

Syllabus for Stats 485 (Capstone Seminar) University of Michigan, Fall 2023

A seminar to solidify your grasp of core statistical models, and to train you to answer empirical questions using models of data. You'll learn to select, critique and adapt statistical models, and to write about each step of this process, through a sequence of substantial modeling and reporting exercises. The course satisfies LSA's Upper-Level Writing Requirement (ULWR).

Course Structure

1. Introduction: It's less binary than it seems. Weeks 1-3.
2. Statisticians' stock-in-trade: Regression and its generalizations. Weeks 3-13. Chapters 1–11 of Advanced Data Analysis from an Elementary Point of View ("ADAEPV") by C. Shalizi (2019).
3. Additional trade secrets: Missingness, multiplicity and measurement. Weeks 13-15. ADAEPV and additional assigned readings.

Texts. Readings will be assigned prior to most class meetings. Most readings will be posted as PDFs on the course Perusall site, which you can navigate to from the course Canvas site; this includes selections from ADAEPV.

Instructors. Ben Hansen (bbh@umich.edu) Associate Professor of Statistics; Aaron Abkemeier (aaronabk@umich.edu) and Yash Patel (yppatel@umich.edu), PhD students in Statistics. (To email all of the instructors at once, use stats485GSIs@umich.edu.)

Course Logistics

Weekly assignments. A paper or problem set is due most Friday afternoons, with submission through Canvas (where in many cases you'll be redirected to gradescope.com).

Papers contribute the larger share of your grade (see below). You'll write one 6–8 page paper for each unit of the course. Each of these will be submitted twice, the second time after the student has received comments on her initial submission. Each student will also write several memos commenting on other students' papers.

Papers are graded according to rubrics based on the paper prompt. Grading rubrics represent a sample of aspects of the prompt. The sample of aspects of the prompt that we select for emphasis on the grading rubric isn't fully selected until after the paper is due, so we won't be able to share it with you in advance of your writing your paper. If this leaves you wondering what you'll be graded on, reread the prompt. Non-native English speakers should be assured that these rubrics are designed to reward clear, informative writing about well-executed statistical analyses, whether or not the writer shows mastery with English idioms.

The initial submission of each 6–8 page paper should be a polished document, not a draft. Accordingly its contribution to your grade is not overridden by your grade on the second submission. Second submissions are expected to revise initial submissions substantially, responding to comments you will have received on your first submission as well as additional requirements that may have been added to the prompt.

When working on problem sets or data analyses contributing to a paper, you may discuss and share work freely with other currently enrolled students. On the other hand, everything you submit on papers, problem sets, peer reviews and technical appendices must be written in in your words and your words only. Please write out your own problem sets and technical appendices. Papers and memoranda especially must be written in your own words.

You may miss up to one (1) problem set without penalty, with no need for an excuse. Extensions of up to 24 hours may be granted when students have other conflicting obligations. Send extension requests to stats485GSIs@umich.edu. Unless your need for an extension arose suddenly, file your request by close of business¹ the day before the due date. Late submissions without an extension are not ordinarily accepted.

Small group assignments. Students are placed into randomly assigned groups 4 times per semester. You'll be asked to sit with your group, work on in-class problems with your group, and discuss readings and

¹That is, the end of the business day. In most workplaces this means 5pm local time, but in this course we take it as 6 Eastern Standard Time.

problems within your assigned group. You'll be able to coordinate within your group on Perusall and on Piazza.

If there's another student in the class whom you've had a prior conflict with, use this form to request that they not be put with you the next time groups are shuffled. Groups are re-set at the beginning of each unit and in the middle of unit 2.

Class preparation and in-class assignments. For most class meetings you'll be asked to do a reading assignment in advance; this work contributes to the Participation component of your grade. Most will be posted to Perusall, where you can post comments and questions as you read that will be visible to other students in the class; Perusall will assign you a 0-2 point score, posted to the Perusall site but not to Canvas, based on its assessment of your comments, your engagement with the readings, and your engagement with other students' comments.

Usually your posts are visible not to the whole class but to your current randomly assigned group of a handful of other students. Coordinate with your group-mates to promote your responsiveness to one another's posts, for example by reading around the same time and by agreeing to pose and answer both easy and hard questions about the reading; as long as your exchange is on-topic and in your own voice (not Wikipedia's or a chatbot's), this will help your Perusall score. Good posts come in several flavors, with some articulating connections to topics discussed in class, in other readings, in homework or in paper assignments; others addressing reading comprehension questions that may have been posted with the assignment; and still others raising or addressing new questions. Aim for 0-3 posts per assignment, roughly 1-5 per week. If you find that your group-mates are silent on a Perusall question or comment of yours that you'd like to discuss, don't hesitate to bring it along to an office hour for discussion there, either with an instructor or another student. Skim the reading assignment the day it's posted or shortly afterwards, to appraise how much time you should set aside for it (and enable coordination with group-mates you may be reading with).

We'll break out into small groups during most class meetings. Students are expected to work on in-class problems within their assigned groups, submitting answers, or notes toward answers, over Gradescope² by the end of class. These submissions also contribute to the Participation component of your grade. Usually you'll be invited to submit jointly with other members of your group; in these cases, you can collaborate on the same submission and have only one of you submit it, provided that on submission that person indicates the names of everyone in your group who contributed to it. It's never permissible to include on your submission the name of a group member who didn't come to class. You're always free to submit on your own, without naming other group members on the submission.

As with Perusall assignments, classwork is scored on a 0-2 scale. For class meetings with both a Perusall class prep assignment and an in-class assignment, your participation score is $\max(\text{prep}, \min(\text{prep}, 1) + \min(\text{inclass}, 1))$. (Most students will more easily score a 2 by doing both class prep and classwork, but if you can't come to class it's still possible to receive a 2. When there is classwork but not a preparatory assignment on Perusall, your participation score is your classwork score.)

You're counted as having attended on a given day if you used the iClicker Cloud app to check in near the beginning of class, *and* you submitted classwork on that day. Each student is granted up to 3 absences without penalty. Please use these carefully, as the allowance is meant to include funerals, brief hospital stays and other unexpected reasons you may have to be away. (Additional excused absences will be considered only if you experience several such events, and can document them.)

Scheduled instructor meetings. Students will submit paper revisions three times over the course of the term. Each student should meet with an instructor to discuss their revisions of either the unit 1 paper or the unit 2 paper (or both). In weeks when students will be revising papers, GSIs will make appointments available for private meetings, with advance signup through Canvas. In these weeks, GSI office hours (including the additional instructor office hour) will be canceled. Unless an instructor invites you personally to sign up of several slots, please sign up for no more than one of these meetings per revision opportunity.

Electronic device policy. *Use of laptops is forbidden in class meetings.* It's also forbidden to use a tablet with a keyboard. Instead, take notes on paper, or (perhaps) using a tablet-form device with a stylus. Please refrain from use of electronic devices for matters not relating to the course. You may quietly excuse yourself at any time and for any reason, without reason or prior notification of an instructor; use this policy if during class you receive an electronic communication that you need to respond to.

²As a PDF upload. Use the Gradescope mobile app if you can. (If you have an older smartphone or tablet, you'll need to set up a third-party scanning app and upload using the Gradescope website: please refer to Gradescope's tutorial.)

Weekly office hours.

- GSI office hours
 - Wednesdays 4-5:30pm, with Yash Patel. Room G219 Angell Hall.
 - Thursdays 12:30-2pm, with Aaron Abkemeier. Room G219 Angell Hall.
 - Thursdays 5:15–6:30pm, with Prof. Hansen (at beginning) and either Aaron or Yash (5:30-6:30). Room 438 West Hall.

These GSI office hours do not apply during weeks when students are revising papers; instead, the GSIs have individual or small group meetings, by appointment. See Scheduled instructor meetings, below.

- Professor's office hours:
 - Mondays 4:30-5:20, via Zoom;
 - Mondays and Wednesdays from a few minutes after the end of class until the last question is answered, or 1:05pm (whichever's sooner). In the hallway just outside of class. (But **not** right at 12:50pm, and **not** at the podium — two minutes later, outside in the hall!)
 - Thursdays 5:15–5:45, Room 438 West Hall.

The Thursday evening office hour is staffed jointly by Prof. Hansen and a GSI.

Additional course policies

Exams. The course has no examinations.

Grading.

- Papers (20% * 3)
- Short writeups, including peer reviews and technical appendices (3% * 6)
- Problem sets (15%)
- Attendance, classwork and class prep (5%)
- Participation quality, as assessed by instructors (5%)

In assessing your participation quality, we'll focus on your contributions on Piazza, in office hours, in class and on Perusall, but also consider other aspects. Students who are found to have submitted work that is not original to them, or who were unable to satisfactorily explain apparently unoriginal work submissions and did not otherwise participate in a high-quality manner, will be penalized on participation quality. Students who score systematically higher on homework questions that were asked in prior semesters than on newer questions may also be marked down for participation quality. On the other hand, exemplary contributions to Piazza, in office hours, in class *or* on Perusall will earn you high marks for participation quality; it is not necessary to excel simultaneously in all of these categories.

We use conventional cutpoints to convert the weighted percentage scores into grades, i.e. 80%=B-, 83%=B, etc; there is no curve.

Classroom culture of care. All class participants are expected to observe the Wolverine Culture of Care, and to adhere to all safety measures required by the State or University of Michigan.

Student well-being. Student life can be stressful. Sources of stress may include relationships, alcohol or drug use, matters of personal identity, finances, balancing academic and other commitments, and more. If you're finding it difficult to manage these or other concerns, don't hesitate to reach out for help. Course instructors are available for consultations to help manage stressors associating directly with this class. We're also willing to discuss more personal concerns, but in these cases we'll urge you also to explore the many resources the University offers for student well-being.