

CS 533 – Fall 2020

Experimental Methods in Computer Science

MWF – 11 AM to 11:50 AM (Remote Scheduled via Zoom)

Please access UNM Learn for Zoom information regarding online lectures and open question time (office hours)

Course Description

This course explores the design, experimentation, testing, and pitfalls of empirical research in Computer Science. In particular, students will learn how to use a data-driven approach to understand computing phenomena, formulate hypotheses, design computing experiments to test and validate or refute said hypotheses, evaluate and interpret empirical results. Overall, the goal of this course is to provide the students with the foundations of rigorous empirical research.

Course Number: CS 533 001

Course Credits: 3

Course Modality: Remote Scheduled (online meetings on MWF 11-11:50 AM via Zoom)

Instructor: Prof. Bruna Jacobson
Assistant Professor
Email: bjacobson@unm.edu

Open question time (office hours):

Open question time via Zoom

Tuesday 4:00 PM – 5:00PM

Friday 9:00 AM – 10:00 AM

Or by appointment (email me)

Policies and Notices

COVID-19 Information:

Due to the COVID-19 pandemic, UNM and the School of Engineering will require students, staff, and faculty to follow all health guidelines of the New Mexico Department of Health. Specifically, students, faculty and staff will adhere to social distancing guidelines, will wear masks in all

buildings on campus (students are expected to provide their own masks), will maintain a distance of at least six feet from others, and will wash their hands frequently when on campus. To ensure social distancing, classes and laboratories that have enrollments larger than a third of the capacity of the scheduled classroom will be offered in a Face-to-Face + Remote Scheduled format. This will require that students attend class on campus only on certain days, watching the class live via the internet on other days. Your instructor will assign you to specific days to attend on campus – if you have a special need regarding timing, contact your instructor for an accommodation. If you have an underlying health condition that will preclude you from coming to campus, take care of a family member with an underlying condition, or simply do not feel comfortable coming to campus, you can attend remotely; please contact your instructor to make arrangements for this. It is possible that sometime during this semester the pandemic may worsen; if this happens it may be necessary to close campus and transition all classes to a remote delivery.

ADA

In accordance with University Policy 2310 and the Americans with Disabilities Act (ADA), academic accommodations may be made for any student who notifies the instructor of the need for an accommodation. If you have a disability, either permanent or temporary, contact Accessibility Resource Center at 277-3506 for additional information. Please discuss ADA accommodations with Prof. Jacobson at the beginning of the course.

Title IX Statement

A Note About Sexual Violence and Sexual Misconduct: As a UNM faculty member, I am required to inform the Title IX Coordinator at the Office of Equal Opportunity (oeo.unm.edu) of any report I receive of gender discrimination which includes sexual harassment, sexual misconduct, and/or sexual violence. You can read the full campus policy regarding sexual misconduct at <https://policy.unm.edu/universitypolicies/2000/2740.html>. If you have experienced sexual violence or sexual misconduct, please ask a faculty or staff member for help or contact the LoboRESPECT Advocacy Center.

Academic honesty

Unless otherwise specified, you must write/code your own homework assignments. You cannot use the web to find answers to any assignment. If you do not have time to complete an assignment, it is better to submit your partial solutions than to get answers from someone else. Cheating students will be prosecuted according to University guidelines. Students should get acquainted with their rights and responsibilities as explained in the Student Code of Conduct <http://dos.unm.edu/student-conduct/academic-integrityhonesty.html>

Any and all acts of plagiarism will result, at the sole discretion of the instructor, in an immediate dismissal from the course and an official report to the dean of students.

Instances of plagiarism include, but are not limited to: downloading code and snippets from the Internet without explicit permission from the instructor and/or without proper acknowledgment, citation, or license use; using code from a classmate or any other past or present student; quoting text directly or slightly paraphrasing from a source without proper reference; any other act of copying material and trying to make it look like it is yours. Note that dismissal from the class means that the student will be dropped with an F from the course.

The best way of avoiding plagiarism is to start your assignments early. Whenever you feel like you cannot keep up with the course material, your instructor is happy to find a way to help you. Make an appointment or come to office hours, but DO NOT plagiarize; it is not worth it! It hurts the other students and yourself in the long run.

FERPA notice

In order to comply with the Family Educational Rights and Privacy Act of 1974 (FERPA), UNM students must correspond with me using their UNM email account and/or the communication feature of our class learning management system (for example UNMLearn). To protect student privacy, I cannot respond with any information contained in educational records from emails received from non-UNM accounts. For information on FERPA, please visit <http://ed.gov/policy/gen/guid/fpco/ferpa/students.html>.

Respect the UNM Community by Preserving Health:

You have the ability to prevent the spread of COVID-19 and to preserve the health of fellow students, your instructor, staff and the community by following UNM health protocols. The UNM Provost Administrative Directive on Mandatory Student Face Covering and Symptom Reporting of July 9, 2020 requires that all students on UNM-Main and UNM branch campuses wear face masks in the face-to-face classroom and on campus unless they have a specific mask accommodation (confidentially documented with the Accessibility Resource Center). UNM Provost Administrative Directive is consistent with Governor Lujan Grisham's Public Health Emergency Order, as amended, and the Public Health Order of the New Mexico Health Secretary. It also requires daily participation in symptom screening through covidscreen, which will be sent via UNM e-mail.

Acceptable masks and mask wearing in class: A two-layer mask that covers the nose and mouth and that is cleaned regularly is acceptable. A face shield is not sufficient protection. It is vital that you wear your mask correctly, covering your nose and mouth. Removing your mask for an

extended period to eat or drink in class violates the Provost Administrative Directive and endangers others.

Mask Wearing Accommodation: Individuals with a documented disability or diagnosis may seek accommodation with the UNM Accessibility Resource Center (ARC) (arc.unm.edu). Individuals do not need to reveal private information to an instructor. ARC will require documentation of health requirements, which will be kept confidential. The instructor will be informed only of any need for accommodation.

Consequences of not wearing a mask properly: Unless you have an ARC-approved accommodation, if you don't wear a mask, or if you do not wear a mask properly by covering your nose and mouth, you will be asked to leave class. If you fail to wear a mask properly on more than one occasions, you can expect to be dropped from the class. If you insist on remaining in the classroom while not wearing a mask (without an ARC-determined accommodation), class will be dismissed for the day to protect others and you will be dropped from the class immediately.

Course Information

Lectures: CS 533 will be offered in a Remote Scheduled mode. This means that there will be no on-campus meetings and students will attend lectures online during the entirety of the Fall semester.

Lectures meet via Zoom at the scheduled lecture time (MWF 11AM), in a live (synchronous) format.

Lectures will be recorded and posted on UNM Learn. Your audio/video may be recorded during lecture.

Students are required to attend lectures at the scheduled time (see *Participation* below).

Students need to login to the Zoom lecture using their UNM credentials. Use of audio/video is not required but encouraged.

Asking questions via audio is the preferred method, as the chat may not be visible to me during a lecture. Students should feel free to interrupt at any time, as I may not be able to see the "raised hand" symbol on Zoom during lecture.

Textbooks: Lectures will be based on the optional textbooks:

- All of Statistics – A Concise Course in Statistical Inference, by Larry Wasserman.
- Empirical Methods for Artificial Intelligence, by Paul Cohen.
- A Guide to Experimental Algorithmics, by Catherine C. McGeoch

Lecture notes and slides will be made available on UNM Learn.

Course Requirements

Participation: Participation counts for 10% of the grade. Participation includes attendance, asking questions, answering questions and Zoom polls when prompted, participating in in-class discussions, and posting on the UNM Learn discussion board. **I expect that all students will post at least semi-regularly in the discussion board.** Attending open question time (office hour) is not required, but may count towards your participation score at my discretion.

Attendance is required and will be taken at the beginning of a Zoom session. If you have software/network problems and cannot login to the Zoom session on a given day, please let me know ASAP.

Projects: Projects consist in a programming exercise to apply concepts learned in the classroom. Projects should also contain a two-page, two-column (maximum) explanation of your approach to solving the problem. This explanation must contain an **introduction, motivation, methods, results, and conclusion sections**. All references used must be included. A project template is provided on UNM Learn. All sections must be clearly written and complete to receive full credit. Projects are more open-ended and more demanding than problem sets, and will have longer due dates. Projects are not designed to be completed in one day, so please plan accordingly, as **late projects will not be accepted. The final project may also include an online presentation with slides during the last week of classes.**

Homework assignments consist of Problem Sets and Essays

Problem sets: A PDF containing a list of homework problems related to topics studied in class will be assigned on a regular basis. Due dates will be listed on each problem set.

Essays: Essays are a critical review of assigned reading (usually research papers or news articles). Essays must be a maximum of 400 words, double spaced, 12pt font, and are due one week after assignment unless otherwise noted.

Quizzes: Quizzes will be assigned via UNM Learn and are due 48h after announcement of a quiz in class and/or via email, unless otherwise noted.

Turning in assignments:

- Unless otherwise noted, all assignments (projects, homework, and quizzes) must be turned in by 11:59 PM on the due date via UNM Learn.
- It is your responsibility to turn in all assignments on time. Late assignments will not be accepted.
- Partially completed assignments will be accepted and may be awarded partial credit if you were on the right track. If you have an excusable health reason for a late assignment, let me know.
- Problem sets may be assigned in parallel with a project and quizzes. Please start assignments early to make sure you can finish all assignments on time.
- There are two ways you can submit your problem sets:
 - typed in a MSWord (.xdoc) or a pdf generated from a Latex file,
 - or submit your handwritten solutions as a photo (.jpg, .png, etc) or a scanned pdf. If you do not have access to a digital camera or a scanner, let me know.
- All students are expected to submit their own work. You may work and discuss assignments with your classmates, but each student must submit their own assignments. (see *Academic Honesty* above)

Grading:

Projects 40%
Homework 30%
Quizzes 20%
Participation 10%

Important: **There will be no midterm and final exams.** A final project will be assigned in the second half of the semester and will be due on the last week of classes (11/30 – 12/4).

Grades will be rounded up to the next integer and letter grades will be given as:

A	A-	B+	B	B-	C	F
> 94	[91,94]	[87,90]	[83,86]	[79,82]	[75,78]	< 75

Course Schedule

This course is divided into two main thrusts: (1) Statistics and data analysis, and (2) Experimental Design and Modeling. During first half of the course, we will revise probability and study some concepts in statistics, with a focus on determining confidence intervals, parameter estimation, hypothesis testing, and nonparametric tests (thrust 1). Starting in mid to late October, we will cover topics more specific to computer science and computational science, such as performance assessment, experimental algorithmics, and design of computer experiments, applying concepts learned in the first half of the course (thrust 2).

Schedule for Fall 2020*:

Weeks (estimated)	Topic
1	Experimental Methods in CS / Scientific Method
2 – 3	Exploratory Data Analysis / Random Data (Project 1 assignment)
4 – 5	Probability / Nonparametric tests (Project 2 assignment)
6 – 7	Parametric Inference / Hypothesis tests
8 – 9	Statistical Models and Methods (Project 3 assignment)
10	Simulation Modeling and Design
11	Introduction to Experimental Algorithmics (Project 4 assignment)
12 – 13	Measuring Performance
14	Designing Experiments in Human-Computer Interaction
15	Final Project Presentation, project 4 due

**This Schedule of Activities is subject to change. Minor changes will be announced in class, major ones provided in writing via email and UNM Learn Announcements.*