

# ECON 400H — Introduction to Data Science and Econometrics

University of North Carolina at Chapel Hill, Fall 2022

## Course information

Instructor: Christopher Handy, [chandy@unc.edu](mailto:chandy@unc.edu)

Class meetings: Tuesday and Thursday, 2:00pm–3:15pm, Dey 201

Office hours: see schedule on Sakai

## 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/](http://www.openintro.org/book/os/)

Software: RStudio, available free at [www.rstudio.com/products/rstudio/download/](http://www.rstudio.com/products/rstudio/download/)

Website: Sakai, [sakai.unc.edu](http://sakai.unc.edu)

## 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. I expect you to be in the classroom in order to answer these questions. You can fail to respond to 15 percent of the poll questions before losing points on your participation score.

*Assignments:* Most assignments will include a mix of analytical questions and empirical work for which you will use R. There will be approximately nine assignments, and tentative due dates are included on the schedule below. 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 are on the schedule below.

*Final exam:* The final exam is Tuesday, December 6, 12:00pm–3:00pm. If you obtain an official exam excuse, you will take the exam with one of the other sections if possible, or on Wednesday, December 7, 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.

*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:* 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 a significant number of University Approved Absences.

*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 other 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 reduced grade or 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 Sakai.

*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 disabilities, chronic medical conditions, a temporary disability or pregnancy complications resulting in barriers to fully accessing University courses, programs and activities. Accommodations are determined through the Office of Accessibility Resources and Service (ARS) for individuals with documented qualifying disabilities in accordance with applicable state and federal laws. See the [ARS Website](#) for contact information or email [ars@unc.edu](mailto: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 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.

*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, interim, [titleixcoordinator@unc.edu](mailto:titleixcoordinator@unc.edu)), Report and Response Coordinators in the Equal Opportunity and Compliance Office ([reportandresponse@unc.edu](mailto:reportandresponse@unc.edu)), Counseling and Psychological Services (confidential), or the Gender Violence Services Coordinators ([gvsc@unc.edu](mailto:gvsc@unc.edu); confidential) to discuss your specific needs. Additional resources are available at [safe.unc.edu](http://safe.unc.edu).

**Schedule of topics and assessments**

Week	Dates	Tuesday	Thursday	Assignments
1	Aug 15–21	Summarizing data	Summarizing data	
2	Aug. 22–28	Probability	Probability	
3	Aug. 29–Sep. 4	Discrete random variables	Discrete random variables	A1 due
4	Sep. 5–11	No class: Well-being day	Continuous random variables	A2 due
5	Sep. 12–18	Continuous random variables	Joint and conditional distributions	A3 due
6	Sep. 19–25	Exam practice problems	<b>Exam 1</b>	
7	Sep. 26–Oct. 2	Joint and conditional distributions	Point estimates and sampling distributions	
8	Oct. 3–9	Point estimates and sampling distributions	Confidence intervals	A4 due
9	Oct. 10–16	Confidence intervals	Hypothesis tests	A5 due
10	Oct. 17–23	Hypothesis tests	No class: Fall Break	A6 due
11	Oct. 24–30	Exam practice problems	<b>Exam 2</b>	
12	Oct. 31–Nov. 6	Simple regression	Simple regression	
13	Nov. 7–13	Simple regression	Multiple regression	A7 due
14	Nov. 14–20	Multiple regression	Multiple regression	A8 due
15	Nov. 21–27	Regression inference	No class: Thanksgiving	A9 due
16	Nov. 28–Dec. 4	Exam practice problems		

**Final exam:** Tuesday, December 6, 12:00pm–3:00pm, Dey 201