DATA SCIENCE MAJOR, B.S.

The bachelor of science (B.S.) in data science provides students with a foundation in data science in preparation for entry to the workforce or pursuit of an advanced degree. The B.S. in data science is comprised of six competencies that include ethics, communications, computational thinking, mathematical and statistical foundations, optimization and multivariate thinking, and machine learning and AI. The curriculum provides high-level coursework, in-depth exposure to quantitative topics, and opportunities for direct application through collaborative teamwork.

Admission to the Major

Those wishing to declare the bachelor of science (B.S.) in data science must be admitted to the School of Data Science and Society. Students are eligible to apply in the spring semester after completing or while currently enrolled in the prerequisite courses. Please see the school's website (https://datascience.unc.edu/undergraduate-degrees/) for the most up-to-date information about the admission to the major process.

Student Learning Outcomes

Upon completion of the data science program, students should be able to

Mathematical and Statistical Foundations:

- Use appropriate data analytics and statistical techniques to discover new relationships, deliver insights into research problems or organizational processes, and support decision-making.

Computational Foundations:

- Describe how operating systems and networks are created, organized, and transmit information. Build and understand algorithms for analyzing large data sets and accurate numerical modeling for problems.

Multivariate Thinking and Optimization:

- Analyze and suggest organizational processes for various optimization strategies (e.g., machine learning principles and computational algorithms for analyzing network properties) using a variety of tools originating from advanced mathematical and statistical theory.

Machine Learning and AI:

- Select appropriate classes of machine learning methods for specific problems and use appropriate training and testing methodologies when deploying algorithms.

Communications:

- Convey data analyses through written and oral communication skills as well as visualization techniques.

Responsible Data Science:

- Apply security, privacy protection, governance, and ethical considerations in data management.

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		
DATA 110	Introduction to Data Science [†]	3
DATA 120	Ethics of Data Science and Artificial Intelligence	3
Communications (select one):		3
DATA 150	Communication for Data Scientists	
COMM 113	Public Speaking	
COMM 171	Argumentation and Debate	
ENGL 119	Picture This: Principles of Visual Rhetoric	
ENGL 303	Scientific and Technical Communication	
ENGL 411	Writing for Clients: Technical Communication Practicum	
GEOG 115	Maps: Geographic Information from Babylon to Google	
GEOG 415	Communicating Important Ideas	
INLS 541	Information Visualization	
MEJO 102	Future Vision: Exploring the Visual World	
Mathematical and Statistical Foundations (select one):		3
BIOS 650	Basic Elements of Probability and Statistical Inference I	
MATH 521	Advanced Calculus I [H]	
STOR 435/ MATH 535	Introduction to Probability	
STOR 535	Probability for Data Science	
STOR 634	Probability I	
Optimization and Multivariate Thinking (select one):		3
MATH 522	Advanced Calculus II [H]	
MATH 524	Elementary Differential Equations	
MATH 560	Optimization with Applications in Machine Learning	
STOR 415	Introduction to Optimization	
STOR 612	Foundations of Optimization	
Machine Learning and AI (select one):		3
BIOS 635	Introduction to Machine Learning	
COMP 562	Introduction to Machine Learning [H]	
STOR 565	Machine Learning	
STOR 566	Introduction to Deep Learning	
Computational Thinking (select one):		3-4
BIOS 511	Introduction to Statistical Computing and Data Management	

BIOS 512	Data Science Basics	
COMP 301	Foundations of Programming	
MATH 566	Introduction to Numerical Analysis	
MATH 661	Scientific Computation I	
STOR 320	Introduction to Data Science	
STOR 520	Statistical Computing for Data Science	
STOR 572	Simulation for Analytics	
Choose six upper-division electives (see list below) OR a four-course concentration and two upper-division electives. Any course listed under the above competencies can be counted as an upper-level elective if it is not counted towards the fulfillment of the competency.		18
Additional Requirements		
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 120	Foundations of Statistics and Data Science †, F	3-4
or COMP 110	Introduction to Programming and Data Science	
or COMP 116	Introduction to Scientific Programming	
MATH 233	Calculus of Functions of Several Variables †, H, F	4
or MATH 235	Mathematics for Data Science	
MATH 381	Discrete Mathematics †, H	3-4
or STOR 315	Discrete Mathematics for Data Science	
or COMP 283	Discrete Structures	
Total Hours		**60-63**

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.

† Must be completed to apply to the School of Data Science and Society.

Upper-Division Electives

Code	Title	Hours
BIOS 645	Principles of Experimental Analysis	3
BIOS 664	Sample Survey Methodology	4
COMP 421	Files and Databases	3
COMP 486	Applications of Natural Language Processing	3
COMP 488	Data Science in the Business World	3
COMP 550	Algorithms and Analysis	3
COMP 560	Artificial Intelligence	3
COMP 576	Mathematics for Image Computing	3
COMP 664	Deep Learning	3
COMP 722	Data Mining	3
MATH 528	Mathematical Methods for the Physical Sciences I	3
MATH 529	Mathematical Methods for the Physical Sciences II	3
MATH 550	Topology	3
MATH 577	Linear Algebra	3
MATH 590	Topics in Mathematics (approval based on topic)	3
MATH 594	Nonlinear Dynamics	3
MATH 662	Scientific Computation II	3
STOR 445	Stochastic Modeling	3
STOR 455	Methods of Data Analysis	3
STOR 515	Dynamic Decision Analytics	3
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 590	Special Topics in Statistics and Operations Research (approval based on topic)	3
STOR 712	Optimization for Machine Learning and Data Science	3
STOR 893	Special Topics (approval based on topic)	1-3
MATH 662	Scientific Computation II	3

Economic Analysis Concentration

Code	Title	Hours
ECON 400	Introduction to Data Science and Econometrics 1, H	4
ECON 470	Econometrics 1, H	3
Select one of the following options:		3
ECON 571	Advanced Econometrics 1	
ECON 573	Machine Learning and Econometrics 1	
ECON 575	Applied Time Series Analysis and Forecasting 1	
Select one of the following options:		3
ECON 522	Macroeconomic Analysis of the Labor Market 1	
ECON 525	Advanced Financial Economics 1	
ECON 545	Advanced Industrial Organization 1	
ECON 550	Advanced Health Econometrics 1	
ECON 551	Economics of Education 1	
ECON 552	The Economics of Health Care Markets and Policy 1	
ECON 580	Advanced Labor Economics 1	
Total Hours		**13**

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

1 Course requires a prerequisite(s) not otherwise counting in the major. Please review prerequisite information carefully when planning your course selection.

Data Science in Politics Concentration

Code	Title	Hours
POLI 381	Data in Politics II: Frontiers and Applications 1	3
POLI 480	Experimenting on Politics	3
Select one of the following options:		3

POLI 209	Analyzing Public Opinion [H]	
POLI 350	Peace Science Research [1]	
POLI 487	Networks in International Relations	
POLI 488	Game Theory [1]	
Select one of the following options:		3
POLI 193	Internship in Political Science [1]	
POLI 395	Mentored Research in Political Science (for 3 credits)	
Total Hours		**12**

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

1 Course requires a prerequisite(s) not otherwise counting in the major. Please review prerequisite information carefully when planning your course selection.

The School of Data Science and Society offers support to secure internship and research opportunities.

Contact Information

School of Data Science and Society
Visit Program Website (https://datascience.unc.edu/)
211 Manning Drive, CB# 3177

Director of Undergraduate Studies
David Adalsteinsson
david@unc.edu

Student Services Manager
Johanna Foster
Johanna_Foster@unc.edu

Student Services Manager
Katie Smith
smithkw@unc.edu

Dean
Stan Ahalt

Senior Associate Dean for Academic and Faculty Affairs
Amarjit Budhiraja
budhiraj@email.unc.edu

Educational Consultant
Kathryn Smith
smithkw@unc.edu