for Engineers and Scientists II</td>
<td>3</td>
</tr>
<tr>
<td>STAT 362</td>
<td>Introduction to Computer Statistical Packages</td>
<td>3</td>
</tr>
<tr>
<td>STAT 456</td>
<td>Applied Regression Analysis</td>
<td>3</td>
</tr>
<tr>
<td>STAT 463</td>
<td>Introduction to Exploratory Data Analysis</td>
<td>3</td>
</tr>
<tr>
<td>STAT 489</td>
<td>Pre-Capstone Professional Development</td>
<td>3</td>
</tr>
</tbody>
</table>
STAT 490  Capstone in Statistics (Mason Core)  3
Total Credits  24

Mathematics Core
MATH 113  Analytic Geometry and Calculus I (Mason Core)  1,2  4
MATH 114  Analytic Geometry and Calculus II  3  4
MATH 203  Linear Algebra  3  3
Total Credits  11
1 Math 123-124 may be taken in place of MATH 113 if student does not have sufficiently high math placement scores to be eligible for MATH 113.
2 MATH 115 may be taken in place of MATH 113 if student qualifies.
3 MATH 116 may be taken in place of MATH 114 if student qualifies.

Computational Skills Core
CS 105  Computer Ethics and Society (Mason Core)  1  1
or CDS 151  Data Ethics in an Information Society (Mason Core)  4
CS 112  Introduction to Computer Programming (Mason Core)  4  4
Total Credits  5
1 Students in the Statistical Analytics concentration must take CS 105.

Restricted Electives
Statistics
Select nine credits of STAT electives  9
STAT courses numbered 440-499  1
Total Credits  9
1 May not be used to fulfill other degree requirements.

Technical
Select nine credits of technical electives. Specific course selections must be pre-approved by the undergraduate coordinator. Students may need to choose electives to satisfy prerequisites for some of these courses. In some cases, students will need to contact other departments for permission to enroll.

CDS courses numbered above 200
CS courses numbered above 200
MATH courses numbered above 200
OR courses numbered above 300
BENG 322  Health Data Challenges
CYSE 325  Discrete Events Systems Modeling
ENGH 388  Professional and Technical Writing
IT 214  Database Fundamentals
SYST 473  Decision and Risk Analysis
SYST 488  Financial Systems Engineering
Total Credits  9

Concentrations
Select one concentration and complete all requirements.

Concentration in Applied Statistics (ASTA)
Focuses on developing proficiency in analytical methods applicable to a specific discipline of the student’s choosing. This is accomplished through the requirement to complete a minor in a field that makes substantial use of data analysis.

Students must complete 15 - 21 credits in a pre-approved minor, selected in consultation with the undergraduate coordinator. Courses taken to fulfill the minor requirements that are not used to fulfill Major Core or Restricted Electives requirements are considered unique to the minor. At least 15 credits of the minor coursework, technical electives, general electives, and additional Mason Core courses must be at or above the 300 level.

Concentration in Mathematical Statistics (MTHS)
Designed for students interested in mastering the theoretical underpinnings of statistics and probability; this concentration is recommended for students who intend to continue graduate studies in statistics or whose main focus is on research.

STAT 356  Statistical Theory  3
CDS 130  Computing for Scientists (Mason Core)  3
MATH 213  Analytic Geometry and Calculus III  3
MATH 290  Introduction to Advanced Mathematics  3
MATH 315  Advanced Calculus I  3
Total Credits  15
1 MATH 215 may be taken in place of MATH 213 if student qualifies.

At least 9 credits of the technical electives, general electives, and additional Mason Core courses must be at or above the 300 level.

Concentration in Statistical Analytics (STLA)
Blends the disciplines of computer science and statistics in a very modern way and is designed for students interested in applying concepts from statistics and computer science to the analysis of massive data sets.

STAT 472  Introduction to Statistical Learning  3
CS 211  Object-Oriented Programming  3
CS 310  Data Structures  3
CS 330  Formal Methods and Models  3
CS 450  Database Concepts  3
or CDS 302  Scientific Data and Databases  3
CS 484  Data Mining  3
or CDS 303  Scientific Data Mining  3
MATH 125  Discrete Mathematics I (Mason Core)  3
OR 481  Numerical Methods in Engineering  3
Total Credits  24

Additional Mason Core

Foundation Requirements
Written Communication  1  6
Oral Communication  3

Core Requirements
Literature  3
Arts  3
Western Civilization/World History  3
Global Understanding  3
Social and Behavioral Sciences  3
Natural Science  7
Total Credits  31

1 Statistics majors must take the Natural Sciences and Technology section of ENGH 302.

**General Electives**

The number of general elective credits varies with choice of concentration  7-16

Total Credits  7-16