

STAT 143 – Intro to Probability and Statistics

Course Description

Welcome to this introductory course in statistics. Statistics is “the science and art of obtaining, analyzing and interpreting data for the purpose of reaching conclusions” (Urquhart, 1971). The course is organized around 8 modules, with these themes:

1. Introduction to data and statistical software
2. Normal distributions, sampling distributions, and the Central Limit Theorem
3. Bootstrapping for confidence intervals.
4. Randomization for hypothesis testing.
5. Inference on means and proportions using standard error formulas.
6. Hypothesis tests for non-binary categorical data: the chi-square statistic.
7. 1-way ANOVA: the F-statistic
8. Simple linear regression
9. Multiple regression (possibly, if there is time)

Course Objectives

Upon successful completion of this course, students will be able to:

- Identify situations appropriate to various kinds of studies (controlled randomized experiments, observational studies, or surveys), and describe features inherent to well-designed studies of these types.
- Organize, display, and summarize categorical and quantitative data.
- Construct confidence intervals and carry out hypothesis tests from samples drawn from a population, giving accurate interpretations of the results.
- Understand the role of statistics in the pursuit of truth, and be able to identify misuses which, either accidentally or intentionally, can hide that truth.
- Use technology, as appropriate, for the outcomes listed above.

Required Textbook and Resources

[Statistics: Unlocking the Power of Data](#), 1st (2013) edition, by Lock, Lock, Lock, Lock and Lock.

This will be used for supplemental reading and homework problems. So, while the 2nd (2017) edition is perfectly fine for the readings, you will want the 1st edition so you are doing the correct problems.

[How Not to Be Wrong: The Power of Mathematical Thinking](#), by Jordan Ellenberg.

This book will help provide context for some of the work we do.

You will need reliable internet service, a computer with HD (facetime) camera, microphone and speakers, a web browser, and (likely) a smart phone or handheld digital camera. You must have regular access to email.

Course Assessments

Discussion Forums

You have been assigned to a 3- or 4-member discussion group. Each day you are expected to check the website Group Discussion forum. You should

- read and respond to new discussion topics.
- read postings from your fellow discussion group members and respond to their ideas.
- provide responses to questions asked of you about ideas and lines of thought you have proposed.

A considered response may be better than a quick one, but part of the grading for this will be based on you making timely posts. Stay tuned in, respond to your group respectfully, don't grandstand or be excessively verbose (emphasize quality over quantity); just contribute meaningfully in a way that helps bring your classmates and you to a fuller understanding of the material.

Homework

Homework is assigned regularly in this course. In your writeups, provide rationale (reasoning, calculations, software output/graphs) for your conclusions. You are welcome to discuss problems in class forums, but your writeup needs to be in your own words. I appreciate **typed solutions** to exercises, which will be the easiest way to include results from software; whether typed or handwritten, your work must be submitted as a single .pdf document (scan or convert to this format as needed) to gradescope.com by 10 pm on Saturday each week (with a likely exception during Week 8). Submissions will be allowed for up to 48 hours following, at a 25% reduction in score. You will receive an invitation from gradescope.com to establish credentials for logging in and submitting work.

Grade Computation

Your grade will be determined according to the following weights:

Group discussions	8%
Responses to reading questions	8%
Homework	25%
Midterm Wed. July 1, 9 am	25%
Final Fri. July 24, 9 am	34%

Course Contact

The course will be run largely asynchronously, with a new course module opening up in time (but not necessarily early) for the new week. The midterm and final exams are set for 9 am on Wed. June 16 and Fri. July 9, respectively. **I strongly urge you to make arrangements to take them synchronously with the other students at the specified time.** The Respondus Lock-Down browser with monitoring will be used within Moodle. This is an essential tool in an online setting to maintain the integrity of student work during exams. Should you have misgivings, speak with the instructor right away during Week 1.

An informal Microsoft Teams meeting is scheduled for 7:30-9:30 pm EDT Wednesday through Saturday. The purpose is for conversations on class material and/or homework; your attendance is not required. Your professor will generally be in attendance at the Wednesday and Thursday meetings, though often not for the full two hours. If you duck in unannounced you may find no other classmate in attendance, and I encourage you to both read through any topics that have been started already, and start a new topic when your question is not already being addressed. I am available to meet at other times. It is most effective to make arrangements in advance for such meetings, contacting me via email or a chat message in Teams in order to do so.

Many of you have experience some form of asynchronous, online education. More than in traditional classrooms, a student's ability to thrive is tied to participation and self-discipline/motivation. It is worth some consideration, if you haven't reflected on this yet, as to whether you have the commitment, not just at the outset, but through the weeks ahead, even if material becomes quite challenging. Do not arrange life this summer in such a way that you find yourself in a deep hole. Discussion groups should provide some natural accountability, but stay vigilant as to whether you may need to explore a more direct accountability relationship with a classmate.

Institutional Policies

Policies at Calvin offer our students both support and boundaries for wellness and success. These are elaborated on the "Calvin Student Resources and Policies" webpage. You are encouraged to look over these policies, so that you know your responsibilities and rights, whether on campus or online.