STATISTICS AND ANALYTICS
MAJOR, B.S.

The major in statistics and analytics is an excellent program for students interested in statistical data science, operations research, and actuarial science, as well as in fields such as business, economics, public policy and health, psychology, and biomedicine where the decision and statistical sciences play an increasingly important role.

Student Learning Outcomes

Upon completion of the statistics and analytics program, students should be able to:

- Demonstrate foundational knowledge of probability, statistics, optimization, and stochastic modeling
- Exhibit proficiency in one or more of the scientific programming languages commonly used in statistics and analytics
- Apply the analytical and computational skills needed to formulate and solve data science problems
- Interpret and translate numerical results into actionable ideas and communicate them orally and in writing
- Find employment in professions relying on data and analytics, or continue education in related graduate programs

Requirements

In addition to the program requirements, students must

- earn a minimum final cumulative GPA of 2.000
- complete a minimum of 45 academic credit hours earned from UNC–Chapel Hill courses
- take at least half of their major core requirements (courses and credit hours) at UNC–Chapel Hill
- earn a minimum cumulative GPA of 2.000 in the major core requirements. Some programs may require higher standards for major or specific courses.

For more information, please consult the degree requirements section of the catalog (http://catalog.unc.edu/undergraduate/degree-requirements/).

Statistics and analytics majors must complete 120 academic hours.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>MATH 347</td>
<td>Linear Algebra for Applications</td>
<td>3</td>
</tr>
<tr>
<td>STOR 415</td>
<td>Introduction to Optimization</td>
<td>3</td>
</tr>
<tr>
<td>STOR 435</td>
<td>Introduction to Probability</td>
<td>3</td>
</tr>
<tr>
<td>or STOR 535</td>
<td>Probability for Data Science</td>
<td></td>
</tr>
<tr>
<td>STOR 445</td>
<td>Stochastic Modeling</td>
<td>3</td>
</tr>
<tr>
<td>STOR 455</td>
<td>Methods of Data Analysis</td>
<td>3-4</td>
</tr>
<tr>
<td>or STOR 320</td>
<td>Introduction to Data Science</td>
<td></td>
</tr>
</tbody>
</table>

Five additional courses from Group A and Group B, including at least 5-16 three additional courses from Group A (see lists below)

<table>
<thead>
<tr>
<th>Code</th>
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<th>Hours</th>
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<tbody>
<tr>
<td>BIOS 511</td>
<td>Introduction to Statistical Computing and Data Management</td>
<td>4</td>
</tr>
<tr>
<td>BIOS 664</td>
<td>Sample Survey Methodology</td>
<td>4</td>
</tr>
<tr>
<td>BUSI 403</td>
<td>Operations Management</td>
<td>3</td>
</tr>
<tr>
<td>BUSI 408</td>
<td>Corporate Finance</td>
<td>3</td>
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Additional Requirements

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>COMP 116</td>
<td>Introduction to Scientific Programming (COMP 110 may be substituted)</td>
<td>3</td>
</tr>
<tr>
<td>MATH 231</td>
<td>Calculus of Functions of One Variable</td>
<td>4</td>
</tr>
</tbody>
</table>
BUSI 410 Business Analytics
BUSI 532 Healthcare and Service Operations Management
BUSI 533 Supply Chain Management
COMP 401 Foundation of Programming (Student can take COMP 301 or COMP 401 )
COMP 410 Data Structures (Student can take COMP 210 or COMP 410 )
COMP 421 Files and Databases
ECON 410 Intermediate Microeconomics
ECON 420 Intermediate Macroeconomics
ECON 511 Advanced Game Theory
INLS 523 Introduction to Database Concepts and Applications
MATH 347 Linear Algebra for Applications
MATH 383 First Course in Differential Equations
MATH 521 Advanced Calculus
MATH 522 Advanced Calculus II
MATH 523 Functions of a Complex Variable with Applications
MATH 524 Elementary Differential Equations
MATH 548 Combinatorial Mathematics
MATH 566 Introduction to Numerical Analysis

H Honors version available. An honors course fulfills the same requirements as the nonhonors version of that course. Enrollment and GPA restrictions may apply.

Major Courses:

COMP 116 Introduction to Scientific Programming (COMP 110 may be substituted)
MATH 231 Calculus of Functions of One Variable
MATH 232 Calculus of Functions of Several Variables
MATH 233 Calculus of Functions of Several Variables
STOR 155 Introduction to Data Models and Inference
STOR 215 Foundations of Decision Sciences
MATH 381 Discrete Mathematics

Third and Fourth Years

MATH 347 Linear Algebra for Applications
STOR 415 Introduction to Optimization
STOR 435 Introduction to Probability
STOR 535 Probability for Data Science
STOR 445 Stochastic Modeling
STOR 455 Methods of Data Analysis
STOR 320 Introduction to Data Science

Five additional courses from the following two groups of courses, including at least three additional courses from Group A.

Global Language through level 3 (http://catalog.unc.edu/undergraduate/ideas-in-action/global-language/) varies

Sample Plan of Study

Sample plans can be used as a guide to identify the courses required to complete the major and other requirements needed for degree completion within the expected eight semesters. The actual degree plan may differ depending on the course of study selected (second major, minor, etc.). Students should meet with their academic advisor to create a degree plan that is specific and unique to their interests. The sample plans represented in this catalog are intended for first-year students entering UNC–Chapel Hill in the fall term. Some courses may not be offered every term.

In the first two years, students are required to complete the standard calculus sequence as well as introductory courses in statistics, operations research, and computer science. At the beginning of their third year, students take advanced courses in statistics, probability, and operations research. They have a great deal of flexibility in tailoring their program to meet their individual interests.

<table>
<thead>
<tr>
<th>Code</th>
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</tr>
</thead>
<tbody>
<tr>
<td>IDST 101</td>
<td>College Thriving</td>
<td>1</td>
</tr>
<tr>
<td>ENGL 105</td>
<td>English Composition and Rhetoric</td>
<td>3</td>
</tr>
<tr>
<td>or ENGL 105I</td>
<td>English Composition and Rhetoric</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Interdisciplinary)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>First-Year Seminar or First-Year Launch (<a href="http://catalog.unc.edu/undergraduate/ideas-in-action/first-year-seminars-launches/">http://catalog.unc.edu/undergraduate/ideas-in-action/first-year-seminars-launches/</a>)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Triple-I and Data Literacy (<a href="http://catalog.unc.edu/undergraduate/ideas-in-action/triple-i/">http://catalog.unc.edu/undergraduate/ideas-in-action/triple-i/</a>)</td>
<td>4</td>
</tr>
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Third and Fourth Years

MATH 347 Linear Algebra for Applications
STOR 415 Introduction to Optimization
STOR 435 Introduction to Probability
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STOR 320 Introduction to Data Science

Five additional courses from the following two groups of courses, including at least three additional courses from Group A.

Global Language through level 3 (http://catalog.unc.edu/undergraduate/ideas-in-action/global-language/) varies

It is recommended that all statistics and analytics majors take ECON 410 as a social and behavioral sciences Approaches course. Students interested in the actuarial profession also should take BUSI 102 as a general elective.
Dual Bachelor’s – Master’s Degree Program

The Department of Statistics and Operations Research offers a dual bachelor’s – master’s degree program. Interested students should consult the graduate program director.

Special Opportunities in Statistics and Analytics

Honors in Statistics and Analytics

Candidates for honors or highest honors must secure approval from the program director. They must take STOR 691H and STOR 692H, and maintain an overall grade point average of 3.3 and a grade point average in statistics and analytics courses of at least 3.3 at the end of the semester preceding the semester in which they graduate.

Departmental Involvement

The Department of Statistics and Operations Research sponsors Carolina’s Actuarial Student Organization (CASO), for students interested in careers in the actuarial sciences. CASO organizes study groups for the actuarial exams, sponsors talks by professional actuaries, keeps members aware of employment opportunities, and maintains contact with alumni and corporations in the field. The department is also a co-sponsor of Carolina Analytics and Data Science (CADS) student organization, which aims to foster communication among the students who are interested in careers in data science and analytics and contribute to their intellectual growth by hosting speakers from industry as well as academia.

Experiential Education

When arranged in advance with a supervising faculty member, STOR 493 can be used to earn credit for appropriate work experience in the summer or during the academic year. STOR 493 satisfies the experiential education requirement. Students interested in STOR 493 should secure approval from the program director before starting their work. STOR 496 can also be used to satisfy the experiential education requirement.

Undergraduate Awards

Two undergraduate awards for graduating seniors are given each year by the statistics and analytics program. One is the Statistics and Analytics Award, given to the outstanding graduating senior, and the second is the W. Robert Mann Award, given for excellence in actuarial science. Plaques bearing the names of winners are located in the undergraduate study room in Hanes Hall.

Undergraduate Research

Undergraduate research under the direction of faculty members from the Department of Statistics and Operations Research is offered through the independent study and research course, STOR 496, and the senior honors thesis courses, STOR 691H and STOR 692H.

Department Programs

Major

• Statistics and Analytics Major, B.S. (p. 1)

Minor

• Data Science Minor (http://catalog.unc.edu/undergraduate/programs-study/data-science-minor/)

Graduate Programs

• M.S. in Statistics and Operations Research (http://catalog.unc.edu/graduate/schools-departments/statistics-operations-research/)
• Ph.D. in Statistics and Operations Research (http://catalog.unc.edu/graduate/schools-departments/statistics-operations-research/)

Contact Information

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