

STATS 116 Syllabus

Harrison Li

Stanford University, Summer 2023

Introduction and logistics

Welcome to Stats 116! This is a rigorous first course in probability. Lectures will closely follow the book *Introduction to Probability* by Joe Blitzstein and Jessica Hwang (both with Stanford ties). Since we only have 8 weeks we cannot cover all of it. Joe has made the book freely available to read at <http://probabilitybook.net>.

- Instructor: Harrison Li. Email: hli90722@stanford.edu. **Please use the Ed discussion forum, not email, for course content related questions, for the benefit of your fellow students.**
- Lectures: Monday-Thursday, 10:30 am - 11:20 am, Gates B3
- Sections: Friday 10:30 am - 11:20 am, see location in ExploreCourses
- Office Hours: Wednesday 2:00 pm - 4:00 pm, TBD (Harrison)

Grading

- 45% weekly homework assignments, 15% midterm exam, 40% final exam
- No late homework will be accepted, but the lowest homework score will be dropped
- Homeworks will be due on Thursdays starting July 6 and will cover the material from the preceding week's lectures
- All homeworks must be completed individually, but you may consult TAs and other students for guidance. It is an Honor Code violation to copy other's solutions to any problems.
- The midterm will be 50 minutes, in class, on Thursday, July 20
- The final exam will be 3 hours on XX

This is a challenging course, so exam scores may be lower than you're used to. Do not stress - grading will heavily take this into consideration.

Course outline

The main prerequisites are: Strong comfort with single variable calculus, some comfort with rigorous mathematical argument, a working understanding of partial derivatives and multiple integration, some working familiarity with matrices, and knowledge of the contents of a standard deck of 52 cards. No statistics or probability background is assumed.

A tentative calendar of lecture topics is provided below and subject to change.

| Topic | Dates | Textbook chapters |
|--|------------|-------------------|
| Counting, basic definitions, naive definition of probability | 6/26, 6/27 | 1.3, 1.4 |
| Non-naive definition of probability; inclusion-exclusion | 6/28 | 1.6 |
| Conditional probability: Definition, Bayes' rule, and LOTP | 6/29, 7/3 | 2.1-2.4 |
| Independence and conditional independence | 7/5 | 2.5 |
| Important examples | 7/6 | 2.6, 2.7 |
| Discrete random variables: Distributions, PMFs, and CDFs | 7/10 | 3.1, 3.2, 3.6 |
| Important discrete distributions: Stories and properties | 7/11, 7/12 | 3.3-3.5, 4.3, 4.7 |
| Expectation: Definitions, linearity and LOTUS | 7/13, 7/17 | 4.1, 4.2, 4.5 |
| Indicator random variables and variance | 7/18, 7/19 | 4.4, 4.6 |
| Midterm | 7/20 | |
| Continuous random variables: PDFs and the uniform | 7/24 | 5.1-5.3 |
| Important continuous distributions | 7/25, 7/26 | 5.4-5.5 |
| Joint, marginal, and conditional distributions | 7/27, 7/31 | 7.1-7.2 |
| Covariance and correlation | 8/1 | 7.3 |
| The multinomial distribution | 8/2 | 7.4 |
| Change of variables | 8/3 | 8.1 |
| Conditional expectation: Definitions and properties | 8/7, 8/8 | 9.1-9.3 |
| Laws of total expectation and variance | 8/9, 8/10 | 9.5, 9.6 |
| Important inequalities | 8/14 | 10.1 |
| Law of large numbers, central limit theorem | 8/15, 8/16 | 10.2, 10.3 |
| Review + further directions | 8/17 | |

Honor code

You are free to form study groups for homework. However, you must write up homework from scratch independently, and you must acknowledge in your submission all the students or others you discussed the problems with. You may use the Internet or other public resources to clarify concepts but may not search for direct solutions to any problems assigned for homework or exams.

Accessibility

Stanford is committed to providing equal educational opportunities for disabled students. If you experience disability, please register with the Office of Accessible Education (OAE). Professional staff will evaluate your needs, support appropriate and reasonable accommodations, and prepare an Academic Accommodation Letter for faculty. For more information, please visit oae.stanford.edu. If you already have an Academic Accommodation Letter, we invite you to share your letter with us at the earliest possible opportunity so we can mitigate any barriers to access to inclusion that you might encounter in this course.