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Teaching Assistants: Amudhessan Nakkeran and Tian-Shu Huang

Class time: Tu Thu 9:30-11am and conducted in real-time on Zoom

Office hours: with TA/instructor will be scheduled on Zoom *posted/updated* on Canvas

Group study times: with your peers will be scheduled on Zoom *posted/updated* on Canvas drop by to meet other students in the class

351Kafe social time: I will periodically host a virtual social break on Zoom– I encourage you to come meet with me and others we can chat about whatever you like but for a change lets leave probability out of it :) Bring lunch/coffee as appropriate.

Unique ID: 16340

Overview: The course serves as an introduction to probability, statistics and random processes for engineers. It will focus on the fundamentals and applications of probability models and associated computations that are typical in electrical engineering, including motivating examples, reliability in compute and communication systems, decision making, algorithms, web search, machine learning and data sciences, etc. A detailed topical syllabus and schedule is provided at the end of document.

Pre-requisites: This course will draw on mathematical background you should have acquired either in high school and/or university level calculus in particular M 427K, M 427J with a grade of C- or better. Although it is no longer a pre-requisite, it would be helpful to have taken EE 313.

Required textbook: *Introduction to Probability*, D. Bertsekas and J. Tsitsiklis, Athena Scientific, 2nd Ed., 2008.

Recommended textbook: *Probability and Stochastic Processes: A friendly introduction for electrical and computer engineers*, R. Yates and D. Goodman, Wiley, 2nd Ed., 2005.

This course carries the quantitative reasoning flag. Quantitative Reasoning courses are designed to equip you with skills that are necessary for understanding the types of quantitative arguments you will regularly encounter in your adult and professional life. You should therefore expect a substantial portion of your grade to come from your use of quantitative skills to analyze real-world problems.

Online course platforms: We will be using the following platforms

- *UT Canvas* –course management platform– will be used for positing class material/homework and self-diagnostic quizzes.
- *Piazza* – an online discussion platform – please use this for posting and answering questions regarding the course to your peers and course staff.
- *Gradescope* – electronic homework submission and homework/exam grading platform.
- *Zoom* : Classes conducted live on zoom and recorded hopefully be made available on a timely basis thereafter. Office Hours and Group Study Times will not be recorded.
- *Zoom/Proctorio*: Midterm 1 and 2 and Final exam will be conducted online an proctors by TAs and myself either with Zoom or Proctorio.

General course policies: Some general principles for this course.

Class attendance is expected. The aim the in class lectures and activities is to jump start your understanding and stimulate your interest. I will identify key points in course material that you should focus on which should help you use your time more efficiently in learning the material. Note you are responsible for the material in the reading assignments, course notes, as well as what is covered in class. **Look over what will be presented before hand!**

Use of computers and phones in class is discouraged unless related to course activities. Research has been shown these distractions can have a big impact on your learning. Click on this **article**. I would encourage you to get in the habit of shutting everything around you down and focus and be **active** during our Zoom classes, e.g., ask questions and take notes or write comments on your slides.

Discussing homework is encouraged. Copying is considered cheating. Be absolutely sure to submit your own *independent* homework solutions, e.g., copying or letting someone else copy your homework is unacceptable – the entire homework grade will be dropped for both.

Homework: A total of 11 weekly homeworks will be assigned except on weeks when you have a midterm. You will need to scan your homework and submit it electronically via Gradescope *before 12 noon on Friday*. To that end you will need to set up a Gradescope account (instructions will be emailed to you) and details on pdf scanning and uploading homeworks are included in your first homework.

No late homeworks will be accepted. If you miss one or two homeworks no problem, the two homeworks with the lowest scores will be dropped when computing your overall homework grade.

Self-diagnostic quizzes: I will make self-diagnostic multiple-choice quizzes available on Canvas on Friday each week. They will be due on Tuesday midnight. They intended to help you (and the instructor) do a sanity check on how you are doing. These quizzes may cover basic material from the previous week or from Tuesday's lecture. They are open book will not require you preparing, and will have a time limit of 10 minutes.

No makeup quizzes will be given. If you miss one or two quizzes no problem, the two quizzes with the lowest scores will be dropped when computing your overall quiz grade.

Exams: There will be two midterms and a final exam taken online as follows:

- Midterm 1 – *Thursday, October 1, 9:30-10:45am*
- Midterm 2 – *Tuesday, November 10, 9:30-10:45am*
- Final – *Thursday December 10, 2-5pm*

These exams are closed book, however you are allowed to bring a single cheat-sheet (8.5 x 11 inch paper) to each exam. You can write on both sides. The material on the cheat sheet needs to be handwritten. Example exams will be made available on canvas.

The exams will be conducted using appropriate and flexible technology.

No make up exams will be given. If you will miss an exam you need to let the instructor know *prior* to the exam. The instructor will determine if the absence is excused on a case-by-case basis based on concrete material. For an excused absence, the exam score will be calculated as the weighted average of the other mid-term exam and final scores based on their relative weights. Unexcused absences will result in zero points for the exam.

Grading: Your final grade will be determined based on your work throughout the semester as follows:

Homework	16%
Self-diagnostic quizzes	5%
Midterm 1	22%
Midterm 2	22%
Final Exam	35%

Prompt grading and regrade requests. We will grade promptly, and will consider regrade requests only within *two weeks* of time/date the graded homework/exam is returned (i.e., made available) on Gradescope. You are encouraged to discuss requests with the course staff, however requests must be submitted via Gradescope, with a brief written justification. No grade changes will be made in any students presence.

Fair and transparent grading. The midterm and final exams will be individually curved to permit you to track how you are doing throughout the semester. Homework and quizzes will not be curved. Grade cutoffs will be as follows:

A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
90	86.67	83.34	80.00	76.67	73.34	70.00	66.67	63.34	60	56.67	53.34

You can expect roughly 25% of the students to get an A, 25% a B, 50% a C or below.

The TAs and I are here to help do not hesitate to reach out and talk to us.

Some important notes:

The university has a variety of resources that can be extremely useful and exist to serve our community. Please contact appropriate offices as detailed below.

University Honor Code: “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, fairness, and respect toward peers and community.”
<http://www.utexas.edu/about/mission-and-values>.

Academic adjustment: The University of Texas at Austin provides, upon request, appropriate academic adjustments for qualified students with disabilities. Contact Services for Students with Disabilities at (512) 471-6259 [voice], (866) 329-3986 [video], ssd@uts.cc.utexas.edu, or
<http://ddce.utexas.edu/disability>.

Wellness: You are at a top university and dealing with lots of stress and demands which can be intense. I encourage you to take care of yourself. Do your best to maintain a healthy lifestyle this semester by eating well, exercising, socializing, getting enough sleep and taking some time to relax. This will help you achieve your goals and cope with stress. All of us benefit from support during times of struggle. If you are having any problems or concerns, do not hesitate to come speak to the TAs and myself. There are also many resources available on campus that can provide help and support. Asking for support sooner rather than later is almost always a good idea. If you or anyone you know experiences any academic stress, difficult life events, or feelings like anxiety or depression, we strongly encourage you to seek support. Counselors are available Monday-Friday 8am–5pm at the UT Counseling and Mental Health Center (CMHC) on the 5th floor of the Student Services Building (SSB) in person and by phone (512-471-3515). The 24/7 UT Crisis Line is 512-471-2255. Consider also reaching out to a friend, faculty member, or family member you trust to help get you the support you need.

Campus Carry: “The University of Texas at Austin is committed to providing a safe environment for students, employees, university affiliates, and visitors, and respecting the right of individuals who are licensed to carry a handgun as permitted by Texas state law.” For more information, please see <http://campuscarry.utexas.edu/students>.

Date	Topic	Reading	HW-due
Tu 8/27	L1: Course introduction, probability and set theory	1.1	
Tu 9/1	L2: Probability models and axioms	1.1-1.2	
Th 9/3	L3: Conditioning and Bayes' rule	1.3-1.4	1
Tu 9/8	L4: Independence	1.5	
Th 9/10	L5: Counting	1.6	2
Tu 9/15	L6: Discrete RVs, PMFs and expectation	2.1-2.2	
Th 9/17	L7: Variance, conditioning, and joint PMFs	2.3-2.5	3
Tu 9/22	L8: Conditional PMFs, independence	2.6-2.7	
Th 9/24	L9: Problem solving and applications		4
Tu 9/29	L10: Continuous RVs, PDFs, expectation and Normals	3.1-3.3	
Th 10/1	In class Midterm 1 covering L1 – L9		
Tu 10/6	L11: Conditioning on an event, multiple continuous RVs	3.4-3.5	
Th 10/8	L12: Conditioning on an RV, independence, Revisiting Bayes Rule	3.5	5
Tu 10/13	L13: Derived distributions – single and multiple RVs, convolution	4.1	
Th 10/15	L14: Sums of independent RVs, covariance and correlation	4.2-4.3	6
Tu 10/20	L15: Conditional expectation as a RV, random sums of RVs	4.3, 4.5	
Th 10/22	L16: Bivariate Gaussian	4.4, notes	7
Tu 10/27	L17: Inequalities, Weak Law of Large Numbers	5.1-5.3	
Th 10/29	L18: Central Limit Theorem, pollster problem	5.4	8
Tu 11/3	L19: Problem solving and applications		
Th 11/5	L20: Bayesian statistical inference : MAP and ML	8.1 - 8.2	9
Tu 11/10	In class Midterm 2 covering L10 – L19		
Th 11/12	L21: Least Mean Squares Estimation and Linear Least Means Square Estimation	8.3,8.4,	
Tu 11/17	L22: Classical statistical inference: Point estimation, confidence intervals	9.1	
Th 11/19	L23: Introduction to Random Processes: Bernoulli Process	6.1	10
Tu 11/24	L24: Discrete-time Markov Chains (DTMC), classification of states	7.1-7.2	
Th 11/26	Thanksgiving		
Tu 12/1	L25: DTMCs invariant/stationary distribution and convergence		
Th 12/3	L26: Course Wrapup		11
	Final Thursday December 10, 2-5pm (as per Registrar's website)		