

## Syllabus for Math 170E Lecture 1, Winter 2023

**Lectures:** MWF 12:00–12:50pm Pacific Time, MS 4000A

**Canvas Web Page:** <https://bruinlearn.ucla.edu/courses/141851>

**Syllabus:** Introduction to probability theory with emphasis on topics relevant to applications. Topics include discrete (binomial, Poisson, etc.) and continuous (exponential, gamma, chi-square, normal) distributions, bivariate distributions, distributions of functions of random variables (including moment generating functions and central limit theorem).

**Textbook:** The class textbook is:

- Hogg, Tanis, Zimmerman, *Probability and Statistical Inference*, Tenth Edition

**Instructor:**

**Justin Forlano**

Office: MS 6617A

Email: [forlano@math.ucla.edu](mailto:forlano@math.ucla.edu)

(Please, include [Math170E] in the subject line.)

**Teaching Assistants:**

**Ben Jarman** ([bjarman@math.ucla.edu](mailto:bjarman@math.ucla.edu))

Office: MS 7630

Discussion sessions: (1A) Tuesdays 12:00pm–12:50pm, Boelter Hall 5264

Discussion sessions: (1B) Thursdays 12:00pm–12:50pm, Boelter Hall 5419

**Eilon Reisin-Tzur** ([ereisint@math.ucla.edu](mailto:ereisint@math.ucla.edu))

Office: MS 2361

Discussion sessions: (1C) Tuesdays 12:00pm–12:50am, Royce Hall 160

Discussion sessions: (1D) Thursdays 12:00pm–12:50am, Boelter Hall 5280

**Logistics & Communication:** Lectures and discussion sessions will be conducted in person. Course announcements will be made in class and on the BruinLearn page. It is your responsibility to keep up with the information posted on the BruinLearn course page, in particular problem sets and general announcements.

Technology permitting, I will be making use of BruinCast services to record lectures. This means that the lecture recordings will be asynchronous and not livestreamed. Recordings will usually be available two hours after each class and can be found on our BruinLearn page in the "UCLA Media Reserves" tab.

**Piazza:** We will use Piazza for out-of-class/OH discussion. Piazza is an online forum where you can post questions, even anonymously, and get answers from myself or your TA. Moreover, asking a question via Piazza benefits not only yourself but also your classmates, as they may have similar questions. We also like Piazza over email because we can use  $\text{\LaTeX}$  in our response to make math more readable.

You can join, and subsequently use, the Piazza page by clicking on the Piazza tab on the left-hand side of the BruinLearn page.

**Recording:** Lectures will be recorded, technology permitting. Handwritten notes taken by the instructor will also be made available. Both items will be uploaded to BruinLearn under the corresponding Week section as soon as practicable after each lecture. In view of this, your face or voice may appear in the recording if, for example, you ask a question in lecture. The video recordings will only be embedded into BruinLearn and hence they will not be downloadable.

**Office hours:** The instructor and the TA will provide weekly office hours.

• **Justin:**

Wed 4:30–5:30 PM MS6617A  
Fri 5:30–6:30 PM MS6617A

• **Ben:**

TBA

• **Eilon:**

TBA

**Enrollment issues.** First read these instructions. Then email [ugrad@math.ucla.edu](mailto:ugrad@math.ucla.edu)

**Assessment:** Assessed work will consist of weekly homework assignments, two midterms, and a final exam.

**Grading:** The grade in this class will be computed as the maximum of the following two schemes:

Scheme 1:	Scheme 2:
Final Exam: <b>40%</b>	Final Exam: <b>50%</b>
Best Midterm: <b>25%</b>	Best Midterm: <b>30%</b>
Worst Midterm: <b>20%</b>	
Homework: <b>14.5%</b>	Homework: <b>19.5%</b>
End of quarter evaluation: <b>0.5%</b>	End of quarter evaluation: <b>0.5%</b>

Students scoring  $\geq 90\%$  overall will be awarded at least an A-. Students scoring  $\geq 80\%$  overall will be awarded at least a B-. Students scoring  $\geq 70\%$  overall will be awarded at least a C-. I may lower the threshold for a specific letter grade but I will not raise it e.g. C grades may become easier to reach.

**Final Exam:** The final exam will be at **11:30am–2:30pm, Tuesday, March 21.**

- No notes, no collaboration.
- There will be no make-up exams.
- You must take the final exam to pass the class.
- The date of the final exam cannot and will not be changed.
- You must take the final exam to pass the class.
- Further details will be posted to the BruinLearn page at least a week before the exam.

Midterms: There will be 2 midterm exams:

Midterm	Date
1	Fri, February 3
2	Fri, March 3

- The exams will be 50 minutes in duration.
- There will be no make-up exams.
- Further details will be posted to the BruinLearn page at least a week before the exam.

Homework: There will be 9 homework assignments, which are to be submitted via **Grade-scope** by **11:59pm on Friday**, starting Week 2:

Homework	Due date
1	January 20
2	January 27
3	February 4
4	February 10
5	February 17
6	February 24
7	March 3
8	March 10
9	March 17

- Late submissions will **not** be accepted.
- Your lowest two homework scores will be dropped.
- Homeworks sheets will be uploaded to the relevant week on BruinLearn.
- Credit will only be given for complete solutions showing all work, written neatly and using correct notation. If I or your TA do not understand what you have written for a problem, you will not get credit for it.
- Leave all answers in exact form unless specified otherwise.
- You are encouraged to work together on these problems, however you must turn in your own work.
- If you experience any issues due to submission, e.g. your internet was down or there was a power blackout, email me as soon as possible so that we may find a solution. I have the ability to upload assignments on your behalf. If you leave it too long, I have the right to penalise for lateness or refuse your submission. We reserve the right to deduct points for not adequately uploading your submission e.g. it is not readable, questions have not been linked to those on Gradescope, pages have not been rotated. It is your responsibility to ensure the readability of your submissions. Remember: we can only grade what has been written!

*On writing in this course:* Often problems in this class require careful reasoning beyond merely stringing together mathematical symbols (e.g. algebra) and basic propositional logic. Thus, you will need to provide sufficient justification for your solutions. Here are some comments as to the level of rigour expected in student solutions:

- Every solution requires justification. Even though only a subset of homework problems on each problem set will be fully graded, this does not mean that only

three problems need justification. Every solution requires justification; we just don't have the time to grade all problems.

- In general, having a solution that only lists the numerical expression for the answer will not give you full points. The reason for these policies is not that we are trying to be tricky, or strict. The point of these solutions is to demonstrate your understanding of the solution to the reader/grader. Some good points to check while examining your solutions:
  - Does my solution demonstrate my understanding of the material?
  - Is my solution distinguishable from a student who copied a solution from another source?
  - Is my solution readable and understandable for someone who is not in this course, or someone who does not know the solution?

It is easy to show your work for a particularly involved or difficult problem. It is harder to show your work for a problem you may consider trivial, which makes it even more important to demonstrate your understanding. For simple probability questions you may ask yourself some question such as: what does each term in your solution represent? What does it count? Why does this give you the correct number of ways to count blah? The explanation does not have to be a paragraph, or longer. Even just drawing arrows towards each term to describe what they are counting would be sufficient. The best guides to the level of detail and quality of writing we are looking for are the homework/midterm solutions and the worked problems in the textbook.

The more relevant work you show, the more partial credit we can give, even if you end up with an incorrect solution!

Academic honesty: Review the UCLA Code of Conduct. You are welcome (indeed encouraged) to discuss the class materials amongst yourselves and to use whatever human, online, or printed sources you wish to master the material. However, you must write up your own solutions in your own words; the loaning, posting, or copying of solutions is strictly forbidden. Likewise, the posting of problems to online forums or 'tutoring' websites is forbidden.

Please be warned that the instructor and TA are *obliged* to report any suspected academic dishonesty to the Office of Student Conduct.

COVID-19 Policy: Keeping our community safe depends on each of us following the latest UCLA health and safety guidelines. While campus policies fluctuate with shifting local, state, and national mandates, current information is available at [covid-19.ucla.edu](https://covid-19.ucla.edu). Be advised that refusal to comply with current campus directives related to COVID-19 mitigation will result in dismissal from the classroom and referral to the Office of Student Conduct. If you have any questions or concerns about UCLA's COVID-19 protocol, go to <https://covid-19.ucla.edu/information-for-students/>. Thank you for protecting your fellow Bruins!

#### **Campus resources:**

- Students requiring academic accommodations should contact the Center for Accessible Education, A255 Murphy Hall, (310)825-1501. In order to ensure accommodations, students should contact the CAE at the start of the quarter.
- Counseling and Psychological Services (CAPS) provides confidential counseling to all students and can be reached 24/7 at (310)825-0768.

• You can receive confidential support and advocacy at The CARE Advocacy Office for Sexual and Gender-Based Violence, 1st Floor Wooden Center West, CAREadvocate@caps.ucla.edu, (310)206-2465.

• You can report gender discrimination, sexual violence or sexual harassment directly to UCLA's Title IX Office, 2255 Murphy Hall, titleix@conet.ucla.edu, (310)206-3417. Reports to law enforcement can be made to UCPD at (310)825-1491. These offices may be required to pursue an official investigation. Students who have questions about the rights of pregnant/parenting students should contact the Title IX Office as well. The Title IX Office can assist students with reporting options and identifying resources if they believe their rights have been violated.

**Course outline:** The following course outline is optimistic. I endeavour to have a minimum of one review class before the final exam. I reserve the right to change the schedule at will.

Week	Day	Section(s)	Topic(s): section numbers in <i>Hogg et. al</i>	Assignment(s) due
1	Mon	1.1	Probability spaces	
	Wed	1.1, 1.4	More on probability spaces and independence	
	Fri	1.2	Methods of enumeration	
2	Mon		<b>No class:</b> (MLK Jr. holiday)	HW1
	Wed	1.2	Methods of enumeration (cont.)	
	Fri	1.3	Conditional probability	
3	Mon	1.5	Bayes' Theorem	HW2
	Wed	2.2	Discrete random variables	
	Fri	2.2	Expectation	
4	Mon	2.3	Special expectation (higher moments)	HW3 Midterm 1
	Wed	2.4	The binomial distribution	
	Fri		<b>No class:</b> (Midterm 1)	
5	Mon	2.5	The negative binomial distribution	HW4
	Wed	2.6	The Poisson distribution	
	Fri	3.1	Continuous random variables	
6	Mon	3.1	Continuous random variables (cont.)	HW5
	Wed	3.2	The exponential and Gamma distributions	
	Fri	3.3	The normal distribution	
7	Mon		<b>No class:</b> (Presidents' Day holiday)	HW6
	Wed	4.1	Discrete bivariate distributions	
	Fri	4.1	Discrete bivariate distributions (cont.)	
8	Mon	4.2	The correlation coefficient	HW7 Midterm 2
	Wed	4.3	Conditional distribution	
	Fri		<b>No class:</b> (Midterm 2)	
9	Mon	4.4, 4.5	Continuous bivariate distributions	HW8
	Wed	5.1, 5.2	Functions of a random variable	
	Fri	5.3	Several random variables	
10	Mon	5.4	Chebyshev's inequality and convergence of random variables	HW9
	Wed	5.4	The moment generating function technique	
	Fri	5.6, 5.7	The Central limit theorem and approximation of discrete distributions	
11	Tues			Final Exam