

UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL  
DEPARTMENT OF ECONOMICS

ECON 400: INTRODUCTION TO DATA SCIENCE AND  
ECONOMETRICS  
SUMMER SESSION II, 2023

Lecture: 09:45AM-11:15AM MTWRF

Recitation: 11:45AM-01:00PM MW

Kenan Laboratories, Rm. B121

Instructor: Samuel Barker

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Office Hours: T from 11:45-01:00PM in the EconAid Center/Gardner, Rm. 009

Course Website: <https://edtech.unc.edu/service/canvas/>

This website contains all announcements, homework assignments, their deadlines, course materials, an outline of the course, and this syllabus. You can access the site using your ONYEN.

### Course Materials

**Text:** “OpenIntro Statistics”, available cheaply at [www.openintro.org/book/os/](http://www.openintro.org/book/os/)

**Software:** R and RStudio: <https://posit.co/download/rstudio-desktop/>

### Course Description

This course is an introduction to statistics, probability, data, estimation, and causal analysis. Topics will include basic set theory, rules of probability, discrete and continuous distributions of random variables, hypothesis testing, and regression analysis. This course will also include an introduction to programming in statistical software to explore relationships in data, as well as how to create, present, and understand statistical tables and graphs.

### Course Objectives

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

## Requirements

- Gradescope (access through Canvas): Weekly homework, must be submitted to Gradescope. It is a free software provided through the university. You can access Gradescope through the Canvas site.
- Stable internet.
- Access to academic articles through the UNC library.

## Graded Course Components

- **8 Weekly Homeworks (30%):** Problem sets will lag behind lectures by one week. There will be four homeworks each with two parts (eight homeworks total), and both parts will cover the previous week's material. They will be fairly substantial, so please start on them early in the week. The goal of these assignments is primarily for learning, not assessment. You are encouraged to talk with one another and with the instructor, however, your work must be your own, and you must submit your own work. These will be due on Friday at the start of class (see the schedule below).

Each homework has two parts, and grading will be done separately for each part. For each part:

- A complete submission with a level of at least 60% accuracy and quality will result in a 100% on the assignment.
  - Failing only one of the above requirements will result in a 50% on the assignment.
  - An incomplete submission with below 60% level of work or no submission at all will result in a 0% on the assignment.
  - The lowest 2 grades out of the 8 will be dropped.
- **4 Weekly Quizzes (5%):** Every Friday, there will be short, low-stakes quizzes that test you on the content from the week. They are designed to give you immediate feedback on your understanding, and to help you become comfortable with the sort of questions that will be present on the Midterm and Final.

Grading:

- Partial credit will be awarded for non-multiple choice questions.

- **Presentation and Replication (15%):** The last week of class, each student will present for 5-10 minutes on a table from an academic paper. Students will be expected to communicate what mathematical equation was used to get the results in the table, what the interpretation is for each parameter in the table, and what the authors intended to communicate with the table.

Alongside this presentation, students will be expected to simulate fake data to mimic the paper, and to recreate the table in statistical software using this simulated data—we will discuss in detail how this is done.

Grading:

- The presentation and the replication each have a weight of 7.5%.
- **Midterm (20%):** The Midterm will be held halfway through the semester. It will be a 1.5-hour exam that covers all material covered up to the time of the exam. The

type of questions will be the same as those given in Quizzes. At least one homework question will make an appearance.

Grading:

– Partial credit will be awarded for non-multiple choice questions.

- **Final (30%):** The Final will be held at the time assigned by the registrar. It is a 3-hour exam that covers all content from the course. The type of questions will be the same as those given in Quizzes. At least one homework question will make an appearance.

Grading:

– Partial credit will be awarded for non-multiple choice questions.

## Grading

Final letter grades for the course are given by the following list:

93 – 100% = <i>A</i>	73 – 77% = <i>C</i>
90 – 93% = <i>A–</i>	70 – 73% = <i>C–</i>
87 – 90% = <i>B+</i>	67 – 70% = <i>D+</i>
83 – 87% = <i>B</i>	63 – 67% = <i>D</i>
80 – 83% = <i>B–</i>	60 – 63% = <i>D–</i>
77 – 80% = <i>C+</i>	< 60% = <i>F</i> .

## 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, and physical and learning ability. 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 suggestions.

## University and Course Policies

- **Honor Code Statement:** I expect all students to follow the guidelines of the UNC honor code. In particular, students are expected to refrain from "lying, cheating, or stealing" in the academic context. You can read more about the honor code at [honor.unc.edu](http://honor.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.
- **Attendance Policy and Approved Absences:** 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 with official notification from the organization (e.g., travel letter).
  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). Please note that this may also pertain to significant health conditions, such as COVID-19 or severe flu.
- **Invalid excuses:** Anything not listed explicitly as a University Approved Absence, including but not restricted to club activities/events, interviews (unless interviewer provides documentation that the date of the interview cannot be changed), illnesses which are not severe enough to warrant hospitalization, travel and/or vacation plans, feeling unprepared, etc. Attendance is recommended. You are responsible for any announcements that you may have missed if you choose not to attend class. You should get the missed notes/announcements from one of your peers or by watching the recorded lecture. You are not required to attend class; however, an unexcused absence during a Friday class will result in a zero for the Lecture Exercise.
  - **Make-up Work with a University Approved Absence:** Students who present me with University Approved Absence documentation are eligible for makeup work. This includes documentation which comes specifically from ARS, EOC, the Office of the Dean of Students, the Gender Violence Service Coordinators or the official organization (barring club sports).
    - All other types of documentation cannot be used for University Approved Absences, and thus, makeup work cannot be given under these circumstances.
    - Documentation must specify exactly which dates the student is to be excused for; thus, a beginning and end time must be made explicit.
    - Makeup requests must be submitted prior to missing an exam if at all possible and no later than 5 days after the student has returned if there is a sudden absence.
    - If you have a university approved absence, then it is your responsibility to email me at sbarker@unc.edu either before or during the week you return to let me know which assignment(s) you would like to make up. If you email more than 5 days after you return, you will be unable to make up the missed work.
  - **Late Assignments:**
    - Late assignments are not accepted unless you have a University Approved Absence with one of the proper documentations as described above.
    - I will not accept an assignment past the deadline if you are having a technical problem. There are drops built into the grading system to allow for these issues.

## University Resources

- **Accessibility Resources & 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.

Date Range: 06/26/2023-08/01/2023

Table 1: Course Schedule

<b>Dates</b>	<b>Topics</b>	<b>Graded Items</b>
06/26-06/30	Probability and Data as Random Variables	
M T W R F	Summarizing Data Set Theory and Probability Random Variables (1) Random Variables (2) Random Variables (3)	Quiz 1
07/03-07/07		
M T W R F	Multivariate and Conditional Distributions <b>No Class. Have a happy 4th of July!</b> Sample Distribution and Point Estimates (1) Sample Distribution and Point Estimates (2) Asymptotics	Quiz 2, HW 1 & HW 2 due
07/10-07/14	Statistical Tests (1)	
M T W R F	<b>Midterm</b> Confidence Intervals Hypothesis Testing Simple Regression (1) Simple Regression (2)	<b>Midterm</b>    Quiz 3, HW 3 & HW 4 due
07/17-07/21	Statistical Tests (2)	
M T W R F	Multiple Regression (1) Multiple Regression (2) Regressions in Economics Endogeneity and Ideas in Identification Regression Inference	Quiz 4, HW 5 & HW 6 due
07/24-07/28		
M T W R F	Presentations (1) Presentations (2) Presentations (3) TBD —	Replication, HW 7 & HW 8 due

### Disclaimer

Although the instructor intends to follow this syllabus as closely as possible, there may be times when deviations from the material presented herein are necessary. Changes will be announced as early as possible so that students can adjust their schedule.