MATH170B: PROBABILITY THEORY

Fall 2018

GENERAL INFORMATION

Instructor	Hanbaek Lyu	(Email: *hlyu@math.ucla.edu*, Office: MS 6156)
Lectures	MWF 3:00PM - 3:50PM at MS 5137	Course webpage
Office hours	(tentative) MWF 1:55PM - 2:55PM	
Textbook	Introduction to Probability by D. P. Bertsekas and John N. Tsitsiklis, 2nd edition	
	(*Additional lecture notes will be available in the course webpage*)	
Prerequisites	MATH 170A	
TA	Daniel Raban	(Email: *danielraban@math.ucla.edu* , Office: MS 5343-11)

COURSE DESCRIPTION

Fundamental notions of probability space and random variables were introduced in 170A. The main theme of this course, 170B, is how a sequence of random variables behave. We first develop some essential tools such as conditional expectation and transforms of random variables. Next, we study limit theorems on sums of independent and identically distributed random variables: The Law of Large Numbers describe how they behave on average, and the Central Limit Theorem captures how they fluctuate around the mean. Lastly, we have a close look at some essential stochastic processes such as Bernouli and Poisson processes, and discrete-time Markov chains such as random walks.

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**: Monday, Oct.22 in class.
  - **Midterm 2**: Wednesday, Nov.21 in class.
  - **Final**: Friday, Dec.14. 11:30AM - 2:30PM. (Room will be announced later)
- 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
0	F 9/28	4.1	Derived distributions
1	M 10/1	4.1	Derived distributions
	W 10/3	4.1	Derived distributions
	F 10/5	4.2	Covariance and correlation
2	M 10/8	4.2	Covariance and correlation
	W 10/10	4.3	Conditional expectation and variance
	F 10/12	4.3	Conditional expectation and variance
3	M 10/15	4.4	Transforms
	W 10/17	4.4	Transforms
	F 10/19	4.5	Sums of a random number of RV's
4	M 10/22		**Midterm 1**
	W 10/24	5.1	Markov and Chebyshef inequalities
	F 10/26	5.2	Weak law of large numbers
5	M 10/29	5.3	Convergence in probability
	W 10/31	5.4	Central limit theorem
	F 11/2	5.4	Central limit theorem
6	M 11/5	5.5	Strong law of large numbers
	W 11/7	5.5	Strong law of large numbers
	F 11/9	6.1	Bernoulli process
7	M 11/12		No class
	W 11/14	6.1	Bernoulli process
	F 11/16	6.1	Bernoulli process
8	M 11/19	6.2	Poisson process
	W 11/21		**Midterm 2**
	F 11/23		No class
9	M 11/26	6.2	Poisson process
	W 11/28	6.2	Poisson process
	F 11/30	7.1	Discrete-time Markov chains
10	M 12/3	7.1	Discrete-time Markov chains
	W 12/5	7.1	Discrete-time Markov chains
	F 12/7		Review
11	F 12/14		**Final**