

STA 130A: Mathematical Statistics: Brief Course

Syllabus — Fall 2026 (as of September 1, 2026)

Basic Course Information

Instructor	Dogyoon Song (<i>Email: dgsong@ucdavis.edu</i>) Office hours: TBA; MSB 4220
Teaching Assistant	TBA Office hours: TBA
Lectures	MWF 11:00–11:50 AM, Wellman Hall 226 In person only; lectures will not be recorded
Discussion Sections	B01 Tue 11:00–11:50 AM, Hart Hall 1130 B02 Tue 12:10–1:00 PM, Olson Hall 147
Important Dates	<i>Midterm 1:</i> Mon, October 19, in-class <i>Midterm 2:</i> Mon, November 9, in-class <i>Final exam:</i> Mon, December 7, 3:30–5:30 PM

Course Description

STA 130A is a one-quarter introduction to probability and the foundations of mathematical statistics. The first part of the course develops probability models, discrete and continuous random variables, expectation, joint and conditional distributions, transformations, and limit theorems. The final part studies sampling distributions and basic point and interval estimation, including the method of moments and maximum likelihood. Emphasis is placed on sound statistical reasoning and core calculations.

Prerequisites: The official prerequisite is as follows:

- One of MAT 016C, MAT 017C, MAT 019C, or MAT 021C, with a grade of C- or better
- One of STA 013/013V/013Y, STA 032, STA 035B, or STA 100, with a grade of C- or better

Credit limitation: Students who have completed STA 131A may receive only two units of credit for STA 130A.

Textbook: Please use the correct edition. Digital copies will be available through the Canvas Reading List.

- Bertsekas, D. and Tsitsiklis, J. (2008). *Introduction to Probability (2nd ed.)*. Athena Scientific, Belmont.
- Rice, J. (2007). *Mathematical Statistics and Data Analysis* (3rd ed.). Brooks/Cole, Cengage Learning.

Online Platforms: We will use multiple online platforms and resources in STA 130A (more details below).

- The [course webpage](#) will host lecture notes, homework, supplementary materials, etc.
- [Canvas](#) will be used for discussion materials and for turning in homework. Solutions will be here.
- [Piazza](#) will be used for discussion.

Please use email only for questions related to private matters (accommodations, grading, emergencies, etc.).

Course Topics and Tentative Schedule

Below is a tentative list of topics that will be covered in this course. The tentative schedule presented below is subject to changes depending on time constraints.

- Probability basics
 - Sample spaces, events, and probability laws
 - Conditional probability, total probability, and Bayes' rule
 - Independence
 - Counting and basic combinatorics
- Discrete & continuous random variables
 - Probability mass/density functions (PMFs/PDFs), cumulative distribution functions (CDFs)
 - Expectation, variance, and moments
 - Joint and conditional distributions; independence, covariance, and correlation
 - (Laplace) transform and moment generating functions
- Limit theorems
 - Markov and Chebyshev inequalities
 - The (weak) law of large numbers
 - The central limit theorem
- Estimation
 - Sampling distributions; chi-square, t , and F distributions
 - Point estimators and their properties
 - The method of moments and maximum likelihood
 - (time permitting) Fisher information, efficiency, and selected topics in sufficiency

Week	Topics	Readings	Notes
1	Foundational concepts	BT, Ch. 1.1–1.4	HW 1
2	Combinatorics / Random variables	BT, Ch. 1.5–2.2	HW 2
3	Discrete random variables	BT, Ch. 2.3–2.7	HW 3
4	Continuous random variables	BT, Ch. 3.1–3.3	Midterm 1
5	Joint and conditional distributions	BT, Ch. 3.4–4.1	HW 4
6	Covariance / MGFs	BT, Ch. 4.2–4.5	HW 5
7	Deviation inequalities / limit theorems	BT, Ch. 5.1–5.4	Midterm 2
8	Sampling distributions	Rice, Ch. 6.1–6.2	HW 6
9	Confidence intervals / point estimation	Rice, Ch. 6.3, 8.1–8.5	HW 7
10	Large-sample theory / efficiency	Rice, Ch. 8.5, 8.7–8.8	Final exam

Assessments & Grading

Grading Scheme: Student performance will be evaluated based on the four components as below.

The baseline cutoffs for grades of A, B, C, and D are 90%, 80%, 70%, and 60%, respectively; scores below 60% receive an F. Plus/minus cutoffs will be determined consistently after all course grades are available. These thresholds may be adjusted at the end of the quarter in a way that favors the students. For example, the cutoff for an “A-” may end up being adjusted to be lower than 90%, but not higher.

Component	Weight		Date
Homework	30%	7 problem sets	As assigned
Midterms	30%	Midterm 1	Mon, October 19 in class
(Higher of the two)		Midterm 2	Mon, November 9 in class
Final exam	40%		Wed, December 9, 8:00–10:00 AM
Participation	up to 3% point extra		
Total	100% + up to 3% extra		

Homework (30%): Seven homework assignments will provide concept review, focused calculations, and guided R practice. The lowest score will be dropped, and the homework grade is the average of the six highest scores. As soon as the course begins, students are *strongly encouraged* to complete the ungraded “Homework 0” for self-assessment (by the first week); this will not be collected, and no solutions will be provided.

Here is a tentative schedule for homework assignments.

HW	Released	Due	HW	Released	Due
0	–	Never	4	Fri, Oct 23	Thu, Oct 29
1	Fri, Sep 25	Thu, Oct 1	5	Fri, Oct 30	Thu, Nov 5
2	Fri, Oct 2	Thu, Oct 8	6	Fri, Nov 13	Thu, Nov 19
3	Fri, Oct 9	Thu, Oct 15	7	Fri, Nov 20	Tue, Dec 1

- **Submission requirements.**

- All homework must be submitted as a single PDF file on Canvas/Gradescope by the due date. Email submissions are not accepted.
- Homework submissions may be typed (in L^AT_EX or any other software you are comfortable with), or written and scanned. The final submission must be a single PDF file containing all your solutions to the assigned problem set.

- **Late submission policy.** *No late homework will be accepted; submissions after the deadline receive zero points.* However, your lowest homework grade out of 7 will be dropped; this dropped score is intended to cover ordinary illness, emergencies, or other extenuating circumstances, so no further arrangements or exceptions will be made. Begin assignments early; questions posted close to the deadline may not receive a response in time.

Midterms (30%) and Final (40%): Both midterms are held during the regular lecture time. The final exam will take place at the designated time noted above. More details will be announced at a later date.

There will be no make-up exams. The lower of the two midterm scores is dropped; consequently, a missed midterm receives a score of zero and will ordinarily become the dropped score. A student who cannot take the final examination for good cause should contact the instructor as soon as possible. An Incomplete may be assigned when the student’s completed work is of passing quality and constitutes a significant portion of the course requirements, subject to the instructor’s determination and UC Davis policy.

Participation in Lectures (up to 3% point of extra credit): Students may earn up to three (3) bonus points of extra credit through active participation. Of the three total percentage points of extra credit:

- **Up to two extra points** may be awarded at the instructor’s discretion for lecture participation and engagement. To be considered for lecture-participation credit, you must *contribute in person to a class discussion during a lecture* (not in discussion section)—by asking or answering a question, or providing a relevant comment on a presentation—at least once during the quarter.
- **Up to one additional extra point** may be awarded upon the TA’s recommendation for active participation in discussion or TA office hours.

Course Policies

Attendance & Participation

Lectures. Attendance is not mandatory but is strongly recommended. *Lectures are held in person and will not be recorded* unless otherwise specified. If you miss a lecture, you are responsible for any material covered and announcements made in your absence; in that case, studying on your own and attending office hours is recommended if you have further questions.

Active participation is encouraged, both in class and on Piazza. Cell phones, laptops, and other electronic devices must be silenced in class, and should be used in class only for learning purposes related to the lecture. Chatting or other disruptive behavior may result in a student being dismissed for the day; repeated disruptive behavior may result in a discussion with your academic advisor on appropriate further action.

Discussion Section. It is also important to attend the discussion section, where additional explanations and examples will be provided to deepen your understanding on the lecture content. These sessions are designed for students' practice through hands-on experience, and have no separate assessments during the discussion sessions. We value your ability to communicate mathematical and statistical ideas accurately, so please take the opportunity to share your thoughts and questions, and be prepared to present solutions to the group.

Code of Conduct & Academic Integrity

All students are expected to follow the [UC Davis Code of Academic Conduct](#). Violations include (but are not limited to) collaborating or communicating during exams, copying or allowing someone to copy graded assignments, doing someone else's homework/exam (or having someone do yours), sharing assignments/exams, and submitting work that is not your own. The fact that the violation did not benefit you directly does not diminish its seriousness.

Under the UC Davis Code of Academic Conduct, instructors are required to report suspected academic misconduct to [Student Conduct and Integrity](#). Any suspected violation (for example, cheating on an assignment or exam) will be reported. If a student admits responsibility or is found in violation through the conduct process, regardless of the extent or type of violation, a first confirmed violation will result in a failing grade on the relevant assignment or exam; a second confirmed violation will result in a failing grade in the course. Please abide by the code of conduct—remain vigilant and avoid any misconduct.

Collaboration and the Use of Artificial Intelligence (AI) Tools: Collaboration in studying course material is encouraged, and students are welcome to discuss assignments with classmates. However, all submitted work must be your own; you may discuss ideas and approaches, but you may not share or view another student's written solutions or code. **If you collaborate on homework, clearly list the names of all students involved.**

The use of large language models (LLMs) (e.g., ChatGPT, Claude, Gemini, Grok) or any other AI tools for any graded component of this course, including homework and exams, is strictly prohibited. This includes any form of assistance, including generating solutions, receiving hints or explanations, revising or polishing writing, and any other related use. Any suspected violation will be reported to Student Conduct and Integrity.

Distribution of Course Materials

Course materials are provided for students' personal educational use. However, they may not be posted, sold, recorded, or distributed outside the class—including through sites such as Chegg or Course Hero—without the instructor's prior written permission. Violations may result in student conduct proceedings under the UC Davis Code of Academic Conduct.

Getting Help

Piazza, Office Hours, and Email

- **Piazza:** You can access Piazza via the link on the Canvas sidebar. You can ask public questions about content and logistics. Students are encouraged to answer each other's questions. Please follow the guidelines below when posting on Piazza:
 - **Please search before posting.** Your question may have already been answered.
 - **Please be specific and informative.** For example, posting a code and simply asking “what is wrong with this code?” is not acceptable. Please explain what you have tried and where you are stuck in detail. If appropriate, along with your posted question, explain what else you tried that didn't work. The answers to many common coding questions can be found on <https://stackoverflow.com/>.

For answerers, “I don't know either” is not an appropriate answer as it does not contribute constructively to the conversation.
- **Office hours:**
 - Instructor: Questions regarding lecture content or organizational aspects of the course.
 - TA: Questions regarding contents of the course, discussions, homework assignments and their grading, code, Canvas and Piazza.
- **Email:** Please use email only for questions related to private matters (accommodations, grading, emergencies, etc.). For questions about class logistics or content, please post on Piazza, ask in class, or bring them to discussion sessions or office hours. Emails not following these guidelines may not be answered.

Please do not send messages on Canvas; the Canvas inbox is not monitored and you may not receive a response.

Other Campus Resources

- **Statistics tutors** at the Academic Assistance and Tutoring Centers (AATC) provide support for RStudio. More information is available [here](#).
- **UC Davis student resources** Many students face different challenges during college, and it is healthy to seek support. [This](#) is a comprehensive list of resources covering general academics, health and wellness, finances, housing, career/internship, and other topics.
- **Health & wellness** Health and wellness resources are available [here](#). If you have an emergency, call 911 immediately, or go to the nearest emergency room. Mental health staff are available 24 hours a day, 7 days a week by phone at (530) 752-2349 (follow the prompts to speak with a counselor).

Accommodations for Students with Disabilities

UC Davis is committed to educational equity in the academic setting, and in serving a diverse student body. All students who are interested in learning more about the Student Disability Center (SDC) are encouraged to contact them directly at <https://sdc.ucdavis.edu>, sdc@ucdavis.edu or (530) 752-3184. If you are a student who requires academic accommodations, please submit your SDC Letter of Accommodation as soon as possible, ideally within the first two weeks of class.