DATA SCIENCE CAPSTONE
TERM
FACULTY
University of Kansas

Contents

1 Preliminary Details

1.1 Course Information

Course Number: Data Science Capstone
Course Name: Community Data Labs
Location: TBD
Time: TBD
Start/End Date: TBD
Final Exam Time: TBD

1.2 Professor Information

Professor: TBD
Office: TBD
Office Hours: TBD
Email: someone@ku.edu

2 Course Description, Objectives and Textbook

2.1 Course Objectives

Course Description:
Data science empowers users to provide data-driven solutions to problems and questions worldwide. This course provides students an opportunity to work on real-world problems that come from local and state governments, health care, education, and small businesses across the state of Kansas. Students will gain experience working from start to finish on delivering data-driven solutions for these problems. Students will develop knowledge and skills in formulating effective questions to answer with data, computer programming, data management and wrangling, exploratory data analysis and visualization, statistical inference and prediction, data-driven decision making, and communication. Students will also learn professional skills to work with different organizations across the state.

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

- Apply multiple data analysis tools, including visualization, to describe a dataset.
- Define a problem statement given a dataset and constraints.
- Apply multiple data analysis tools to make inferences and predictions based on a given dataset that addresses a problem statement.
- Analyze the results of multiple data analysis tools critically.
- Identify strategies for solving data science problems with the software.
- Communicate with a community partner to define the scope of a project, define a deliverable outcome, find effective solutions to problems and ultimately deliver the outcome to the partner.

Prerequisite: Data I (PSYC/POLS/ECON 199) or [Computer Programing (EECS 138) and Intro Statistics (PSYC 210; MATH 365 ECON 426; POLS 306; SOC 380)]; Data 2 (PSYC/POLS/ECON 399); College Algebra (MATH 101 or MATH 104); Per departmental approval

2.2 Textbook

No Textbook required.
The instructor may provide readings through Canvas.

Reference Textbook *An Introduction to Statistical Learning.* Gareth James, Daniela witten, Trevor Hastie, and Robert Tibshirani. Second Edition.

A pdf of *An Introduction to Statistical Learning* is provided on Canvas as are supporting materials for the labs included in the textbook chapters.

2.3 Technology

We will use computational and statistical programming during this class. We will base our textbook lab demonstrations in Python and R, but you can also use Stata, Matlab, or other (even Excel if you are feeling adventurous!) for the workshops and the final data project.

3 Assignments

Progress Reports: 600 points. There will be three equally spaced progress reports throughout the semester. Rubrics for each will be provided in class. The reports will help scaffold the final data project and the deliverable for the community partner. The three progress reports are described below:

Progress Report 1 (200 points): this progress report will provide a description of the dataset used, the question to be answered, and how variables of the dataset address pieces of the question. Note any relevant background research that has been done and any background research that still needs to be done. Estimated length: 2-3 pages.

Progress Report 2 (200 points): this progress report will provide a description of the code created. The report should address code developed for visualization, descriptive analysis, and statistical analysis. It should detail any additional coding work that is yet to be done.

Progress Report 3 (200 points): this progress report will provide a description of the analysis and insights obtained with the data. The report should address how these results are actionable for the community partner.

Final Data Project: 300 points. Information about writing the final paper will be given in the course. The final paper will describe all parts of the research project. It will include a separate summary of the entire project (abstract), followed by an introduction, data section, result section, and conclusions. The length of the paper will be 4000-5000 words.

The paper will be prepared in the software of your choice. Good options would be Microsoft Word, a data analysis software like RMarkdown or Stata's dyndoc, or script editing software such as LaTeX. References should be in APA format.

Final Presentation: 100 points. The presentations will take place in Week 15. These will include one in-class presentation and one presentation/poster session at the KDSC Annual Workshop. A presentation rubric will be provided in the course.

3.1 Grades

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.

3.2 Grading Scale

points	percent	letter grade
900 – 1,000 points	90-100	A
800 – 899 points	80-89	B
700 – 799 points	70-79	C
600 – 699 points	60-69	D
0 - 599 points	<59	F

4 Attendance Policy

Class attendance, whether in the classroom or in a remote environment, is vital to your academic success. You are expected to attend each class session. If you consistently miss class, it will adversely affect your grade. If you miss more than three class periods, your grade is reduced by five percentage points. Each additional absence will lower your grade by an additional percentage point.

Some other important policies to note:

- Attendance is expected. However, sometimes missing class is unavoidable. Students are responsible for obtaining missed lecture notes from their classmates. I expect that you arrive to class on time and not depart early. I also request that all cell phones and pagers are turned off for the duration of the class.
- Any student with a disability that may preclude full course participation should contact the instructor in order to discuss accommodations.
- Any student who plans to observe a religious holiday that conflicts in any way with this course should contact the instructor in order to discuss accommodations.

5 Academic Misconduct

The University community traditionally has been a place where all members are free to express and exchange ideas. Such fundamental goals of the University as intellectual growth and development

are predicated on honest investigation, straightforward expression of views and opinions, and genuine dialogue. The attainment of these goals requires that all who participate in the exchange of ideas maintain intellectual integrity. The University of Kansas seeks to ensure that both the professor and the student are protected from unfair actions or accusations in cases of cheating and plagiarism. The University encourages faculty and students to adopt a responsible attitude toward one another.

Academic misconduct includes but is not confined to plagiarizing; cheating on assignment and assessments; turning in counterfeit reports, tests, and papers; stealing tests and other academic material; knowingly falsifying academic records or documents; and turning in the same work to more than one class. Students and faculty alike must recognize that none of the procedures set forth in this document operate to the exclusion of civil or criminal litigation. Likewise, no definitions in this document supersede any parties concerned to resolve the contested issues without the necessity for recourse to the law in a manner that protects the rights of the individuals involved.

Consequences of academic misconduct may include, but are not limited to, a failing grade for an assignment, a failing grade for a course, or expulsion from the University. Any form of academic misconduct which results in administrative or academic withdrawal is noted on the student's transcript.

Collaboration Policy: Discussion and the exchange of ideas are essential to academic work. You are encouraged to study with your classmates. However, you should ensure that any work you submit for evaluation is the result of your own efforts and that it reflects your own ability. You must also adhere to standard citation practices and properly cite any books, articles, websites, lectures, etc. that have helped you with your work (for instance, if you used something besides course materials to complete a homework assignment). If you received any help with your work (e.g., tutoring or feedback from someone besides the professor), you must also acknowledge this assistance.

6 Instructor's Expectations

Late work: Late homework can be made up by turning in an assignment one week later with a deduction of one letter grade from the total points of the assignment.

Missed work: Homework assignments that are missed due to illness, family emergency, or university-sponsored event can be made up one week later with no deduction of points. Please alert the instructor well in advance if travel conflicts with class. If you do not provide one of these two excuses in advance of the class period, the late work penalty will apply.

Classroom management: This course is run with expectations of professional conduct. If at any time, the instructor deems that a student is not comporting him or herself in this manner, the student will be asked to leave the class for that day and will be marked absent for the time away from class.

7 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.

8 ADA Statement

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.

9 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.

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.

11 Course Schedule

NOTE: the course schedule is subject to change to accommodate course content and progress on community partner projects.

Day	Concept/Activity	Project Timeline
Week 1		
Tuesday	Introduction and Syllabus	
Thursday	Project overview	Prepare to work with community partners
Week 2		
Tuesday	Data Management	
Thursday	Data Visualization	Finalize project selection
Week 3		
Tuesday	Case Study 1	
Thursday	Case Study 1	Clearly define project
Week 4		
Tuesday	Verbal Reports	
Thursday	Verbal Reports	Describe dataset and project
(Due Tuesday)	**Progress Report 1**	
Week 5		
Tuesday	Case Study 2	
Thursday	Case Study 2	Complete data wrangling
Week 6		
Tuesday	Case Study 3	
Thursday	Case Study 3	
Week 7		
Tuesday	Case Study 4	
Thursday	Case Study 4	Complete data exploration
Week 8		
Tuesday	Verbal Reports	
Thursday	Verbal Reports	Describe code
(Due Friday)	**Progress Report 2**	

Day	**Concept/Activity**	Project Timeline
Week 9	SPRING BREAK	
Week 10		
Tuesday	Case Study 5	
Thursday	Case Study 5	
Week 11		
Tuesday	Case Study 6	
Thursday	Case Study 6	
Week 12		
Tuesday	Case Study 7	
Thursday	Case Study 7	
Week 13		
Tuesday	Case Study 8	
Thursday	Case Study 8	Finalize model, analyses, and plots
Week 14		
Tuesday	Workshop Days	
Thursday	Workshop Days	Presentation and report preparation
(Due Tuesday)	**Progress Report 3**	Analysis and conclusions
Week 15		
Tuesday	In-Class Presentations	
Thursday	In-Class Presentations	Present to community partner at KDSC Annual Workshop (April 26th)
Week 16		
Tuesday	Paper Writing	
Thursday	Paper Writing	
Finals Week		
May 6th	**Final Paper Due**	