STATS 100B

Introduction to Mathematical Statistics

MW, 12:30-1:45 PM, HAINES 39

[Zoom link](#)

Instructor: Jingyi Jessica Li

Email: jli@stat.ucla.edu
WWW: https://ccle.ucla.edu/course/view/22W-STATS100B-3
Office Hours: Tue 9–10 AM
Teaching Assistant: Dongyuan Song
TA Email: dongyuansong@ucla.edu

Discussion Sections:

Section	Day	Discussion Time	Location
3A	Thurs	2:00-2:50 PM	MS 5128
3B	Thurs	3:00-3:50 PM	MS 5128

TA Office Hours: Tue 10–11 AM

*This syllabus is subject to change. Changes, if any, will be announced in class.

Course Description:

STATS 100B focuses on statistical inference, specifically, parameter estimation of various distributions. The problem is stated as follows: Suppose $X_1, X_2, \ldots, X_n$ are i.i.d. random variables from a distribution with pdf $f(x; \theta)$, where θ is unknown. Given an observed sample of $X_1, X_2, \ldots, X_n$, we would like to find an estimate of the parameter θ. We will also discuss topics including properties of estimators, confidence intervals, hypothesis testing, etc. Various distributions, e.g. t, χ^2 and F distributions, will be discussed at the beginning of the course.

Prerequisite(s): STATS 100A, or MATH 170A.

Credit Hours: 4

Textbook (recommended):

Mathematical Statistics and Data Analysis, 3$^{\text{rd}}$ Edition, Duxbury Press, 2006.
Author: John A. Rice; **ISBN:** 0-534-39942-8

Course Topics:

1. STATS 100A quick review — Chapter 1.
2. Simulations: Techniques for simulating continuous random variables — Chapter 2.
3. Moments, and moment generating functions — Chapter 4.
4. Moments of linear combinations of random variables and covariance between two random variables — Chapter 4.
5. Chebyshev's inequality — Chapter 4.
6. The Central Limit Theorem and the Law of Large Numbers. The distributions of the sample mean and the sum of n observations — Chapter 5.
7. The Chi-Square distribution and the distribution of the sample variance. The F and t distributions — Chapter 6.
8. Estimation and properties of estimators. Method of moments and method of maximum likelihood. Cramer-Rao inequality, Rao-Blackwell theorem — Chapter 8.
9. Confidence intervals for means and proportions — Chapters 7 and 8.

10. Hypothesis testing. Neyman-Pearson lemma, power functions and likelihood ratio tests — Chapter 9.

11. Regression and correlation — Chapter 14.

Course Grades:

There will be 7 homework problem sets, 1 midterm exam, and 1 final exam. Homeworks will be assigned on every **Wednesday** on CCLE and due on the next Wednesday on CCLE. Please type or scan your homework and submit it in **a combined pdf**.

Late homework and make-up exams will only be allowed at the instructor's discretion, subject to a penalty.

The course grade will be based on the calculation:

Homeworks	20%
Midterm	35%
Final	45%

For every exam, students can bring a one-page two-sided letter-size note. The course is graded on a curve. If you believe that an item grade is incorrect, you must inform the instructor and TA in writing (e-mail is writing) **within 3 business days of the return of the materials**. The return of materials is defined as when graded materials were made available to the class and not when a student decides to claim or review the materials.

Course Policies:

1. Please post your questions about course materials under the Discussion Forum on CCLE https://ccle.ucla.edu/mod/forum/view.php?id=4288851. We will answer your questions on a daily basis. **Questions about course materials sent by email will not be answered.**

2. Every student is expected to solve the homework problems independently. This will be the most important preparation for students to solve problems with limited time at exams. Study groups and discussion among students are encouraged, but every student should write down the homework answers independently.

3. Discussion sections will cover example problems as an extension of lectures, and the example problems will be related to homework problems. **No homework answers will be given in discussion sections before the homework due date.**

4. Office hours will be used to answer your questions about course materials. **Office hours are not the time and place for students to do homeworks. No homework answers will be given at office hours before the homework due date.**

5. Please try to keep your camera on during remote lectures unless there are special concerns.

6. You are expected to adhere to the honor code and code of conduct. If you have a disability that will require academic accommodation, please contact the UCLA Office for Students with Disabilities (OSD).

Academic Integrity:

As a student and member of the University community, you are here to get an education and are, therefore, expected to demonstrate integrity in your academic endeavors. All students must uphold University of California Standards of Student Conduct as administered by the Office of the Dean of Students. Students are subject to disciplinary action for several types of misconduct, including but not limited to: cheating, multiple submissions, plagiarism, prohibited collaboration, facilitating academic dishonesty, or knowingly furnishing false information. You may have assignments or projects in which you work with a partner or with a group. For example, you are welcome, and even encouraged, to work with others to solve homework problems. Even though you are working together, the assignment you submit for a grade must be in your own words, unless you receive specific instructions to the contrary. For more information about academic integrity, please go to http://www.deanofstudents.ucla.edu/.

Communication:

Please keep a current e-mail address with my.UCLA.edu in order to receive class announcements and reminders.

Important Dates:

First day of classes: January 3, 2022.

Last day of classes: March 9, 2022.

Holidays: January 17 (Martin Luther King, Jr.), February 21 (Presidents' Day).

Exams:

Midterm: Wednesday 01/26/2022 time & location TBD.
Final: Monday 03/14/2022 3:00-6:00 PM, location TBD.

Good Luck!!!