CSC196 Analyzing Data

Mon / Wed : 12:30 – 1:45pm : The Commons Room 105

Course Description

This course provides a rigorous yet accessible introduction to the fundamental concepts of probability and statistics, equipping students with the tools to analyze and interpret data and to reason about uncertainty. Topics include probability rules and counting methods, discrete and continuous random variables, expectation and variance, sampling distributions, and the Central Limit Theorem. Statistical topics cover descriptive statistics, estimation, confidence intervals, correlation, and hypothesis testing. Throughout the course, students will apply theory to real-world problems using analytical methods and computational tools. By the end of the term, students will be able to design basic experiments, interpret data responsibly, and make informed decisions based on probabilistic reasoning.

Instructor and Contact Information

Instructor: Jason Pacheco, Gould-Simpson Room 707, pachecoj@arizona.edu

Instructor: Cesim Erten, Gould-Simpson Room 845, cesim@arizona.edu

Teaching assistant: Alonso Granados Baca, alonsog@arizona.edu

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Course Webpage: http://pachecoj.com/courses/csc196_spring26/

D2L: https://d2l.arizona.edu/d2l/home/1719690

Piazza: https://piazza.com/arizona/spring2026/csc196

Gradescope: https://www.gradescope.com/courses/1213413

Course Format and Teaching Methods

The course will consist of regular in-person lectures. In-class discussion as well as Q&A is encouraged.

Course Objectives

The broad objectives of this course are to develop a solid fundamental understanding of probability and statistics and learn how to apply them to a diverse set of problems. By the end of this course students will be able to: understand and use probabilistic reasoning, work with random variables and distributions, summarize and visualize data, apply foundational statistical inference methods, understand variability and uncertainty, connect probability models to real-world data, and use computational tools in Python.

Topics Covered

Introductory to Probability
- Introductory Statistics and Data Analysis
- Probability
- Random Variables and Probability Distributions
- Mathematical Expectation
- Some Discrete Probability Distributions

Continuous Probability
- Concepts of Calculus
- Introduction to Continuous Probability
- Some Continuous Probability Distributions

Statistics

Functions of Random Variables
Fundamental Sampling Distributions
One- and Two- Sample Estimation
One- and Two- Sample Hypothesis Testing
Bayesian Statistics

Expected Learning Outcomes

Students who successfully complete this class will gain knowledge in:

- The foundations of probability and statistics, including core probability rules, counting methods, discrete and continuous random variables, and moments of a distribution.
- Practical data skills and the ability to perform computations in Python using various packages such as Numpy, Scipy, and Matplotlib.
- Critical thinking involved in interpreting uncertainty and variability in real-world contexts, distinguishing between association and causation, and making informed data-driven decisions.

Makeup Policy for Students Who Register Late

Students must complete assignments on time. No makeup opportunity will be offered for students. Late registrants to the course will receive a zero grade for any missed assignments.

Course Communications

All course communications will be conducted via Piazza. Assignments will be submitted via Gradescope and feedback will be provided on that platform.

Required Texts or Readings

This class will select reading material from the following textbook:

Walpole et al. "Probability and Statistics for Engineers and Scientists, 9th Ed." Pearson. 2011.

Assignments and Examinations: Schedule/Due Dates

- *HW1 : Out 1/21 : Due 1/28 : Introduction to Statistics*
- *HW2 : Out 1/28 : Due 2/04 : Probability*
- *HW3 : Out 2/04 : Due 2/11 : Random Variables*
- *HW4 : Out 2/11 : Due 2/18 : Mathematical Expectation*
- *Midterm 1 : 2/23*
- *HW5 : Out 2/25 : Due 3/04 : Discrete Probability*
- *HW6 : Out 3/16 : Due 3/23 : Continuous Probability*
- *HW7 : Out 3/23 : Due 3/30 : Functions of Random Variables*
- *HW8 : Out 3/30 : Due 4/06 : Fundamental Sampling Distributions*
- *Midterm 2 : 4/13*
- *HW9 : Out 4/15 : Due 4/22 : One- and Two- Sample Tests*
- *HW10 : Out 4/22 : Due 4/29 : Bayesian Statistics*
- *HW11 : Out 4/29 : Due 5/06 : TBD*

Regrade requests must be made within 1 week of the date that the assignment was graded. Note that this is a tentative schedule and it may be adjusted based on instructors' discretion.

Final Examination

*The final exam will be held **Wed. 5/13 at 10:30am – 12:30pm** in the regular classroom.*

Regulations and final exam scheduling can be found here: https://registrar.arizona.edu/faculty-staff-resources/room-class-scheduling/schedule-classes/final-exams

Grading Scale and Policies

Assignment grading. Assignment deliverables will generally consist of two parts: 1) all code developed in response to the assignments; and 2) a report, in PDF format explaining what has been done, what the results were, commenting on the results, and answering any questions posed in the assignment. The instructor will provide a document that details the expectations of the report. Assignments will be graded with respect to four criteria: 1) reproducibility (the ease by which the grader can run the code to get the reported results); 2) completeness (the extent that the work done and sufficient effort was applied); 3) correctness; and 4) the exposition (clarity, insight, and conformance to the guidelines provided). The weight of these four criteria will vary among the assignments, but students are advised that the fourth criterion will generally have substantive weight.

Grading breakdown

Assignments: 20%
Quizzes: 15%
Midterm: 30%
Final Exam: 35%

90% guarantees an A, 80% guarantees a B, 70% a C, and 60% a D.

Incomplete (I) or Withdrawal (W):

Requests for incomplete (I) or withdrawal (W) must be made in accordance with University policies, which are available at https://catalog.arizona.edu/policy/courses-credit/grading/grading-system.

Dispute of Grade Policy:
Any grading disputes should be communicated to the professor within one week of having received the grade. The professor will announce in class and on Piazza when grading is complete for each assignment. If a student has not received a grade on a submitted assignment it must be communicated to the adviser within one week of this announcement. If no assignment was submitted it will receive a score of zero.

Scheduled Topic and Activities

All assignments, due dates, and readings are available on the course webpage. The following are scheduled topics by week:

Week 1: Course Overview
Week 2: Introduction to Statistics
Week 3: Probability
Week 4: Random Variables and Probability Distributions
Week 5: Mathematical Expectation
Week 6: Some Discrete Probability Distributions
Week 7: Concepts of Calculus
Week 8: Continuous Probability
Week 9: Spring Break
Week 10: Some Continuous Probability Distributions
Week 11: Functions of Random Variables
Week 12: Fundamental Sampling Distributions
Week 13: One- and Two-Sample Estimation
Week 14: One- and Two-Sample Hypothesis Tests
Week 15: Bayesian Statistics
Week 16: TBD
Week 17: Course Wrapup

Note that this is a tentative schedule and it may be adjusted based on instructors' discretion.

Classroom Behavior Policy

To foster a positive learning environment, students and instructors have a shared responsibility. We want a safe, welcoming, and inclusive environment where all of us feel comfortable with each other and where we can challenge ourselves to succeed. To that end, our focus is on the tasks at hand and not on extraneous activities (e.g., texting, chatting, reading a newspaper, making phone calls, web surfing, etc.).

Students are asked to refrain from disruptive conversations with people sitting around them during lecture. Students observed engaging in disruptive activity will be asked to cease this behavior. Those who continue to disrupt the class will be asked to leave lecture or discussion and may be reported to the Dean of Students.

Safety on Campus and in the Classroom

For a list of emergency procedures for all types of incidents, please visit the website of the Critical Incident Response Team (CIRT): https://cirt.arizona.edu/case-emergency/overview

Also watch the video available at

https://arizona.sabacloud.com/Saba/Web_spf/NA7P1PRD161/app/me/ledetail;spf-url=common%2Flearningeventdetail%2Fcrtfy000000000003841

University-wide Policies link

Links to the following UA policies are provided here: https://catalog.arizona.edu/syllabus-policies

- Absence and Class Participation Policies
- Threatening Behavior Policy
- Accessibility and Accommodations Policy
- Code of Academic Integrity
- Nondiscrimination and Anti-Harassment Policy
- Class Recordings
- Additional Resources
- Preferred Names and Pronouns

Department-wide Syllabus Policies and Resources link

Links to the following departmental syllabus policies and resources are provided here, https://www.cs.arizona.edu/cs-course-syllabus-policies :

- Department Code of Conduct
- Illnesses and Emergencies
- Obtaining Help
- Confidentiality of Student Records
- Land Acknowledgement Statement

Subject to Change Statement

Information contained in the course syllabus, other than the grade and absence policy, may be subject to change with advance notice, as deemed appropriate by the instructor.