ECON 3818: INTRO TO STATISTICS WITH COMPUTER APPLICATIONS

Tuesday and Thursday: 3:55-5:10pm

Room: ECON 119

Instructor: Joseph Fry

E-mail: jofr2085@colorado.edu

Office Hours: Friday 1-3pm held over zoom using the following link:
https://cuboulder.zoom.us/j/91201028555

Please allow me 24 hours to respond to all emails. If you need help with course material, please see me during my office hours. If you need more help than can be provided in office hours, consider visiting the department's undergraduate tutor or viewing the department's private tutor list: https://www.colorado.edu/economics/undergraduate-program

COURSE DESCRIPTION

Econ 3818 is an introductory course in the theory and methods of statistics. Statistics allows datasets to be transformed into usable information, analyzed for patterns and trends, which improve decision-making.

Upon completion of the course, students should be able to

- Be prepared for a future course in Econometrics – the data driven side of economics.
- Will be able to load datasets into R and perform statistical methods to gather information about the data.
- Understand the probability theory behind basic statistical tests and implement the methods.

We will study basic probability, probability distributions (especially the normal distribution), and descriptive and inferential statistics, including estimation and hypothesis testing.

Emphasis is on both theory and applications. Weekly problem sets will explore issues in statistical theory and practice. The course will use the programming language R to do data analysis on simulated and real datasets

Required Materials

- Textbook: *The Basic Practice of Statistics*. David Moore, William Notz, and Michael A Fligner.

Prerequisites:

- Econ 2010 & 2020. Econ 1088 (or an approved similar course). This class requires algebra and calculus so exposure to these concepts is required.

Computer Application: R is a free programming language that is utilized primarily for data analysis. We will spend time throughout the course working on **R** exercises through the **RStudio** interface.

Grading:

Assignment	**Percentage**
Homework	15%
R Problem Sets	10%
R Project	10%
Midterm 1	20%
Midterm 2	20%
Final	25%

Curving: Midterms may be curved individually, and a curve may be applied to the overall course grade to conform to departmental standards. I will automatically increase final course grades that are 0.5% below any grade cutoff after any final grading curve has been applied. *Grade Adjustments:* Other than the 0.5% bump discussed above, I will not grant any request to increase your grade to meet a certain cutoff. You will receive the grade that you earned

throughout the course. If you are concerned about your grade(s) you should immediately come talk to me. I will do everything I can to help you be successful in this course.

Grading Scale:

Grade	**Percentage**	**Grade**	**Percentage**
A	$93 \leq x$	C	$73 \leq x < 77$
A-	$90 \leq x < 93$	C-	$70 \leq x < 73$
B+	$87 \leq x < 90$	D+	$67 \leq x < 70$
B	$83 \leq x < 87$	D	$63 \leq x < 67$
B-	$80 \leq x < 83$	D-	$60 \leq x < 63$
C+	$77 \leq x < 80$	F	x < 60

Homework: There will be weekly homework assignments assigned through the Achieve website. These will be due by 11:59 pm on **most** Sundays. No late homework will be accepted. The two chapter homeworks with the lowest grades will be dropped.

Recitation: Recitation attendance is not mandatory. However, it is crucial for success to attend recitation. Material covered in recitation will look very similar to exam questions and will serve as high-quality review of lecture material. Your TA is TBA . Email: TBA.

R Project & Exercises: There will be five simple **R** assignments and one data project throughout the semester. A '.Rmd' (R Markdown file) and a '.html' file should be turned in for each assignment.

Exams: There will be two midterms throughout the semester. They will consist of multiple choice questions along with a couple of free response questions. Any tables required will be provided by the instructor. There will be no make-up exams, unless there is documentation of a medical or family emergency. If you miss an exam, the weight of that exam will be added to the final exam.The final exam is cumulative, but the midterms are not.

Extra Credit: The only extra credit opportunity will be through iClickers. There will be roughly 2-3 clicker questions per lecture. A maximum of five percentage points will be

added to your grade for excellent clicker participation. Make sure to register your iClickers, instructions provided here:
https://oit.colorado.edu/tutorial/cuclickers-set-iclicker-student-account

TENTATIVE COURSE OUTLINE

Week	Dates	Content
1	Aug 24-26	• Topics: Administration, Introduction to Statistics, Population vs. Sample • Chapters: 1, 2 • Due: Homework 1, Ch. 1-2, due Sun at 11:59pm
2	Aug 31 - Sept 2	• Topics: Introduction to **R**, What is Probability, Random Variables, Probability Rules • Chapters: 12, 13 • R Day: Tuesday 8/31 (Bring Laptop) • Due: **R assignment 1, due Thursday beginning of class** • Due: Homework 2, Ch. 12-13, due Sun at 11:59pm
3	Sept 7-9	• Topics: Binomial Distribution • Chapters: 14 • R Day: Thursday 9/9 (Bring Laptop) • Due: Homework 3, Ch. 14, due Sun at 11:59pm
4	Sept 14-16	• Topics: Normal Distribution, Distributions, and Mathematical Expectations • Chapters: Chapter 3, Distributions Handout, Expectations Handout • Due: **R assignment 2, due Thursday beginning of class**
5	Sept 21-23	• Topics: Data Generation, **Midterm 1 Review** • Chapters: 8, 9 • Review Day: Thursday 09/24 • Due: Homework 4, Ch. 8-9, due Sun at 11:59pm
6	Sept 28 - 30	• Topics: Parameters and Statistics • Chapters: 15 • Midterm 1, Tuesday 9/28 • Due: Homework 5, Ch. 15, due Sun at 11:59pm

7	Oct 5-7	• Topics: Confidence Intervals, Intro to Hypothesis Testing, p- values • Chapters: 16, 17 • R Day: Tuesday 10/5 (Bring Laptop) • Due: Homework 6, Ch. 16-17, due Sun at 11:59pm
8	Oct 12-14	• Topics: Size, Power, Inference • Chapters: 18 • Due: **R assignment 3, due Wed beginning of class** • Due: Homework 7, Ch. 18, due Sun at 11:59pm
9	Oct 19-21	• Topics: t-distribution, Single and Two Sample Uses of t-distribution • Chapters: 20, 21 • Due: Homework 8, Ch. 20, due Sun at 11:59pm
10	Oct 26-28	• Topics: Two Sample Uses of t-distribution, Review for Midterm 2 • Chapters: 21 • R Day and Review Day: Tuesday 10/26 (Bring Laptop) • Due: Homework 9, Ch. 21, due Wednesday at 11:59pm • **Midterm 2, Thursday 10/28**
11	Nov 2-4	• Topics: Tests of Proportions • Chapters: 22, 23 • Due: **R assignment 4, due Thursday beginning of class** • Due: Homework 10, Ch. 22-23, due Sun at 11:59pm
12	Nov 9-11	• Topics: Covariance & Correlation, Least Squares, Marginal and Conditional Probability • Chapters: 4, 5, 6 • Due: Homework 11, Ch. 4-5, due Sun at 11:59pm
13	Nov 16-18	• Topics: Marginal and Conditional Probability • Chapters: 6 • R Day: Tuesday (Bring Laptop) • No Class Thursday, Drop-in Meetings for **R** Project • Due: Homework 12, Ch. 6, due Sun at 11:59pm
14	Nov 23-25	• Tuesday: Optional R Day (ggplot2 for better graphing) and Drop-in Meetings for **R** Project • No Class Thursday: Thanksgiving Break • Due: **R Project due Sunday at 11:59pm**

15	Nov 30 - Dec 2	• Topics: Inference in Regression, Final Exam Review • Chapters: 26 • Due: Homework 13, Ch. 26, due Sun at 11:59pm
16	Dec 7-9	• Topics: Final Exam Review • Due: **R assignment 5, due Thursday beginning of class**
	Dec 13	• **Final Exam: Sunday, Dec 13 4:30–7p.m.**

UNIVERSITY POLICIES

Classroom Behavior Both students and faculty are responsible for maintaining an appropriate learning environment in all instructional settings, whether in person, remote or online. Those who fail to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, political affiliation or political philosophy. For more information, see the policies on classroom behavior and the Student Conduct and Conflict Resolution policies.

Requirements for COVID-19 As a matter of public health and safety due to the pandemic, all members of the CU Boulder community and all visitors to campus must follow university, department and building requirements and all public health orders in place to reduce the risk of spreading infectious disease. Students who fail to adhere to these requirements will be asked to leave class, and students who do not leave class when asked or who refuse to comply with these requirements will be referred to Student Conduct and Conflict Resolution. For more information, see the policy on classroom behavior and the Student Code of Conduct. If you require accommodation because a disability prevents you from fulfilling these safety measures, please follow the steps in the "Accommodation for Disabilities" statement on this syllabus.

As of Aug. 13, 2021, CU Boulder has returned to requiring masks in classrooms and laboratories regardless of vaccination status. This requirement is a temporary precaution during the delta surge to supplement CU Boulder's COVID-19 vaccine requirement. Exemptions include individuals who cannot medically tolerate a face covering, as well as those who are hearing-impaired or otherwise disabled or who are communicating with someone who is hearing-impaired or otherwise disabled and where the ability to see the mouth is essential to communication. If you qualify for a mask-related accommodation, please follow the steps in the "Accommodation for Disabilities" statement on this syllabus. In addition, vaccinated instructional faculty who are engaged in an indoor instructional activity and are separated by at least 6

feet from the nearest person are exempt from wearing masks if they so choose. Students who have tested positive for COVID-19, have symptoms of COVID-19, or have had close contact with someone who has tested positive for or had symptoms of COVID-19 must stay home.

Accommodations for students with Disabilities If you qualify for accommodations because of a disability, please submit your accommodation letter from Disability Services to your faculty member in a timely manner so that your needs can be addressed. Disability Services determines accommodations based on documented disabilities in the academic environment. Information on requesting accommodations is located on the Disability Services website. Contact Disability Services at 303-492-8671 or dsinfo@colorado.edu for further assistance. If you have a temporary medical condition, see Temporary Medical Conditions on the Disability Services website.

Preferred Student Names and Pronouns CU Boulder recognizes that students' legal information doesn't always align with how they identify. Students may update their preferred names and pronouns via the student portal; those preferred names and pronouns are listed on instructors' class rosters. In the absence of such updates, the name that appears on the class roster is the student's legal name.

Honor Code: All students enrolled in a University of Colorado Boulder course are responsible for knowing and adhering to the Honor Code academic integrity policy. Violations of the Honor Code may include, but are not limited to: plagiarism, cheating, fabrication, lying, bribery, threat, unauthorized access to academic materials, clicker fraud, submitting the same or similar work in more than one course without permission from all course instructors involved, and aiding academic dishonesty. All incidents of academic misconduct will be reported to the Honor Code (honor@colorado.edu); 303-492-5550). Students found responsible for violating the academic integrity policy will be subject to nonacademic sanctions from the Honor Code as well as academic sanctions from the faculty member. Additional information regarding the Honor Code academic integrity policy can be found on the Honor Code website.

Discrimination & Harassment Policy: The University of Colorado Boulder (CU Boulder) is committed to fostering an inclusive and welcoming learning, working, and living environment. CU Boulder will not tolerate acts of sexual misconduct (harassment, exploitation, and assault), intimate partner violence (dating or domestic violence), stalking, or protected-class discrimination or harassment by or against members of our community. Individuals who believe they have been subject to misconduct or retaliatory actions for reporting a concern should contact the Office of Institutional Equity and Compliance (OIEC) at 303-492-2127 or email cureport@colorado.edu. Information about OIEC, university policies, reporting options, and the campus resources can be found on the OIEC website. Please know that faculty and graduate instructors have

a responsibility to inform OIEC when made aware of incidents of sexual misconduct, dating and domestic violence, stalking, discrimination, harassment and/or related retaliation, to ensure that individuals impacted receive information about their rights, support resources, and reporting options.

Religious Holidays: Campus policy regarding religious observances requires that faculty make every effort to deal reasonably and fairly with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. See the campus policy regarding religious observances for full details.