ECON-3818-020 - Introduction to Statistics with Computer Application

Spring 2022

Professor:	**Mahdieh Yazdani**	**Time:**	MWF 12:20 – 1:10
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Course Description: The purpose of this course is to introduce you to the principles of statistical reasoning and inference. To this end the ultimate goals of the course are for you to thoroughly understand the following concepts: describing data with graphs and numbers, basic probability rules, sampling distributions of test statistics, hypothesis testing, and confidence intervals across multiple settings covered in the course, and finally knowledge of simple regression. This course is essential to your success in the study and long-run understanding of economics. CU economics 4000-level courses require knowledge of basic statistical reasoning and understanding. Further our required econometrics courses build directly off of this course. Finally, this course helps you build a skill that has enormous potential financial return in the marketplace. The course consists of five closely related parts. The first part of the course introduces ways to explore data using visual and numerical measures. You will learn about summary measures for single variables and we will consider relationships between variables. The second part of the course introduces you to basic probability theory, popular probability distributions, and mathematical expectation. The third part of the course introduces you to sampling distributions and their properties, properties of estimators, confidence intervals, and hypothesis testing. The fourth part of the course is all applied statistical inference including inference about the mean of a probability distribution, inference about differences in two population means, inference about a single proportion from a population, and inference about differences in two proportions. The fifth and final part of the course further explores correlation and simple regression analysis and then adds inference about simple regression. This course will enable you to carry out empirical studies in economics and related fields. The course will be held remotely from January 10th to 23rd each MWF from 12:20 PM - 1:10 PM. You can easily attend the class by clicking on the link below:

https://cuboulder.zoom.us/j/93018875587

Starting January 24th the class will be held in person.

Lecture Classroom: ECON 117

Class Meeting Time: MWF 12:20 PM – 1:10 PM.

Recitation:

Mondays 3:35 PM - 4:25 PM.

Wednesdays 9:05 AM - 9:55 AM.

Office Hours: Mondays & Fridays 10:05 - 11:30 AM, or by appointment.

You can attend my office hours by clicking on the link below:

https://cuboulder.zoom.us/j/99275203481

TA's Office Hours: Tuesdays from 10:00 AM - 2:00 PM.

You can attend your TA's office hours by clicking on the link below:

https://cuboulder.zoom.us/j/2519570627

Prerequisites: To enroll in this course, students must have completed Econ 2010 and Econ 2020 and either Econ 1088 or Math 1081 or Math 1300 or Math 1310 or APPM 1350 (all minimum grade C-).

Class Technology:

- **R Programming:** This course provides practical hands-on training in using statistical software for empirical economics analysis. We will be using R (an open source programming language for statistical analysis and graphics).
- **Achieve Learning System:** The course will use the Macmillan Publishing, Achieve learning system for homework, and some quiz assignments. There are instructions to sign up for Achieve through Canvas found in the **"To Do Before Class Starts Module"**.
- **Clickers:** The class and recitation sections will use clickers. Answers to clickers questions will be used for class attendance and will be a part of your grade. You will need to sign up for iClicker Reef.

Textbook:

- The Basic Practice of Statistics, 9th Edition, by David Moore, William Motz, and Michael Fligner. The course will use MacMillan Publishing's Achieve homework system that comes with an electronic version of the book embedded in the system. You will sign up for the Basic Practice of Statistics + Achieve System ($82.35 before tax) through Canvas.

Attendance: Classes are interactive, and you will get the most out of this course by attending each class meeting. I will randomly take attendance at the beginning, middle, or the end of the class. You will be allowed up to 9 absences without penalty. Students with more than 9 absences (three weeks of class) throughout the semester will fail the course. Note that there are no additional absences available for standard "excused" reasons (illness, family emergency, transportation problem, etc.).

Canvas website: Please make sure to check Canvas regularly for lecture notes, problem sets, announcements, and other updates regarding the course.

Problem Sets: There will be a number of problem sets. You may work with a partner and turn in a single document. The problem sets consist of multiple choices, codding in R, statistical reasoning and inference, and etc.. You are encouraged to form study groups of two. Each group should submit their answers, codes, results, analysis, and interpretation in **only one copy**. Assignments should be submitted on Canvas by the due dates. There will be incentives to turn in your assignment on time. I will apply a 20% penalty to assignment turned in after the deadline, for delays of at most 24 hours. As an extra chance your lowest problem set grade will be dropped. You could change your partner if you feel your group isn't as productive as you expected.

Final Research Paper: The goal of this project is to give you the opportunity to apply your knowledge over a real world data set and practice the principles of statistical reasoning and inference. For example, in your paper you would need to describe your data with graphs and numbers, define the hypotheses, perform simple linear regression models over your data set, test your hypotheses, and do inference analysis. You are highly encouraged to form study groups of two. You will write a paper on a topic of interest to you, focusing on analysis of relevant data. You should submit your codes, results, figures, tables, analysis, and

interpretation in roughly 6 pages. To make sure that you have found an appropriate data set and provide some guidance we will use the week of class-time 03/14 for group meetings to discuss your research topic. The research paper is due on Monday, April 16th, by 11:59 pm. No late submission will be accepted. Each team will present their research paper for almost 15 minutes. In each group, partners should both present their work in roughly equal proportion. Each individual's presentation will account for 50% of his/her research paper grade.

Exams: There will be few quizzes and one midterm. Midterm and quizzes will be held in regular class hours. As an extra chance I will drop your lowest quiz grade. There will be no make-up exam unless you provide legitimate proof abiding by university regulations.

Group Discussions - Extra Credits: There will be a number of group discussions in this class. During the group discussion sessions you will be assigned a practice set. In a group of 2 or 3 you and your partner(s) may discuss with each other and share your screens to answer the questions. During the group discussions I will join your group and you can ask your questions. These group discussion sessions can offer you practice in critical thinking and problem solving and optimize your learning.

Grade Disputes: If you believe an error occurred in the grading of an exam, quiz, or problem set, you must send your TA a detailed written request within 2 weeks of receiving the grade. The request should specifically mention which questions you believe were graded incorrectly and provide justification for why your answers deserved more credit. Such concerns will not be considered unless raised in a timely manner.

Grading Policy:

Grade	**Percent**
Clicker	10%
Exercises	15%
Midterm	25%
Quizzes	20%
Final Research Project	30%
Group Discussions	Extra Credits 10%

Important Dates	**Midterm, Research Paper, & Presentations**
Midterm Exam	3/7 and 3/9
Project Meetings	3/14, 3/16, and 3/18
Spring Break	3/21 to 3/25
Research Paper Due	4/16, by 11:59 pm
Research Paper Presentations	04/18 to 04/27

Tentative Course Outline:

Tentative Schedule	**Resource: The Basic Practice of Statistics, 9th Edition, by David Moore, William Motz, and Michael Fligner.**
R Tutorial	Introduction to R
Chapter 0	Getting Started
Chapter 1 & R Tutorial	Picturing Distributions with Graphs
Chapter 2 & R Tutorial	Describing Distributions with Numbers
Chapter 3 & R Tutorial	The Normal Distributions
Chapter 4 & R Tutorial	Scatterplots and Correlation
Chapter 5 & R Tutorial	Regression
Chapter 6	Two-Way Tables
Chapter 8	Sampling
Chapter 9	Experiments
Chapter 12	Introducing Probability
Chapter 13	General Rules of Probability
Chapter 14	Binomial Distributions & Mathematical Expectation
Chapter 15	Sampling Distributions
Chapter 16	Confidence Intervals: The Basics
Chapter 17	Tests of Significance: The Basics
Chapter 18	Inference in Practice
Chapter 20	Inference about a Population Mean
Chapter 21	Inference Comparing Two Means
Chapter 22	Inference about a Population Proportion
Chapter 23	Inference Comparing Two Proportions
Chapter 24	Inference about Variables: Part IV Review
Chapter 26	Inference for Regression

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 Code of Conduct.

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 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.

Disability Accommodation: 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 or injury, see Temporary Medical Conditions under the Students tab 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. Violations of the policy may include: 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 who are 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 at the Honor Code Office website.

Sexual Misconduct, Discrimination, Harassment and/or Related Retaliation: The University of Colorado Boulder (CU Boulder) is committed to fostering a positive and welcoming learning, working, and living environment. CU Boulder will not tolerate acts of sexual misconduct (including sexual assault, exploitation, harassment, dating or domestic violence, and stalking), discrimination, and harassment by 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 cureport@colorado.edu. Information about the OIEC, university policies, anonymous reporting, and the campus resources can be found on the OIEC website. Please know that faculty and instructors have a responsibility to inform OIEC when made aware of incidents of sexual misconduct, discrimination, harassment and/or related retaliation, to ensure that individuals impacted receive information about options for reporting and support resources.

Religious Observances: 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 campus policy regarding religious observances for full details.