MATH170A: PROBABILITY THEORY

Winter 2019

GENERAL INFORMATION

Instructor	Hanbaek Lyu	(Email: *hlyu@math.ucla.edu*, Office: MS 6156)
Lectures	MWF 2:00PM - 2:50PM at MS 5137	Course webpage
Office hours	(tentative) MW 12:55PM - 1:55PM and F 3:00 - 4:00PM	
Textbook	Introduction to Probability by D. P. Bertsekas and John N. Tsitsiklis, 2nd edition	
Prerequisites	Math 33A	
TA	Fan Yang	(Email: *yangf.cuhk@gmail.com* , Office: MS 3949)

COURSE DESCRIPTION

In this course we study foundations of probability theory. The key concept is random variable, which is a mathematical device that is designed to describe outcomes of uncertain observations. We learn various essential random variables, their properties, and how to quantify and manipulate them.

GRADING

- Final score will be the maximum of the following two schemes:
  - **Scheme 1**: Homework (15%) + Midterm 1 (20%) + Midterm 2 (20%) + Final (45%)
  - **Scheme 2**: Homework (15%) + Better of the midterms (30%) + Final (55%)
- All grades will be posted via MyUCLA gradebook.

HOMEWORK

- Homeworks will be assigned weekly on every Wednesdays, and are due at the beginning of the class on following Wednesday.
- No late homeworks will be accepted.
- Two lowest homework scores will be dropped.
- A random sample of problems will be graded by the TA.
- Solutions on some selected problems will be posted in the course website.
- Discussing homework problems with the instructor, TA, or classmates are encouraged. But you need to write your own solution with your own understanding.

EXAMS

- There are two midterms and one final exam.
  - **Midterm 1**: Wednesday, Jan.30 in class.
  - **Midterm 2**: Friday, Mar.1 in class.
  - **Final**: Monday, Mar. 19, 3:00PM - 6:00PM (location TBD)
- There is no make-up exam. You should attend the final exam to pass the course.
- Please bring your UCLA ID card to all exams.

TENTATIVE COURSE SCHEDULE

Below is a tentative course schedule based on the departmental guideline. There could be a slight change depending on our progress.

Week	Date	Section	Topics
1	M 1/7	1.1	Sets
	W 1/9	1.2	Probabilistic models
	F 1/11	1.2	Probabilistic models
2	M 1/14	1.3	Conditional probability
	W 1/16	1.3	Conditional probability
	F 1/18	1.4	Total Probability Theorem and Bayes Rule
3	M 1/21		No Class
	W 1/23	1.5	Independence between events
	F 1/25	2.1, 2.2, 2.4	Discrete random variables, expectation, and variance
4	M 1/28		Binomial, Geometric, and Poisson RVs
	W 1/30		**Midterm 1**
	F 2/1	2.5	Joint PMFs of Multiple RVs
5	M 2/4	2.6	Conditioning discrete RVs
	W 2/6	2.6	Conditional expectation of discrete RVs
	F 2/8	2.7	Independence between discrete RVs and events
6	M 2/11	2.7	Independence between discrete RVs
	W 2/13	3.1	Continuous RVs and PDFs
	F 2/15		Uniform, Exponential, and Normal RVs
7	M 2/18		No class
	W 2/20	3.4	Joint PDFs of multiple RVs
	F 2/22	3.5	Conditioning continuous RVs
8	M 2/25	3.5	Conditional expectation of continuous RVs
	W 2/27	3.6	The continuous Bayes rule
	F 3/1		**Midterm 2**
9	M 3/4	1.6	Counting and Stirling's Formula
	W 3/6		de Moivre-Laplace CLT
	F 3/8		Normal approximation of binomial RVs
10	M 3/11		Markov's & Chebyshef's inequalities
	W 3/13	5.1	The Weak Law of Large Numbers
	F 3/15	5.2	Review
11	F 3/19	**Final**	