

ECON 400 — Introduction to Data Science and Econometrics

University of North Carolina at Chapel Hill, Spring 2024

Course information

Instructor: Christopher Handy, chandy@unc.edu

Class meetings: Tuesday and Thursday, 9:30am–10:45am, Hanes Art Center 121

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/48814

Course components and grading

Your grade will be determined from the following components.

Participation	5%
Assignments	15%
Exam 1	20%
Exam 2	20%
Final exam	30%
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 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 15 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.

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 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.

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

Final exam: The final exam is Friday, May 10, 8:00am–11:00am, in Hanes Art Center 121. If you obtain an official exam excuse, you will take the departmental make-up exam on Wednesday, May 8, at a time and place to be announced closer to that date.

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. 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: Assignments are accepted up to 24 hours after the deadline with no penalty, and are not accepted after that. I know that things like personal emergencies or computer problems may prevent you from submitting an assignment, which is why I drop the lowest two assignment scores before computing your assignment average. 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.

Recitations: The recitation sections are an important component of the course and a valuable learning opportunity. I strongly encourage you to attend recitations, and the material covered in recitations may appear on exams. You may attend a recitation other than (or in addition to) the one for which you are registered, space permitting, and the full recitation schedule will be posted on Canvas.

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: 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

<u>Date</u>	<u>Topic</u>
Thursday, Jan. 11	Summarizing data
Tuesday, Jan. 16	Probability
Thursday, Jan. 18	Probability
Tuesday, Jan. 23	Discrete random variables
Thursday, Jan. 25	Discrete random variables
Tuesday, Jan. 30	Continuous random variables
Thursday, Feb. 1	Continuous random variables
Tuesday, Feb. 6	Exam practice problems
Thursday, Feb. 8	Exam 1
Tuesday, Feb. 13	Well-being day
Thursday, Feb. 15	Joint and conditional distributions
Tuesday, Feb. 20	Joint and conditional distributions
Thursday, Feb. 22	Estimation and sampling distributions
Tuesday, Feb. 27	Estimation and sampling distributions
Thursday, Feb. 29	Confidence intervals
Tuesday, Mar. 5	Confidence intervals
Thursday, Mar. 7	Hypothesis tests
March 11–15	Spring break
Tuesday, Mar. 19	Hypothesis tests
Thursday, Mar. 21	Exam practice problems
Tuesday, Mar. 26	Exam 2
Thursday, Mar. 28	Well-being day
Tuesday, Apr. 2	Simple regression
Thursday, Apr. 4	Simple regression
Tuesday, Apr. 9	Multiple regression
Thursday, Apr. 11	Multiple regression
Tuesday, Apr. 16	Multiple regression
Thursday, Apr. 18	Multiple regression
Tuesday, Apr. 23	Regression inference
Thursday, Apr. 25	Exam practice problems
Tuesday, Apr. 30	Exam practice problems
Friday, May 10	Final exam (8–11am, Hanes Art Center 121)