

ECON 3818: INTRO TO STATISTICS WITH COMPUTER APPLICATIONS

MWF 11:30-12:20

Room: Holmes 141

Instructor: Kyle Butts

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Office: ECON 414

Office Hours: T 1:00-1:50 & W 9:30-10:30 and by appointment

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: http://www.colorado.edu/econ/undergraduate/tutor_list.pdf

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	10%
R Problem Sets	10%
R Project	10%
Midterm 1	20%
Midterm 2	20%
Final	20%

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 Sapling website. These will be due by 11:59 pm on **most** Sundays. No late homework will be accepted. The 4 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 PhD student Xiang Chi. Email: xiang.chi@colorado.edu.

R Project & Exercises: There will be five simple **R** assignments and one data project throughout the semester. The R project will be worth 10% and the R assignments will be worth another 10%. R assignments must be turned in to Canvas before class starts on Wednesday. A ‘.Rmd’ (R Markdown file) and/or a ‘.pdf’ should be turned in for the 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. You may use your notes and book for the exam, but may not work with anyone on them. 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.

COVID-19 INFORMATION:

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 public health orders in place to reduce the risk of spreading infectious disease. Required safety measures at CU Boulder relevant to the classroom setting include:

- Maintain 6-foot distancing when possible,
- Wear a face covering in public indoor spaces and outdoors while on campus consistent with state and county health orders,
- Clean local work area,
- Practice hand hygiene,
- Follow public health orders, and
- If sick and you live off campus, do not come onto campus (unless instructed by a CU Healthcare professional), or if you live on-campus, please alert CU Boulder Medical Services.

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 policies on [COVID-19 Health and Safety](#) and [classroom behavior](#) and the [Student Code of Conduct](#). If you require accommodation because a disability prevents you from fulfilling these safety measures, please see the “Accommodation for Disabilities” statement on this syllabus.

Before returning to campus, all students must complete the [COVID-19 Student Health and Expectations Course](#). Before coming on to campus each day, all students are required to complete a [Daily Health Form](#).

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 and complete the [Health Questionnaire and Illness Reporting Form](#) remotely. In this class, if you are sick or quarantined,

- If you are asymptomatic, please attend lecture via zoom.
- If you are symptomatic, please email me and we will plan how you can keep up with the material.

TENTATIVE COURSE OUTLINE

Week	Dates	Content
1	Aug 24-28	<ul style="list-style-type: none"> • 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 4	<ul style="list-style-type: none"> • Topics: Introduction to R, What is Probability, Random Variables, Probability Rules • Chapters: 12, 13 • R Day: Monday 8/31 (Bring Laptop) • Due: R assignment 1, due Wed beginning of class of class • Due: Homework 2, Ch. 12-13, due Sun at 11:59pm • No Class Labor Day, Monday 9/3
3	Sept 7-11	<ul style="list-style-type: none"> • Topics: Binomial Distribution • Chapters: 14 • R Day: Wednesday 9/9 (Bring Laptop) • Due: Homework 3, Ch. 14, due Sun at 11:59pm
4	Sept 14-18	<ul style="list-style-type: none"> • Topics: Normal Distribution, Distributions, and Mathematical Expectations • Chapters: Chapter 3, Distributions Handout, Expectations Handout • Due: R assignment 2, due Wed beginning of class of class
5	Sept 21-25	<ul style="list-style-type: none"> • Topics: Data Generation, Midterm 1 • Chapters: 8, 9 • Review Day: Friday 09/25 • Due: Homework 4, Ch. 8-9, due Sun at 11:59pm
6	Sept 28 - Oct 2	<ul style="list-style-type: none"> • Topics: Parameters and Statistics • Chapters: 15 • Midterm 1, Monday 9/28 • Due: Homework 5, Ch. 15, due Sun at 11:59pm
7	Oct 5-9	<ul style="list-style-type: none"> • Topics: Confidence Intervals, Intro to Hypothesis Testing, p- values • Chapters: 16, 17 • R Day: Monday 10/5 (Bring Laptop) • Due: Homework 6, Ch. 16-17, due Sun at 11:59pm
8	Oct 12-16	<ul style="list-style-type: none"> • Topics: Size, Power, Inference • Chapters: 18 • Due: R assignment 3, due Wed beginning of class of class • Due: Homework 7, Ch. 18, due Sun at 11:59pm

9	Oct 19-23	<ul style="list-style-type: none"> • 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 26-30	<ul style="list-style-type: none"> • Topics: Two Sample Uses of t-distribution, Review for Midterm 2 • Chapters: 21 • R Day: Monday 10/19 (Bring Laptop) • Review Day: Wednesday 10/28 • Due: Homework 9, Ch. 21, due Wednesday at 11:59pm • Midterm 2, Friday 10/30
11	Nov 2-6	<ul style="list-style-type: none"> • Topics: Tests of Proportions • Chapters: 22, 23 • Due: R assignment 4, due Wed beginning of class of class • Due: Homework 10, Ch. 22-23, due Sun at 11:59pm
12	Nov 9-13	<ul style="list-style-type: none"> • 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 16-20	<ul style="list-style-type: none"> • Topics: Marginal and Conditional Probability • Chapters: 6 • R Day: Wednesday 11/18 (Bring Laptop) • No Class 11/20, Drop-in Meetings for R Project • Going Virtual: 11/20 • Due: Homework 12, Ch. 6, due Sun at 11:59pm
14	Nov 23-27	<ul style="list-style-type: none"> • No Class 11/23, Drop-in Meetings for R Project • Optional R Day: Wednesday 11/25 (ggplot2 for better graphing) • No Class Thanksgiving Break, Friday 11/27 • Due: R Project due Sunday at 11:59pm
15	Nov 30 - Dec 4	<ul style="list-style-type: none"> • Topics: Inference in Regression, Final Exam Review • Chapters: 26 • Due: Homework 13, Ch. 26, due Sun at 11:59pm
16	Dec 7	<ul style="list-style-type: none"> • Topics: Final Exam Review • Due: R assignment 5, due Wed beginning of class of class
	Dec 13	<ul style="list-style-type: none"> • Final Exam: Sunday, Dec 13 1:30pm – 4:00pm

UNIVERSITY POLICIES

Students with Disabilities: If you qualify for accommodations because of a disability, please submit to me a letter from disability services in a timely manner so that your needs can be addressed. Disability services determine accommodations based on documented disabilities. Contact: 303-492-8671, Center for Community N200.

Religious Observance Policy: Campus policy regarding religious observances requires that faculty make every effort to reasonably and fairly deal with all students who, because of religious obligations, have conflicts with scheduled exams, assignments, or required attendance. If you have a conflict, please contact me at the beginning of the term so we can make proper arrangements.

Honor Code: All students of the University of Colorado at Boulder are responsible for knowing and adhering to the academic integrity policy of this institution. Violations of this policy may include: cheating, plagiarism, aid of academic dishonesty, fabrication, lying, bribery, and threatening behavior. All incidents of academic misconduct shall be reported to the Honor Code Council (honor@colorado.edu; 303-725-2273). Students who are found to be in violation of the academic integrity policy will be subject to both academic sanctions from the faculty member and non-academic sanctions (including but not limited to university probation, suspension, or expulsion). Other information on the Honor Code can be found at: <http://www.colorado.edu/policies/honor.html> and at <http://www.colorado.edu/academics/honorcode/>

Discrimination & Harassment Policy: The University of Colorado Policy on Sexual Harassment applies to all students, staff and faculty. Sexual harassment is unwelcome sexual attention. It can involve intimidation, threats, coercion, or promises or create an environment that is hostile or offensive. Harassment may occur between members of the same or opposite gender and between any combinations of members in the campus community: students, faculty, staff, and administrators. Harassment can occur anywhere on campus, including the classroom, the workplace, or a residence hall. Any student, staff or faculty member who believes s/he has been sexually harassed should contact the Office of Discrimination and Harassment (ODH) at 303-492-2127 or the Office of Judicial Affairs at 303-492-5550. Information about the ODH and the campus resources available to assist individuals who believe they have been sexually harassed can be obtained at: <http://www.colorado.edu/odh/>