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 (https://catalog.unc.edu/undergraduate/degree-requirements/).

Code	Title	Hours
Core Requirements		
MATH/STOR 235	Mathematics for Data Science	4
or MATH 233	Calculus of Functions of Several Variables	
STOR 315	Discrete Mathematics for Data Science	3-4
or MATH 381	Discrete Mathematics	
or COMP 283	Discrete Structures	
STOR 320	Introduction to Data Science	4
STOR 415	Introduction to Optimization [2]	3
STOR 435	Introduction to Probability [1]	3
or STOR 535	Probability for Data Science	
STOR 445	Stochastic Modeling	3
STOR 455	Methods of Data Analysis	3
One STOR course at the 500 level		3
Additional Requirements		
COMP 116	Introduction to Scientific Programming (COMP 110 may be substituted)	3
MATH 231	Calculus of Functions of One Variable I [H, F]	4
MATH 232	Calculus of Functions of One Variable II [H, F]	4
MATH 347	Linear Algebra for Applications	3
STOR 155	Introduction to Data Models and Inference [F]	3-4
or STOR 120	Foundations of Statistics and Data Science	
Three additional courses from either Group A or Group B (see lists below)		9
Total Hours		**52-53**

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

F FY-Launch class sections may be available. A FY-Launch section fulfills the same requirements as a standard section of that course, but also fulfills the FY-SEMINAR/FY-LAUNCH First-Year Foundations requirement. Students can search for FY-Launch sections in ConnectCarolina using the FY-LAUNCH attribute.

1 Students may not receive credit for both STOR 435 and STOR 535.
2 Students may not enroll in STOR 305 if they have already taken STOR 415.

Statistics and analytics majors must complete 120 academic hours.

Group A

Code	Title	Hours
STOR 305	Introduction to Decision Analytics [2]	3
STOR 471	Long-Term Actuarial Models	3
STOR 472	Short Term Actuarial Models	3
STOR 475	Healthcare Risk Analytics	3
STOR 512	Optimization for Machine Learning and Neural Networks	3
STOR 515	Dynamic Decision Analytics	3
STOR 520	Statistical Computing for Data Science [1]	4
STOR 538	Sports Analytics	3
STOR 555	Mathematical Statistics	3
STOR 556	Time Series Data Analysis	3
STOR 557	Advanced Methods of Data Analysis	3
STOR 565	Machine Learning	3
STOR 566	Introduction to Deep Learning	3
STOR 572	Simulation for Analytics	3

1 Students may not receive credit for both STOR 320 and STOR 520.
2 Students may not enroll in STOR 305 if they have already taken STOR 415.

Group B

Code	Title	Hours
BIOS 664	Sample Survey Methodology	4
BUSI 403	Operations Management	3
BUSI 408	Corporate Finance	3

BUSI 410	Business Analytics	3
BUSI 532	Healthcare and Service Operations Management [H]	3
BUSI 533	Supply Chain Management [H]	3
COMP 401	Foundation of Programming (Student can take COMP 301 or COMP 401) [H]	3-4
or COMP 301	Foundations of Programming	
COMP 410	Data Structures (Student can take COMP 210 or COMP 410)	3
or COMP 210	Data Structures and Analysis	
COMP 421	Files and Databases	3
ECON 410	Intermediate Microeconomics [H]	4
ECON 420	Intermediate Macroeconomics [H]	3
ECON 511	Advanced Game Theory in Economics [H]	3
INLS 523	Introduction to Database Concepts and Applications	3
MATH 383	First Course in Differential Equations [H]	3
MATH 521	Advanced Calculus I [H]	3
MATH 522	Advanced Calculus II [H]	3
MATH 523	Functions of a Complex Variable with Applications	3
MATH 524	Elementary Differential Equations	3
MATH 548	Combinatorial Mathematics	3
MATH 566	Introduction to Numerical Analysis	3

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

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.

Code	Title	Hours
First Year		
IDST 101	College Thriving	1
ENGL 105	English Composition and Rhetoric	3
or ENGL 105I	English Composition and Rhetoric (Interdisciplinary)	
First-Year Seminar or First-Year Launch (https://catalog.unc.edu/undergraduate/ideas-in-action/first-year-seminars-launches/) [F]		3
Triple-I and Data Literacy (https://catalog.unc.edu/undergraduate/ideas-in-action/triple-i/)		4
Global Language through level 3 (https://catalog.unc.edu/undergraduate/ideas-in-action/global-language/)		varies
COMP 116	Introduction to Scientific Programming (COMP 110 may be substituted)	3
MATH 231	Calculus of Functions of One Variable I [H, F]	4
MATH 232	Calculus of Functions of One Variable II [H, F]	4
Second Year		
MATH/STOR 235	Mathematics for Data Science (Second Year)	4
or MATH 233	Calculus of Functions of Several Variables	
STOR 155	Introduction to Data Models and Inference [1, F]	3-4
or STOR 120	Foundations of Statistics and Data Science	
STOR 315	Discrete Mathematics for Data Science	3-4
or MATH 381	Discrete Mathematics	
or COMP 283	Discrete Structures	
STOR 320	Introduction to Data Science	4
Third Year		
MATH 347	Linear Algebra for Applications	3
STOR 415	Introduction to Optimization	3
STOR 435	Introduction to Probability	3
or STOR 535	Probability for Data Science	
STOR 455	Methods of Data Analysis	3
Fourth Year		
STOR 445	Stochastic Modeling	3
One STOR 500-level course [2]		3
Three additional courses from Group A or Group B [2]		9
Total Hours		**63-65**

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

F FY-Launch class sections may be available. A FY-Launch section fulfills the same requirements as a standard section of that course, but also fulfills the FY-SEMINAR/FY-LAUNCH First-Year Foundations requirement. Students can search for FY-Launch sections in ConnectCarolina using the FY-LAUNCH attribute.

1 Prospective statistics and analytics majors are encouraged to take STOR 155 or STOR 120, and STOR 315 or MATH 381 as early as possible in their college careers. Each has a prerequisite of MATH 110 or its equivalent and may be taken before, or concurrently with, MATH 231.

2 Students wishing to prepare for an actuarial career should include STOR 471, STOR 472, STOR 555 and STOR 556 from Group A in their program and take ECON 410 and ECON 420 and BUSI 408 and BUSI 588 as electives. Students who plan to attend graduate school in statistics, operations research, analytics, or a related field, should include in their program COMP 401, STOR 555, STOR 565, and MATH 521.

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 and high-impact experience Gen Ed 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

- Data Science Major, B.A. (https://catalog.unc.edu/undergraduate/programs-study/data-science-major-ba/)
- Statistics and Analytics Major, B.S. (p. 1)

Minor

- Data Science Minor (https://catalog.unc.edu/undergraduate/programs-study/data-science-minor/)
- Statistics and Analytics Minor (https://catalog.unc.edu/undergraduate/programs-study/statistics-and-analytics-minor/)

Graduate Programs

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

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