

ORI 390R.1
Applied Probability
Fall 2023

Professor

Dr. Benjamin D. Leibowicz
bleibowicz@utexas.edu
ETC 5.128D

Topics Covered

Concepts of probability and mathematical statistics; application of these analytical methods to planning and evaluation of research and industrial experimentation. Basic probability theory, combinatorial analysis of random phenomena, conditional probability and independence, parametric families of distributions, expectation, distribution of functions of random variables, limit theorems.

Lecture Time and Location

Lectures will be held on Tuesdays and Thursdays from 11:00 AM – 12:30 PM in ETC 7.146.

Office Hours

I will hold office hours in ETC 5.128D from 4:00 – 5:00 PM on Tuesdays and from 3:00 – 4:00 PM on Thursdays. I encourage you to attend my office hours if you want help understanding the course material, want to go over specific problems or solutions, or want to discuss the course in general.

If you would like to meet with me outside these regular office hours, then please email me and state the specific issue(s) you would like to discuss.

Required Textbook

A First Course in Probability, 10th Edition by Sheldon Ross (Pearson)

Please note that I will assign problems from this edition of the textbook. If you choose to work with an older or international edition, it is your responsibility to make sure you do the correct problems.

The materials for this class are available through the Longhorn Textbook Access (LTA) program, a collaboration between UT Austin, The University Co-op, and textbook publishers to significantly reduce the cost of digital course materials for students. You can access your required materials through the “My Textbooks” tab in Canvas. You are automatically opted into the program but can easily opt-out (and back in) via Canvas through the 12th class day. If you remain opted-in at the end of the add/drop period (12th class day fall/spring, 4th class day summer sessions), you will receive a bill through your “What I Owe” page. If you do not pay your bill by the specified deadline, you will lose access to the course materials and your charge will be removed. More information about the LTA program is available at <https://www.universitycoop.com/longhorn-textbook-access#undefined>.

Grader

The Grader for this course is Zizhe Jiang, who can be reached at zizhe.jiang@utexas.edu. Zizhe will grade your problem sets and exams, so please direct any questions about grading to him.

Materials and Equipment

During lectures, please have a notebook and scientific calculator (or equivalent calculator on your computer) available so that you can practice solving example problems in real time. You will be expected to bring a scientific calculator with you to the exams. This calculator cannot be a device that is able to access the internet.

Course Website

All course materials will be posted on Canvas.

Grading

Your final grade will be calculated using the following weights:

Problem Sets – 30%
Midterm Exam – 30%
Final Exam – 40%

Letter grades will be determined according to the following conversion:

A	93% or greater
A-	90% to <93%
B+	87% to <90%
B	83% to <87%
B-	80% to <83%
C+	77% to <80%
C	73% to <77%
C-	70% to <73%
D+	67% to <70%
D	63% to <67%
D-	60% to <63%
F	<60%

I may choose to raise your final grade by curving or some other method. However, these adjustments will never lower your grade.

Attendance

I will not take attendance or formally penalize you for missing lecture. You are responsible for learning all of the course material and you are ultimately free to decide whether to attend lecture or not. I personally believe that attending lecture is immensely valuable because it allows you to fully engage with the material, interact with your classmates, and ask questions to deepen your understanding. Furthermore, I am more likely to feel comfortable adjusting your grade upward at the end of the semester if you regularly attended and participated in lecture.

Problem Sets

Problem sets will be assigned about once a week and will typically be due at the beginning of class one week later. Please submit them electronically via Canvas as PDF files, which can be based on typed documents or scanned written work. Problem sets will include exercises from the textbook as well as additional problems. You may discuss problem sets with your classmates and work in small teams, but you must individually write up and submit your own solutions. Based on my own experience, problem set teams should be limited to four people or fewer to ensure that you fully participate in solving the problems and thoroughly understand your solutions. Late problem sets will be penalized by 10% per late day, up until 72 hours after the due date. At that point, the solutions will be posted, and zero credit will be received for any subsequently submitted problem set.

Exams

Midterm Exam

Tuesday, October 3

During regular lecture time in regular location

Final Exam

Monday, December 11 (scheduled by the university registrar)

8:00 – 10:00 AM

Honor Code

I expect everyone to follow the UT Honor Code, which states:

“The core values of the University of Texas at Austin are learning, discovery, freedom, leadership, individual opportunity, and responsibility. Each member of the University is expected to uphold these values through integrity, honesty, trust, fairness, and respect toward peers and community.”

All suspected violations of the Honor Code will be referred to the Administration for adjudication. I have formally disciplined students for Honor Code violations in the recent past, and I will do so again without hesitation if any incidents occur in this course. Violating the Honor Code undermines the quality and integrity of your academic experience and degree, and is unfair to the majority of students who go about their work the right way. Cheating can easily result in probation, suspension, or expulsion from the University. Trust me — it’s not worth it!

To avoid ambiguity, all of the following actions related to problem sets will be treated as violations of the Honor Code: copying from a solutions manual, obtaining solutions from the internet, copying from students who took the course in prior years, and copying solutions from classmates without fully participating in solving the problems. Do not make course materials available to anyone outside this course, including on websites that can be accessed by the general public (e.g., CourseHero). Doing so is not only a violation of academic integrity, but is also copyright infringement subject to legal consequences.

If you witness or become aware of other students committing academic integrity violations, please report the issue to me, or directly to Student Conduct and Academic Integrity. I strongly

urge you to do the right thing and speak up if you know of any Honor Code violations taking place in this course. For more information, please see:
<http://deanofstudents.utexas.edu/conduct/index.php>

Disability and Access Statement

The University is committed to creating an accessible and inclusive learning environment consistent with University policy and federal and state law. Please let me know if you experience any barriers to learning so I can work with you to ensure that you have equal opportunity to participate fully in this course. If you are a student with a disability, or think you may have a disability, and need accommodations please contact Disability and Access (D&A). Please refer to D&A's website for contact and more information: <http://diversity.utexas.edu/disability/>. If you are already registered with D&A, please deliver your Accommodation Letter to me as early as possible in the semester so that we can discuss your approved accommodations and needs in this course.

Feedback

I am always interested in receiving constructive feedback that helps me enhance your learning experience, improve the course, and be the most effective instructor I can be. Throughout the semester I may elicit your feedback through both informal and formal channels. Please feel free to attend office hours or schedule a meeting with me at any time to discuss your own learning experience in the course, and whether there are any changes that would enhance it. Near the end of the semester you will have an opportunity to anonymously evaluate the course and myself using UT Austin's standard Course Evaluation form. Your feedback and suggestions are greatly appreciated, and I promise to give them careful consideration.

Tentative Course Schedule

The course schedule below is subject to change and will be updated as frequently as possible.

Date	Topic	Reading	Problem Set Assigned	Problem Set Due
8/22	Welcome			
8/24	Counting	Chapter 1		
8/29	Axioms of Probability	Chapter 2	PS 1	
8/31	Equally Likely Examples			
9/5	Marriage Problem		PS 2	PS 1
9/7	Conditional Probability	Chapter 3		
9/12	The Classics		PS 3	PS 2
9/14	Random Variables	Chapter 4		
9/19	Discrete Random Variable Families		PS 4	PS 3
9/21	Continuous Random Variables	Chapter 5		
9/26	Continuous Random Variable Families		PS 5	PS 4
9/28	Distribution of a Function of a Random Variable		PS 6	
10/3	<i>MIDTERM EXAM</i>			
10/5	Joint Random Variables	Chapter 6		PS 5

10/10	Joint Random Variables			
10/12	Sums of Independent Random Variables		PS 7	PS 6
10/17	Midterm Recap <i>Zoom lecture due to conference travel</i>			
10/19	Expectation	Chapter 7	PS 8	PS 7
10/24	Conditional Expectation			
10/26	Covariance		PS 9	
10/31	Limit Theorems	Chapter 8		PS 8
11/2	Markov Chains	Chapter 9	PS 10	
11/7	Entropy <i>Zoom lecture due to conference travel</i>			PS 9
11/9	Simulation	Chapter 10	PS 11	PS 10
11/14	Maximum Likelihood Estimation			
11/16	Scoring Rules		PS 12	PS 11
11/21	NO LECTURE <i>Thanksgiving Holiday</i>			
11/23	NO LECTURE <i>Thanksgiving Holiday</i>			
11/28	Retrospective Tour of the Material			

11/30	Probability Riddles			PS 12
12/11	<i>FINAL EXAM</i>			