STOR 320-001
Introduction to Data Science
Summer 2025

Course Description

This course is an application-driven introduction to data science. Statistical and computational tools are valued throughout the modern workplace from Silicon Valley startups, to marine biology labs, to Wall Street firms. These tools require technical skills such as programming and statistics. They also require professional skills such as communication, teamwork, problem solving, and critical thinking.

You will learn these tools and hone these skills through hands-on experience working with datasets provided in class and downloaded from certain public websites. During the first part of the semester, we will focus on R programming skills and data visualization. Later topics will include: exploratory data analysis, web scraping, data wrangling, modeling, and effective communication of results.

Plan to come to every class with your computer and ready to work with others. Using resources around you is a key component of successful data analysis. This includes the internet and people.

Course Goals and Learning Objectives

This course will enable you to:

- Establish proficiency in the statistical programming language R making the student immediately competitive in the data science job market.
- Acquire both structured and unstructured data for the purpose of gathering insight on well-crafted research hypotheses.
- Clean, transform, and merge datasets.
- Summarize data using professionally developed tables and various visualizations.
- Model relationships between variables using a variety of techniques, including linear regression, nonlinear regression, logistic regression, and various machine learning techniques.
- Evaluate and compare predictive accuracy from competing modeling methods using cross-validation.
- Honestly interpret results from predictive analytics using creative visualizations and tables.
- Effectively communicate insights both verbally and in writing to a non-technical audience.
- Share data science ideas with a worldwide audience using HTML web pages and dynamic web applications using RMarkdown and RShiny.

As part of the General Education curriculum, this course will satisfy the following focus capacities:

Quantitative Reasoning

Students learn to comprehend and apply mathematical concepts in authentic contexts, developing tools for reasoning with data, logic, and quantitative methods.

Learning Outcomes

These are the learning outcomes that are expected of students after completing a course.

- Summarize, interpret, and present quantitative data in mathematical forms, such as graphs, diagrams, tables, or mathematical text.
- Develop or compute representations of data using mathematical forms or equations as models, and use statistical methods to assess their validity.
- Make and evaluate important assumptions in the estimation, modeling, and analysis of data, and recognize the limitations of the results.
- Apply mathematical concepts, data, procedures, and solutions to make judgments and draw conclusions.
- Synthesize and present quantitative data to others to explain findings or to provide quantitative evidence in support of a position.

Questions for Students

These are the types of questions you should be able to answer after completing a course.

- What is the role of mathematics in organizing and interpreting measurements of the world?
- How can mathematical models and quantitative analysis be used to summarize or synthesize data into knowledge and predictions?
- What methodology can we apply to validate or reject mathematical models or to express our degree of confidence in them?

Empirical Investigation Lab

One Focus Capacity course must include or be associated with a one-credit Empirical Investigation Lab. In such labs, students participate in measurement, data collection and analysis, and hypothesis testing connected to the course content. An Empirical Investigation Lab is not usually a separate class; ordinarily it is a fourth credit attached to another Focus Capacity class.

1. Take empirical measurements using appropriate apparatus.
2. Generate and test hypotheses.
3. Gather, store, and organize data.
4. Analyze and report on data and hypothesis testing.

Course Details

Number	STOR 320-001
Title	Introduction to Data Science
Credit hours	4
Course Format	The course format will include 3 lectures per week. Lectures will be supplemented with in-class programming and practical discussion. Students will also be required to register for a weekly lab with required attendance in person.
Prerequisites	STOR 120 or STOR 155 or Exemption
Target Audience	1st or 2nd year undergraduates seeking a quantitative reasoning (QR) course with a required experimental investigation lab (EIL) and interested in learning about the process of data science including data acquisition, data visualization, data analysis, and technical communication.
Instructor	Dr. Mario Giacomazzo Office: Hanes 134 Phone: 480-489-1398 (Cell) Email: mgiacoma@email.unc.edu Office Hours: M-Th, 9:00AM – 9:45AM M-Th, 11:45AM – 12:00PM
Lab Instructors	Callum Guan Email: cagd31@unc.edu Office Hours: TBD
	https://supermariogiacomazzo.github.io/STOR320_WEBSITE/
Class Days, Times, Location	M-Th, 9:45AM – 11:45AM, Hanes 120
Lab Days, Times, Location	400: F, 9:45AM – 11:45AM, Hanes 107 (Callum)
Course Texts	*R for Data Science*, Hadley Wickham. Legally free online, but can be purchased for less than $40 on Amazon. **FIRST EDITION**

Course Assessments

Assignments	Percentages
Attendance	2%
Labs	15%
Homework	5%
Analyses	15%
Midterms	25%
Final Project	28%
Group Involvement	10%

Grading Scale

Your final grade is based on a weighted average according to the previously addressed breakdown. Curving on individual/group assessments should not be expected. A curve may be applied to the final grades depending upon the class average. Conversion to a letter grade will be based on the table below:

A	93 to 100	B	83 to 86.99	C	73 to 76.99	D	60 to 66.99
A-	90 to 92.99	B-	80 to 82.99	C-	70 to 72.99	F	0 to 59.99
B+	87 to 89.99	C+	77 to 79.99	D+	67 to 69.99		

Assignment Descriptions

Attendance:

Attendance will be taken every class using the UNC Check-in App. You will need to install the UNC Check-in app to your mobile device and bring it to every class. Starting at the beginning of class, you will have 15 minutes to check-in using the mobile app. Instructions for installing and using the UNC Check-in App are available at https://unccheckin.unc.edu/. Go to this website to learn more. You need to attend at least 70% of the lectures to get credit for attendance, otherwise you will receive a 0 for your attendance grade. If you need to miss class for a reason permitted by the university and you don't want to be penalized, you will need to get a university approved absence at https://uaao.unc.edu/. If you cannot get a university approved absence and don't want to be penalized, you must notify your instructor of the reason and provide documentation of the reason in email. The reason should line up with UNC'S definition of a university approved absence. For example, a job interview would not be approved by the university or me.

Labs:

Attendance to all labs is mandatory. Every week, your lab instructor will take attendance. If you are there for the entire class, you will receive 10 points. During this period, students are required to work on a lab assignment. Each lab assignment will be based on the topics discussed in lecture or related to your final project. Students are responsible to turn in their own labs, but are encouraged to work in teams. These assignments are to be completed using RMarkdown and submitted as an HTML file on Canvas by 11:59PM on the lab day. A lab instructor will be provided to help students in the completion of the lab and to facilitate group work. Every lab is worth 20 points and no late lab assignments will be accepted. You will need to get a university approved absence and notify your lab instructor to prevent a loss of points in these weekly labs if you miss class.

Homework:
Homework will be based on problems from the course textbook, *R for Data Science (1ST Edition)*. Each homework assignment will be worth 10 points. These assignments are to be completed using RMarkdown and submitted as an HTML file on Canvas. No late homework assignments will be accepted.

These homework assignments need to be completed individually without any help from other students, AI tools (e.g. ChatGPT), or uploaded work from other students (e.g. CourseHero). If you cheat, you will receive a 0 and the alleged violation will be reported to the UNC.

Analyses:
Analyses are constructed using customized problems from real life data sets. These analyses allow you to practice the techniques learned in the textbook, labs, and class. Each analysis will be worth 40 points. These analyses are to be completed using RMarkdown and submitted as an HTML file on Canvas. If you submit your analyses late, expect a 25% deduction for less than 1 day late, 50% deduction between 1 and 2 days late, and 100% deduction more than 2 days late. All late analyses must be submitted to Canvas as soon as they are completed.

These analyses assignments need to be completed individually without any help from other students, AI tools (e.g. ChatGPT), or uploaded work from other students (e.g. CourseHero). If you cheat, you will receive a 0 and the alleged violation will be reported to UNC.

Midterms:
There will be 2 midterm exams during the semester. The date and material covered of each midterm will be announced at least 1 week before the midterm occurs. Currently, the plan is to have the midterms on July 8 and July 22.

The format of the midterms will depend on the material that they will cover. The midterms will be closed book and be completed without the use of your computer or course materials. If you are found to be submitting the work of other students, an honor code violation will be reported. This could be by communication with others and the sharing of answers and code during the midterm, communication with students in other sections of the course, using solutions from previous semesters, or online answer tools such as Chegg, CourseHero, ChatGPT, etc. This is a zero tolerance policy and all suspected honor code violations will be reported.

Make-up midterms are only possible for University approved absences or consent from the instructor due to extenuating circumstances. Unless you have accommodation as determined by the university or university approved absences, you must take the midterms at the dates and times provided. If you have accommodation, please provide the formal notification before the second week of classes.

Final Project:
The final project is done in groups of 5-6 students and is worth a total of 100 points. There will be 4 parts of varying point values submitted throughout the semester. The first part, the Project Proposal, is worth 10 points and will be due sometime in the beginning of the semester after groups have been designated. The second part, the Exploratory Data Analysis, is worth 20 points and will be due after the middle of the semester after the Project Proposal has been completed. The third part, the Final Paper, is worth 40 points and must be submitted on Canvas by 11:59PM on Thursday, July 24. The fourth part,

the Final Presentation, is worth 30 points and will take place during our designated final exam time according to the university calendar. For our class, this is 3PM to 6PM on Monday, July 28. Attendance for all students is required. Slides must be submitted by 3PM on July 28 to Canvas.

Group Involvement:
Since the final project is a group project that is worth a tremendous number of points, it is very important that each group member fulfills their obligation to their group. Four times during the semester, there will be a survey sent out to the class, where you will score your group members on a scale from 0 (Terrible) to 5 (Excellent). In extreme circumstances, Dr. Mario has the right to remove individuals from their group and force them to submit their own project. If this occurs, changes to grading weights may be altered for individual students.

Course Policies and Resources

Syllabus Changes
Dr. Mario reserves the right to make changes to the syllabus, including all due dates. These changes will be announced as early as possible so that students can adjust their schedules.

Attendance Policy
University Policy: As stated in the University's Class Attendance Policy, no right or privilege exists that permits a student to be absent from any class meetings, except for these University Approved Absences:

1. Authorized University activities: University Approved Absence Office (UAAO) website provides information and FAQs for students and FAQs for faculty related to University Approved Absences
2. Disability/religious observance/pregnancy, as required by law and approved by Accessibility Resources and Service and/or the Equal Opportunity and Compliance Office (EOC)
3. Significant health condition and/or personal/family emergency as approved by the Office of the Dean of Students, Gender Violence Service Coordinators, and/or the Equal Opportunity and Compliance Office (EOC).

Instructors may work with students to meet attendance needs that do not fall within University approved absences. For situations when an absence is not University approved (e.g., a job interview, illness/ flu or club activity), instructors are encouraged to work directly with students to determine the best approach to missed classes and make-up assessment and assignments.

Dr. Mario will require digital documentation in situations that are not University approved, but instructor approved. Without documentation, approval to miss class will not be given, and Dr. Mario has the right to inspect the validity of the documentation. Dishonest documentation is a violation of UNC's honor code.

Attendance will be taken using UNC's Check-in app. If you are having problems checking in using the app on your phone, you need to see me at the end of class so I can manually update your attendance. Dr. Mario will only fix your attendance retroactively one time if you forget to see me at the end of lecture.

Technology Use

Students are required to bring their cell phone and computer to every class. Students must have R and RStudio installed on their computer. Directions for free downloads of this software will be provided. The professor or teaching assistant will occasionally request computers to be closed for dynamic discussion and guest speakers.

Artificial Intelligence (AI) Use Policy

Use of generative AI tools of any kind is not permitted in this course. Any use of these tools will be considered an instance of academic dishonesty and will be referred to Student Conduct.

Time Limited Grade Disputes

You only have 1 week after the grading of an assessment is complete to dispute your grade and possibly receive points back for that assessment. The only grade that should be disputed and modified after the last day of class is the final exam. Dr. Mario makes mistakes and desires that all students receive a fair grade that is correct. However, it is the student's responsibility to review their grades on assignments in a timely manner so that Dr. Mario can make fair decisions and modify grades quickly.

If we cannot resolve the issue, you may talk to our director of undergraduate studies or department chair.

Late Submissions

Homework and Lab Assignments cannot be submitted late at all. This is a zero tolerance policy and you will get a 0. Analyses can be submitted late with penalty. Any late submissions regarding your group project will be penalized based on Dr. Mario's discretion and the penalty will be fairly applied to all members of the group no matter who was at fault or took the blame.

Accessibility Resources

Accessibility Resources and Service (ARS – ars@unc.edu) receives requests for accommodations, and through the Student and Applicant Accommodations Policy determines eligibility and identifies reasonable accommodations for students with disabilities and/or chronic medical conditions to mitigate or remove the barriers experienced in accessing University courses, programs and activities.

ARS also offers its Testing Center resources to students and instructors to facilitate the implementation of testing accommodations.

Faculty and instructors with any concerns or questions about accommodations and/or their implementation, are invited to reach out to ARS to discuss.

Undergraduate Testing Center

The College of Arts and Sciences provides a secure, proctored environment in which exams can be taken. The center works with instructors to proctor exams for their undergraduate students who are not registered with ARS and who do not need testing accommodations as provided by ARS. In other words, the Center provides a proctored testing environment for students who are unable to take an exam at the normally scheduled time (with pre-arrangement by your instructor). For more information, visit http://testingcenter.web.unc.edu/.

Honor Code

I expect all students to follow the guidelines of the UNC Code of Conduct. In particular, students are expected to be aware of policies related to academic integrity. You can read more about the Code of Conduct at studentconduct.unc.edu. In any course, including mine, what constitutes cheating can change from one activity to another. For example, collaboration may be encouraged for an assignment but qualify as cheating during an exam. Please see my guidelines for each activity, and if you are unsure, please ask me to clarify. In remote classes, there may be many temptations for using online exchange sites, such as Chegg. Note that these sites provide names of students who have used their materials, and they routinely cooperate with institutions around academic integrity issues. Please don't get caught up with Code of Conduct issues just because it appears to be simple and untraceable. It is not!

You are not permitted to download or upload any content from this course to the web in any form, including but not limited to Chegg, Course Hero, Coursera, Google Drive, etc. If you post my course content, you may be violating my intellectual property rights. If you post your own work from this course, you are allowing sites to profit from your intellectual property. In utilizing web sources to upload or download course content, you risk violating the University's Honor Code.

IT Acceptable Use Policy

By attending the University of North Carolina at Chapel Hill, you agree to abide by the University of North Carolina at Chapel Hill policies related to the acceptable use of IT systems and services. The Acceptable Use Policy (AUP) sets the expectation that you will use the University's technology resources responsibly, consistent with the University's mission. In the context of a class, it's quite likely you will participate in online activities that could include personal information about you or your peers, and the AUP addresses your obligations to protect the privacy of class participants. In addition, the AUP addresses matters of others' intellectual property, including copyright. These are only a couple of typical examples, so you should consult the full Information Technology Acceptable Use Policy, which covers topics related to using digital resources, such as privacy, confidentiality, and intellectual property.

Additionally, consult the Safe Computing at UNC website for information about data security policies, updates, and tips on keeping your identity, information, and devices safe.

Data Security and Privacy

UNC-Chapel Hill is committed to fulfilling its responsibilities of transparency as a state-sponsored institution of higher learning, protecting certain types of information, and using information Carolina collects only for appropriate purposes. Consult the UNC-Chapel Hill Privacy Statement for additional information.

Counseling and Psychological Services

UNC-Chapel Hill is strongly committed to addressing the mental health needs of a diverse student body. The Heels Care Network website is a place to access the many mental health resources at Carolina. CAPS is the primary mental health provider for students, offering timely access to consultation and connection to clinically appropriate services. Go to the CAPS website or visit their facilities on the third floor of the Campus Health building for an initial evaluation to learn more. Students can also call CAPS 24/7 at 919-966-3658 for immediate assistance.

Title IX and Related Resources

Any student who is impacted by discrimination, harassment, interpersonal (relationship) violence, sexual violence, sexual exploitation, or stalking is encouraged to seek resources on campus or in the community. Reports can be made online to the EOC or by contacting the University's Title IX Coordinator, Elizabeth Hall, or the Report and Response Managers in the Equal Opportunity and Compliance Office. Please note that I am designated as a Responsible Employee, which means I must report to the EOC any information I receive about the forms of misconduct listed in this paragraph. If you'd like to speak with a confidential resource, those include Counseling and Psychological Services, the University's Ombuds Office, and the Gender Violence Services Coordinators. Additional resources are available at safe.unc.edu.

Policy on Non-Discrimination

The University is committed to providing an inclusive and welcoming environment for all members of our community and to ensuring that educational and employment decisions are based on individuals' abilities and qualifications. Consistent with this principle and applicable laws, the University's Policy Statement on Non-Discrimination offers access to its educational programs and activities as well as employment terms and conditions without respect to race, color, gender, national origin, age, religion, sex, genetic information, disability, veteran's status, sexual orientation, gender identity or gender expression. Such a policy ensures that only relevant factors are considered, and that equitable and consistent standards of conduct and performance are applied.

If you are experiencing harassment or discrimination, you can seek assistance and file a report through the Report and Response Coordinators (email reportandresponse@unc.edu or see additional contact info at safe.unc.edu) or the Equal Opportunity and Compliance Office at https://eoc.unc.edu/report-an-incident/.

Learning Center

Want to get the most out of this course or others this semester? Visit UNC's Learning Center to make an appointment or register for an event. Their free, popular programs will help you optimize your academic performance. Try academic coaching, peer tutoring, STEM support, ADHD/LD services, workshops and study camps, or review tips and tools available on the website.

Writing Center

For free feedback on any course writing projects, check out UNC's Writing Center. Writing Center coaches can assist with any writing project, including multimedia projects and application essays, at any stage of the writing process. You don't even need a draft to come visit. To schedule a 45-minute appointment, review quick tips, or request written feedback online, visit UNC's Writing Center online.

Equal Opportunity and Compliance

Equal Opportunity and Compliance Accommodations Team (Accommodations - UNC Equal Opportunity and Compliance) receives requests for accommodations for disability, pregnancy and related conditions, and sincerely held religious beliefs and practices through the University's Policy on Accommodations. EOC Accommodations team determines eligibility and reasonable accommodations consistent with state and federal laws.

Diversity Statement

I value the perspectives of individuals from all backgrounds reflecting the diversity of our students. I broadly define diversity to include race, gender identity, national origin, ethnicity, religion, social class, age, sexual orientation, political background, physical and learning ability and any other way in which individuals differ from one another. I strive to make this classroom an inclusive space for all students. Please let me know if there is anything I can do to improve. I appreciate any suggestions.

Undergraduate Testing Center

The College of Arts and Sciences provides a secure, proctored environment in which exams can be taken. The Center works with instructors to proctor exams for their undergraduate students who are not registered with ARS and who do not need testing accommodations as provided by ARS. In other words, the Center provides a proctored testing environment for students who are unable to take an exam at the normally scheduled time (with pre-arrangement by your instructor). For more information, visit the testing center website.