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ECON/POLS/PSYC/SOC 199
Spring 2024
William Duncan
University of Kansas

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Contents

1 Preliminary Details

1.1 Course Information

Course Number: ECON/POLS/PSYC/SOC 199
Course Name: Data I
Location: Robinson 156
Time: TR, 2:30 - 3:45 PM
Start/End Date: 1/16/2024 - 5/2/2024
Final Exam Time: May 6th, 1:30 - 4:00 PM

1.2 Professor Information

Professor: Dr. William Duncan
Office: Fraser 423
Office Hours: TR, 11:00 AM - 12:00 PM
Email: williamduncan@ku.edu
Office Hours Zoom Option: Zoom Link

Graduate Teaching Assistant: Edina Harsay
Office: Fraser 423
Office Hours: W, 3:30 - 4:30 PM
Email: harsay@ku.edu
Office Hours Zoom Option: Zoom Link

Graduate Teaching Assistant: Daiil Jun
Office: Fraser 423
Office Hours: F, 9:00 - 10:00 AM
Email: daiilj@ku.edu
Office Hours Zoom Option: Zoom Link (password: 202400)

Undergraduate Teaching Assistant: Allie Vo

2 Course Description, Objectives and Textbook

2.1 Course Objectives

Course Description:
Data science is an interdisciplinary field that uses scientific methods, processes, algorithms and systems to derive knowledge and insights from data. This course teaches students the critical concepts of inference and computing, working with real behavioral, economic, geographic, physical, social, and text data. Students obtain basic statistics training from a computational perspective using simulation to answer questions, explore problems, and delve into social issues surrounding data analysis such as privacy and design.

Course Objectives/Student Learning Outcomes:
Upon successful completion of this course, students will be able to:

- Have learned the basic concepts and skills of data science.

    - Work with data from multiple sources and identify relevant questions.
    - Understand and process data and organize information.
    - Analyze data by identifying and applying statistical methods.
    - Visualize and communicate data.
    - Translate results into solutions and communicate findings in a way that positively affects policy or organizational decisions.

- Become familiar with the programming language of Python, particularly in the use of data science and statistical modeling.

Prerequisite: NONE

2.2 Textbook

Required Text Adhikari, A., DeNero, J. & Wagner, D. (2021). *Computational and Inferential Thinking: The Foundations of Data Science*, GitBook Publisher.
https://inferentialthinking.com/chapters/intro

Recommended Text VanderPlas, J. (2016). *Python data science handbook: Essential tools for working with data.* O'Reilly Media, Inc.
https://jakevdp.github.io/PythonDataScienceHandbook/

2.3 Technology

We will use computational and statistical programming during this class. The softare package used for labs and assignments is Python.

2.4 Grading

2.5 Grading Scheme

There are 6 components of the class (described below). Each component is worth 100 points. Your final point total is a weighted average of each of these components. It is out of 100 points and is rounded to the nearest integer. The final point total is set according to the following formula:

$$
\begin{aligned}
\text{Final Grade} \quad = \quad & .05 \times \text{Participation} \\
+ \quad & .20 \times \text{Homework} \\
+ \quad & .15 \times \text{Lab Assignment} \\
+ \quad & .15 \times \text{Low Exam} \\
+ \quad & .20 \times \text{High Exam} \\
+ \quad & .25 \times \text{Final Exam}
\end{aligned}
$$

Your final grade is assigned according to the following break down:

Lower Real Limit	92.5	89.5	86.5	82.5	79.5	76.5	72.5	69.5	66.5	62.5	59.5	0
Grade	4.0	3.7	3.3	3.0	2.7	2.3	2.0	1.7	1.3	1.0	0.7	0

2.6   Class Participation

Everybody will be expected to come to class having read the relevant readings and being prepared to participate in class. Reading assignments are listed in the course schedule below. Complete each reading assignment before the date for which it is listed. Participation points must be earned by attending class meetings. We will calculate the percentage of class meetings that you attend. Course participation grade is assigned according to the following rule

Lower Real Limits	79.5	74.5	69.5	64.5	59.5	64.5	0
Points	100	90	80	70	60	50	0

So a student who attends 80% of the meetings will receive 100 points. A student who attends 79% of the meetings will receive 90 points.

2.7   Homework

Weekly homework assignments are a required part of the course. Each student must submit each homework independently, but you are allowed to discuss problems with other students and course staff.

The homework will use computational notebooks and the python programming language. You do not need prior experience with these tools to be successful. These tools will be introduced in class.

You can turn in your homework assignments 5 days late with a 20% deduction. After 5 days, we will not accept late submissions because we will release answer keys by then. There will be approximately 10 homework assignments. The lowest scored homework will be dropped.

2.8   Lab Assignments

Weekly labs are a required part of the course. After the first week, labs will be released on Sunday night. You can get credit for each lab in one of two ways described below:

- Attend class, make progress substantial enough for your work to be checked off by course staff, and submit your lab (even if it is incomplete) by the end of the class period on the day the lab is due. You need to attend both class meetings of the designated week to get full credit this way.

- Complete the lab independently and submit the completed lab by end of class the day it is due (often Wednesday). "Completing a lab" means passing all tests included in the lab.

There will be approximately 10 labs. The lowest scored lab will be dropped.

2.9   Exams

There are two exams in the class during the semester. These exams contain an in-class portion and a take-home portion. There is also a final exam. This exam has only an in-class portion.

Unless you have accommodations as determined by the university and approved by the instructor, you must take the exams at the dates and times provided here.

2.10 Grade Appeal

Grades on assignments are final. If you feel there is an error in your grade, you must submit a request to me in writing to re-evaluate your assignment. If the error is arithmetic, your grade will be updated without further action. If the error is of another kind, the professor reserves the right to re-grade the entire assignment.

3 Credit Hour Definition

Consistent with best practices in higher education, the University of Kansas subscribes to the federal definition of the "credit hour" endorsed by the Higher Learning Commission. Driven by intended learning outcomes and verified by evidence of student achievement, the "credit hour" is an institutionally-established equivalency that reasonably approximates not less than one hour of the classroom (or direct faculty) instruction and a minimum of two hours of out-of-class student work per week for the duration of the course enrollment period. A 3-credit-hour course, for example, requires approximately 40-45 instruction (or instructional equivalency) hours, roughly 80-90 out-of-class work (self-directed) hours and approximately 120-135 total instructional hours over the course of the semester.

4 Course Policies

4.1 Course Structure

The class will be taught in-person as a flipped course. Students are expected to watch the lectures and read the material before coming to class. Lab work will be done in class, and there should be time to work on some of the homework.

4.2 Academic Deadlines

In the event that this is not the right course for you, the last day to drop this course without a grade is September 12. The last day to withdraw from this course is October 3.

It is important that you spend the necessary time working in this course to achieve the expected outcomes by the end of the term. If you face challenges to fully participating at any time during the semester, please let me know, and please contact me if you expect to miss class. I am available and ready to support your success. Additionally, if you need to report an extended illness or serious accident, please contact Student Support and Case Management at course-adapt@ku.edu or 785-864-4060. A case manager will send email notifications to your instructor(s) on your behalf. When you are able, you will need to follow up with your professors to coordinate a temporary arrangement regarding missed instruction and coursework.

4.3 Policy for Late Assignments

You can turn in your assignment five days late with a 20% deduction. After 5 days, we will not accept late submissions because we will release answer keys in a week.

4.4 Academic Misconduct Statement (From the University Senate Rules and Regulations)

Academic misconduct by a student shall include, but not be limited to, disruption of classes; threatening an instructor or fellow student in an academic setting; giving or receiving of unauthorized aid on examinations or in the preparation of notebooks, themes, reports or other assignments; knowingly misrepresenting the source of any academic work; unauthorized changing of grades; unauthorized use of University approvals or forging of signatures; falsification of research results; plagiarizing of another's work; violation of regulations or ethical codes for the treatment of human and animal subjects; or otherwise acting dishonestly in research. An instructor may, with due notice to the student, treat as unsatisfactory (1) any student work that is a product of academic misconduct, or (2) a student's performance for a course when there are severe or repeated instances of academic misconduct.

4.5 Commercial Note-Taking

Pursuant to the University of Kansas' Policy on Commercial Note-Taking Ventures (http://policy.ku.edu/provost/commercial-note-taking), commercial note taking is not permitted in this class. Lecture notes and course materials may be taken for personal use, for the purpose of mastering the course material, and may not be sold to any person or entity in any form. Any student engaged in or contributing to the commercial exchange of notes or course materials will be subject to discipline, including academic misconduct charges, in accordance with University policy. Please note: note-taking provided by a student volunteer for a student with a disability, as a reasonable accommodation under the ADA, is not the same as commercial note-taking and is not covered under this policy.

4.6 Students with Disabilities

The Academic Achievement and Access Center (AAAC) coordinates academic accommodations and services for all eligible KU students with disabilities. If you have a disability for which you wish to request accommodations and have not contacted the AAAC, please do so as soon as possible. They are located in 22 Strong Hall and can be reached at 785-864-4064 (V/TTY). Information about their services can be found at http://www.disability.ku.edu. Please contact me privately concerning your needs in this course.

4.7 Statement on Diversity and Inclusion

As a premier international research university, the University of Kansas is committed to an open, diverse, and inclusive learning and working environment that nurtures the growth and development of all. KU holds steadfast in the belief that an array of values, interests, experiences, and intellectual and cultural viewpoints enrich learning and our workplace. The promotion of and support for a diverse and inclusive community of mutual respect require the engagement of the entire university.

4.8 Student Academic Success Resources

In addition to any polices and resources noted above, the KU Academic Success Student Resources website provides links to KU Policies and Resources pertaining to academic misconduct, grading polices, harassment and discrimination, diversity and inclusion, mandatory reporting, equal opportunity

and affirmative action, and student rights and responsibilities. Please visit the site to familiarize yourself with these policies and resources. If you have questions or concerns about any of these policies, statements, or resources, please let me know, or contact Student Affairs directly.

4.9   Course Feedback

At the conclusion of this course, the University will provide an opportunity for you to provide feedback via an online (anonymous) Student Survey of Teaching. I strongly encourage you to take advantage of this opportunity to provide feedback. More generally, please feel free to tell me what is working well, and what is not working as well during the semester. Thanks!

4.10   Weapons Policy

Individuals who choose to carry concealed handguns are solely responsible for doing so safely and securely in strict conformity with state and federal laws and KU weapons policy. Safety measures outlined in the KU weapons policy specify that a concealed handgun:

- Must be under the constant control of the carrier.

- Must be out of view, concealed either on the carrier's body, or in a backpack, purse, or bag that remains under the carrier's custody and control.

- Must be in a holster that covers the trigger area and secures any external hammer in an un-cocked position.

- Must have the safety on and have no round in the chamber

5   Course Schedule

NOTE: the course schedule is subject to change at professor's discretion.

Day	Concept/Activity	Reading	HW Due
Week 1			
Tuesday	Cancelled		
Thursday	Introduction and Syllabus		
Week 2			
Tuesday	Cause and Effect	Chapter 2	Due Thurs: Lab 01
Thursday	Intro to Tables and Data Types	Chapter 3	
(Due Tuesday)	**HW01: Causality and Expressions**		
Week 3			
Tuesday	Arrays and Ranges	Chapters 4,5	Due Thurs: Lab 02
Thursday	Creating Tables	Chapter 6	
Week 4			
Tuesday	Data Visualization	Chapter 7	Due Thurs: Lab 03
Thursday	Functions	Chapter 8	
(Due Tuesday)	**HW02: Arrays and Tables**		
Week 5			
Tuesday	Groups, pivots and joins	Chapter 8	Due Thurs: Lab 04
Thursday	Conditional statements, iterations, and simulations	Chapter 9	
(Due Tuesday)	**HW03: Visualizations**		
Week 6			
Tuesday	Sampling and empirical distributions	Chapter 10	Due Thurs: Lab 05
Thursday	Iteration, sampling, and chance	Sections 11.1-11.2	
(Due Tuesday)	**HW04: Functions, Histograms, and Graphs**		
Week 7			
Tuesday	Probability and samples	Sections 11.3-11.4	
Thursday	Take Home Exam I Assigned		
(Due Tuesday)	**HW05: Applying Functions and Iterations**		
Week 8			
Tuesday	Exam Review		
Thursday	In Class Exam I		
Friday	Take Home Exam I Due		

Day	Concept/Activity	Reading	HW Due
Week 9			
Tuesday	SPRING BREAK		
Thursday	SPRING BREAK		
Week 10			
Tuesday	Causality and A/B Testing	Sections 12.1-12.3	Due Thurs: Lab 06
Thursday	Assessing Models	Chapter 13	
(Due Tuesday)	**HW06: Probability, Simulation, Estimation**		
Week 11			
Tuesday	Decision and Uncertainty	Sections 14.1-14.3	Due Thurs: Lab 07
Thursday	Estimation and confidence	Sections 14.4-14.6	
(Due Tuesday)	**HW07: Testing Hypotheses**		
Week 12			
Tuesday	Center, Spread, and Normal Distribution		Due Thurs: Lab 08
Thursday	Normal Distribution and Variance of Sample Means	Sections 15.1-15.2	
(Due Tuesday)	**HW08: Confidence Intervals**		
Week 13			
Tuesday	Sampling Variability	Sections 15.3-15.6	Due Thurs: Lab 09
Thursday	Correlation	Chapter 16	
(Due Tuesday)	**HW09: Bootstrap, Resampling, CLT**		
Week 14			
Tuesday	Regression	Chapter 17	Due Thurs: Lab 10
Thursday	Regression	Chapter 17	
(Due Tuesday)	**HW10: Regression**		
Week 15			
Tuesday	Review		
Thursday	In Class Exam II		
Week 16			
Tuesday	Take Home Exam II Due		
Thursday	Review		
Finals Week			
May 6th	Final Exam	1:30 - 4:00 PM	