ECON 400 — Introduction to Data Science and Econometrics

University of North Carolina at Chapel Hill, Summer 2023

Course information

Instructor: Christopher Handy, chandy@unc.edu

Class meetings: Weekdays, 9:45am–11:15am, Gardner 210

Recitations: Mondays and Wednesdays, 11:45am–1:00pm, Gardner 210

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: Sakai, sakai.unc.edu/portal/site/econ400summer2023

Course components and grading

Your grade will be determined from the following components.

Class participation	7%
Recitations	3%
Assignments	15%
Exam 1	20%
Exam 2	20%
Final exam	25%
Highest exam	10%

I will use the following grading scale, although I may curve numerical grades to higher letter grades at the end of the term 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)

Class 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. I expect you to be in the classroom in order to answer these questions. You can fail to respond to 10 percent of the poll questions before losing points on your participation score.

Recitations: Recitations may include learning skills in RStudio, working on practice problems in groups, you presenting a problem and solution to the class, or other activities. 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 RStudio. There will be nine assignments, and tentative due dates are included on the schedule below. I will drop the lowest three 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.

Midterm exams: There will be two in-class exams. The dates of these are on the schedule below.

Final exam: The final exam will be Thursday, June 22, 8:00am–11:00am, in Gardner 210.

Highest exam: I will use the highest of your three exam scores (exam 1, exam 2, and final exam) for this component of your grade.

Academic policies

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.

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. 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, remember that I will drop your lowest three 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 exams: If you miss a midterm exam and you have a University Approved Absence, I will replace the grade on that exam with the average of your future 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. 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 and exam dates. These changes will be announced as early as possible.

Academic resources and student support

Accessibility Resources and Services: The University of North Carolina at Chapel Hill facilitates the implementation of reasonable accommodations, including resources and services, for students with a disability and/or a chronic health diagnosis resulting in barriers to fully accessing University courses, programs and activities. Accommodations are determined by the Office of Accessibility Resources and Service (ARS) through their Student and Applicant Accommodations Policy, which documents qualifying disabilities in accordance with applicable state and federal laws. See the ARS Website for contact information or email ars@unc.edu.

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. Please contact the University's Title IX Coordinator (Elizabeth Hall, titleixcoordinator@unc.edu), Report and Response Coordinators in the Equal Opportunity and Compliance Office (reportandresponse@unc.edu), Counseling and Psychological Services (confidential), or the Gender Violence Services Coordinators (gvsc@unc.edu; confidential) to discuss your specific needs. Additional resources are available at safe.unc.edu.

Schedule of topics and assessments

Date	Topic	Deadlines
Wed., May 17	Summarizing data	
Thurs., May 18	Probability	
Fri., May 19	Probability	A1 due
Mon., May 22	Discrete random variables	
Tues., May 23	Discrete random variables	A2 due
Wed., May 24	Continuous random variables	
Thurs., May 25	Exam practice problems	A3 due
Fri., May 26	**Exam 1**	
Mon., May 29	No class: Memorial Day	
Tues., May 30	Joint and conditional distributions	
Wed., May 31	Estimation and sampling distributions	
Thurs., June 1	Estimation and sampling distributions	A4 due
Fri., June 2	Confidence intervals	
Mon., June 5	Confidence intervals	
Tues., June 6	Hypothesis tests	A5 due
Wed., June 7	Hypothesis tests	
Thurs., June 8	Exam practice problems	A6 due
Fri., June 9	**Exam 2**	
Mon., June 12	Simple regression	
Tues., June 13	Simple regression	
Wed., June 14	Multiple regression	A7 due
Thurs., June 15	Multiple regression	
Fri., June 16	Regression inference	A8 due
Mon., June 19	No class: Juneteenth	
Tues., June 20	Exam practice problems	A9 due

Final exam: Thursday, June 22, 8:00am–11:00am, Gardner 210