ECON 400 — Introduction to Data Science and Econometrics

University of North Carolina at Chapel Hill, Summer 2024

Course information

Instructor: Christopher Handy, chandy@unc.edu

Class meetings: Weekdays, 9:45am–11:15am, Davie 301

Recitations: Mondays and Wednesdays, 11:45am–1:00pm, Davie 301

Office hours: see schedule on Canvas

Course description

This course is a comprehensive introduction to statistics, including descriptive statistics and statistical graphics, probability theory, distributions, parameter estimation, hypothesis testing, simple and multiple regression, and use of powerful statistical estimation software. This course includes a substantial introduction to basic econometrics.

Prerequisites: ECON 101 and one of MATH 152, MATH 231, STOR 112, STOR 113

Learning outcomes

This course fulfills the Quantitative Reasoning focus capacity of the IDEAs in Action general education curriculum, which has the following learning outcomes.

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

Materials

Text: OpenIntro Statistics, available cheaply at www.openintro.org/book/os/

Software: RStudio, available free at posit.co/download/rstudio-desktop/

Website: Canvas, uncch.instructure.com/courses/59922

Course components and grading

Your grade will be determined from the following components.

Class participation	8%
Recitations	4%
Assignments	18%
Quizzes	45%
Final exam	25%

I will use the following grading scale, although I may curve numerical grades to higher letter grades at the end of the semester if needed.

A	[93, 100]	C+	[77, 80)
A–	[90, 93)	C	[73, 77)
B+	[87, 90)	C–	[70, 73)
B	[83, 87)	D+	[67, 70)
B–	[80, 83)	D	[60, 67)
		F	[0, 60)

Participation: You will answer questions in class using Poll Everywhere. Your participation score is based on whether you answer these questions; there is no penalty for incorrect answers. You can fail to respond to 10 percent of the poll questions before losing points on your participation score. I expect you to be in the classroom in order to answer these questions, and voting from outside the classroom could lead to you getting a zero for your entire participation score.

Recitations: In recitations, you will learn skills in RStudio and work on practice problems in groups. You can miss one recitation meeting before losing points on your recitation score.

Assignments: Most assignments will include a mix of analytical questions and empirical work for which you will use R. There will be nine assignments, and tentative due dates will be posted on Canvas. I will drop the lowest two assignment scores before computing your assignment average. You must first attempt each assignment on your own. After that, you may work with classmates, but you may not simply share answers.

Quizzes: There will be four in-class quizzes. The dates of these quizzes are on the schedule below, and you will get about half the class period for each quiz. I will drop the lowest quiz score, and your quiz grade will be the average of your highest three scores.

Final exam: The final exam is Friday, June 21, 8:00am–11:00am, in Davie 301.

Academic policies

AI use policy: You may not use AI tools to help answer recitation, assignment, quiz, or exam questions in this course. You are permitted to use AI tools to help with practice problems, content review, etc. Be aware that AI tools sometimes give very good answers and explanations, but often make major errors, such as falsely assuming that events are independent.

Attendance: I expect you to attend class if you are able, and to prepare for class by doing any assigned reading and watching any assigned videos. I will post a recording of each day's class, and you should watch it if you have to miss class for any reason. See also the university's Class Attendance Policy.

Conduct: Please respect your fellow students by behaving professionally. This includes arriving on time, not leaving class unnecessarily, and not distracting others.

Honor code: I expect you to follow the guidelines of the UNC honor code; each of you has pledged "not to lie, cheat, or steal." Collaboration is encouraged on assignments but prohibited on exams. You may not consult materials from any previous offering of this course for any reason, and I expect you not to share materials with any future students of this course. Lying or cheating could result in a failing or zero score for your participation grade, for an assignment or exam, or for the course as a whole. If you have questions about the honor code, please ask me or consult the Honor System webpage.

Late assignments: The summer term moves quickly, and I will do my best to post assignment answer keys and grades promptly. Therefore, assignments are not accepted after the deadline. However, I will drop your lowest two assignment scores, which is meant to cover cases of illness, technical problems, and so on. Exceptions to this policy will generally only be made if you accumulate University Approved Absences covering a significant amount of time.

Missed quizzes and exams: If you miss a quiz and you have a University Approved Absence, I will replace the grade on that quiz with the average of your future quiz and final exam grades. For the final exam, the university policy is that you may only take the exam outside the scheduled time if you have an official final exam excuse, and requests involving religious observance or a scheduling conflict must be made no later than the final day of classes. Quizzes or exams missed without an official approval or excuse will generally receive a grade of zero.

Syllabus changes: I reserve the right to make changes to the syllabus, including assignment due dates, quiz dates, and exam dates. These changes will be announced as early as possible.

Academic resources and student support

Accessibility Resources and Services: 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.

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 their 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 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, titleixcoordinator@unc.edu) or the Report and Response Coordinators in the Equal Opportunity and Compliance Office (reportandresponse@unc.edu). Confidential resources include Counseling and Psychological Services and the Gender Violence Services Coordinators (gvsc@unc.edu). Additional resources are available at safe.unc.edu.

Schedule of topics and exams

Date	Topic
Wednesday, May 15	Summarizing data
Thursday, May 16	Probability
Friday, May 17	Probability
Monday, May 20	Discrete random variables
Tuesday, May 21	Continuous random variables
Wednesday, May 22	Continuous random variables
Thursday, May 23	**Quiz 1**
Friday, May 24	Joint and conditional distributions
Monday, May 27	Memorial Day
Tuesday, May 28	Joint and conditional distributions
Wednesday, May 29	Estimation and sampling distributions
Thursday, May 30	Confidence intervals
Friday, May 31	**Quiz 2**
Monday, June 3	Hypothesis tests
Tuesday, June 4	Hypothesis tests
Wednesday, June 5	Simple regression
Thursday, June 6	Simple regression
Friday, June 7	**Quiz 3**
Monday, June 10	Multiple regression
Tuesday, June 11	Multiple regression
Wednesday, June 12	Multiple regression
Thursday, June 13	Regression inference
Friday, June 14	**Quiz 4**
Monday, June 17	Regression inference
Tuesday, June 18	Extra practice questions
Friday, June 21	**Final exam** (8–11am, Davie 301)