MATH 171: Stochastic Processes

Lecture 2, Winter 2018

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Office:	MS 6175
Email:	`m.hlushchanka@math.ucla.edu`
Office Hours:	T 9:30am–11:30am and R 11:30am–12:30pm (*Tentatively*)
Lectures:	MWF 2:00pm–2:50pm, MS 5137
Course Website:	**https://ccle.ucla.edu/course/view/18W-MATH171-2**
Teaching Assistant:	Jacob Moorman
Discussion Sessions:	T 2:00pm–2:50pm, MS 5137

General information

Course prerequisites

Math 33A and Math 170A (or Statistics 100A). Math 170B is helpful, though not required.

Course materials

The main textbook will be *Essentials of Stochastic Processes, Third Edition*, by Rick Durrett (*Second Edition* is freely available **online**). Additional material, when appropriate, will be communicated to you during the class.

Course description

A stochastic or random process is a collection of random variables that is indexed by some mathematical set, which interprets time. We will study some classical discrete-time and continuous-time stochastic processes, for which the index set is given by a countable set and an interval of the real line, respectively. In the class, we will specifically focus on Markov chains (both discrete and continuous time), renewal processes, Poisson processes and Brownian motion. We will also spend time on useful technical aspects underlying the theory, such as martingales. The exact selection of topics is to be determined based on your initial knowledge of probability and the speed you progress through the new material.

Grading Policy

- Your final score in this class will be computed as the maximum of the following two schemes:

Scheme 1		**Scheme 2**	
Homework:	15%	Homework:	15%
Midterm 1:	20%	Max. of Midterms 1 and 2:	30%
Midterm 2:	20%	Final:	55 %
Final:	45%		

- We will use the MyUCLA gradebook.
- Any grading complaints and requests for re-grading must be submitted in writing to the instructor within one week of receiving your score. **Grading complaints not initiated within this period of time will not be considered.**

Homework Policy

- Homework assignments will be issued weekly, not later than Wednesday in class, and will be due next Wednesday before the class starts.
- The assignments will be posted on the course website.
- Homework will be graded and promptly returned to you during your discussion sections.
- Your score on each homework assignment will be based on a few randomly chosen problems, as well as overall completion of the assignment.
- **Late homework will not be accepted.**
- The lowest two homework scores will be dropped.
- Printed or handwritten homeworks have to be submitted. No homeworks submitted via email will be accepted.
- You may use whatever resources you want to do the homework, including computers, textbooks, friends, the TA, etc. However, all homework assignments must be written by you, i.e. you cannot copy someone else's solution.

Exam Procedures

- There will be two midterms and one final exam.
- The **final exam** will take place on **Monday, March 19, 2018 at 11:30am–2:30pm**; the location is TBA (most likely in our regular classroom).
- The **midterms** will tentatively take place on **Wednesdays, January 31** and **February 28** during the regular class time and will be 50 minutes long.
- You **must take the final exam** in order to pass the class.
- **No make-up exams** will be possible.
- Students must bring their UCLA ID cards to the midterms and to the final exam.

Communication

Individual or group consultations and discussions are welcome during office hours. Other time may be possible, but **only** by appointment. I will be happy to communicate by email provided that you identify yourself by your full name and mention your class. Messages lacking that attribute will not be answered.

Tentative Course Schedule

The schedule below is tentative and subject to change. I may also occasionally swap a class with a discussion section. Details will be announced via the class mailing list. You should not sign up for the class unless you are able to attend both the class and the discussion sessions.

Week	Date	Section	Topics
	M, Jan 8	A.1-3	Review of Probability
1	W, Jan 10	A.1-3	Review of Probability
	F, Jan 12	1.1	Markov Chains
	M, Jan 15		No class
2	W, Jan 17	1.1	Examples of Markov Chains
	F, Jan 19	1.3	Classification of States
	M, Jan 22	1.4	Stationary Distributions
3	W, Jan 24	1.6	Limiting Behavior
	F, Jan 26	1.8	Proofs of Limiting Behavior
	M, Jan 29	1.8	Proofs of Limiting Behavior
4	W, Jan 31		**Midterm 1**
	F, Feb 2	1.11	Infinite State Spaces
	M, Feb 5	5.1	Conditional Expectation
5	W, Feb 7	5.2	Martingale Examples
	F, Feb 9	5.3	Gambling Strategies
	M, Feb 12	5.4	Applications to Random Walks
6	W, Feb 14	2.1	Exponential Distribution
	F, Feb 16	2.2	Poisson Process
	M, Feb 19		No class
7	W, Feb 21	2.2	Constructing the Poisson Process
	F, Feb 23	2.3	Compound Poisson Process
	M, Feb 26	2.4	Transformations
8	W, Feb 28		**Midterm 2**
	F, Mar 2	2.4	Transformations
	M, Mar 5	3.1	Laws of Large Numbers
9	W, Mar 7	3.2	Queueing Theory
	F, Mar 9	4.1	Continuous Time Markov Chains
	M, Mar 12	4.2-3	Continuous Time Markov Chains
10	W, Mar 14	6.5	Brownian Motion
	F, Mar 16		Course Review
11	M, Mar 19		**Final exam**

Notice about academic integrity

From the office of the Dean of Students:
"With its status as a world-class research institution, it is critical that the University uphold the highest standards of integrity both inside and outside the classroom. As a student and member of the UCLA community, you are expected to demonstrate integrity in all of your academic endeavors. Accordingly, when accusations of academic dishonesty occur, The Office of the Dean of Students is charged with investigating and adjudicating suspected violations. Academic dishonesty includes, but is not limited to, cheating, fabrication, plagiarism, multiple submissions or facilitating academic misconduct."

Students are expected to be aware of the University policy on academic integrity in the UCLA Student Conduct Code:
http://www.deanofstudents.ucla.edu/Portals/16/Documents/UCLACodeOfConduct_Rev030416.pdf
Please note the sections on (1) cheating, (2) plagiarism, and (3) unauthorized study aids.

Violation of course policy involving plagiarism, cheating, or possession of course materials during exams will be referred to the Dean of Students, who will be encouraged to take strong action. Do not cheat! The penalties can be very harsh. Do not believe it if you hear that "everyone does it." You generally do not hear about the punishments because they are kept confidential. If you are found responsible by the Dean of Students for violating course policy, cheating on any course materials, or giving or receiving unauthorized help, a zero will be assigned for the entire assignment. No exceptions will be made! Past examples of penalties also include loss of an entire term of credit and suspension for several terms. If you plan to apply to graduate or professional school, such a negative mark on your record may be a major obstacle to admission.

No cell phones are allowed during exams. They must be left in your bag and turned off, or submitted to the designated TA/proctor. Students may not use a cell phone as a clock to keep time, nor as a calculator. No hats are allowed in the testing room; they must be left in your bag.

Notice about sexual harassment, discrimination, and assault

Title IX prohibits gender discrimination, including sexual harassment, domestic and dating violence, sexual assault, and stalking. Students who have experienced sexual harassment or sexual violence can receive **confidential** support and advocacy from a CARE advocate:

The CARE Advocacy Office for Sexual and Gender-Based Violence
1st Floor, Wooden Center West
CAREadvocate@caps.ucla.edu
(310) 206-2465

You can also report sexual violence or sexual harassment directly to the University's Title IX Coordinator:

Kathleen Salvaty
2241 Murphy Hall
titleix@conet.ucla.edu
(310) 206-3417