STAT 150 **Stochastic Processes** **UC Berkeley, Fall 2018**

Instructor: Brett Kolesnik, bkolesnik@berkeley.edu

GSI: Mehdi Ouaki, mouaki@berkeley.edu

Lectures: Tues. and Thurs. at 9:30–11 AM in Evans 10.

Overview: STAT 150 is a second course in Probability Theory for majors in Statistics and related fields. Stochastic processes model random phenomena, as they evolve in time and space. Topics include: random walks, Markov chains, branching processes, Poisson processes, renewal theory, martingales, Brownian motion and queueing theory.

Course webpage: https://www.stat.berkeley.edu/~bkolesnik/stat150.html

Office hours: Instructor: Tues. 11–12 PM (after class) and Wed. 12–1 PM in Evans 351 (starting Tues., Sept. 4). GSI: Wed. 9–11 AM in Evans 446.

Piazza: Piazza is an online discussion forum. Your participation is strongly encouraged. Sign up here: https://www.piazza.com/berkeley/fall2018/stat150

Email: If you contact the instructor or GSI by email, please put "STAT 150" in the subject field, however only administrative issues and very brief questions will be dealt with by email. Please post all other questions or comments on Piazza, or else visit office hours.

Tutorials: Problem solving tutorials will be held weekly by the GSI (starting Fri., Aug. 31). Attendance is optional, but strongly encouraged. Time and place: 10–11 AM and 11–12 PM in Evans 342.

Text: The required course text is:

[PK] *An Introduction to Stochastic Modeling* (Pinsky and Karlin), available via ScienceDirect: https://www.sciencedirect.com/science/book/9780123814166

You may also find it useful to consult other textbooks which cover similar material, such as

[BZ] *Basic Stochastic Processes* (Brzezniak and Zastawniak)

[C] *Introduction to Stochastic Processes* (Cinlar)

[D] *Essentials of Stochastic Processes* (Durrett), available at the author's webpage: https://services.math.duke.edu/~rtd/EOSP/EOSP2E.pdf

[GZ] *Probability and Random Processes* (Grimmett and Stirzaker)

[R] *Stochastic Processes* (Ross).

The STAT 150 notes from Spring 2010 (Prof. Jim Pitman) and Fall 2015 (Prof. David Aldous): https://www.stat.berkeley.edu/~pitman/s150s10/ https://www.stat.berkeley.edu/~aldous/150/index.html

Prerequisites: STAT 134 or an equivalent first course in Probability Theory. If you did not receive at least B+ in STAT 134, you may find this course very challenging.

Topics: The course will roughly be based on Chapters 3–9 in Pinsky and Karlin [PK], although not all subsections therein will be covered, and additional material will be drawn from other sources (e.g., Chapter 5 in Durrett [D]). It is important to come to class and take notes. Topics include:

- Markov chains, branching processes [PK §3–4, D §1]
- Poisson processes [PK §5, D §2]
- Continuous time Markov chains [PK §6, D4]
- Martingales [PK §2.5, D §5]
- Brownian motion [PK §8]
- Renewal phenomena [PK §7, D §3]
- Queueing systems [PK §9, D §3].

Review: There is review material in [PK §1–2, D §A]. You may also find it useful to review your STAT 134 notes during the first weeks of term.

Evaluation: Homework assignments, 2 midterm tests (in class) and a final exam.

Grading: Final grades will be calculated as follows: 10% homework, 20% each midterm and 50% final.

Midterm tests: Thurs., Oct. 4 and Thurs., Nov. 15, in class (9:30–11 AM in Evans 10).

Final exam: Tues., Dec 11 at 3–6 PM. Location: TBA.

Homework: A total of 8 assignments will be given and marked for credit, although some assigned questions may not be graded. Some assignments may be longer or more difficult than others. The average of your assignment scores will be used to calculate your final homework grade (worth 10% overall). Assignments are due at the beginning of class on the due date. No late assignments will be accepted. The tentative assignment due dates are as follows:

HW	Due
#1	Thurs., Sept. 6
#2	Thurs., Sept. 13
#3	Thurs., Sept. 27
(MT #1	Thurs., Oct. 4, in class)
#4	Tues., Oct. 16
#5	Thurs., Oct. 25
#6	Thurs., Nov. 1
(MT #2	Thurs., Nov. 8, in class)
#7	Tues., Nov. 20
#8	Thurs., Nov. 29
(Final	Tues., Dec. 11, 3–6 PM in TBA)

Drop deadline: The last day to drop is Wed., Sept. 12 at 11:59 PM.

Holidays: No class on Thurs., Nov. 22 (Thanksgiving).

Academic integrity: UC Berkeley's honour code states:

> *As a member of the UC Berkeley community, I act with honesty, integrity, and respect for others.*

Cheating: Anyone caught cheating on a quiz or exam will receive a failing grade and will also be reported to the University Office of Student Conduct. In order to guarantee that you are not suspected of cheating, please keep your eyes on your own materials and do not converse with others during the quizzes and exams.

Plagiarism/self-plagiarism: You must be original in composing the writing assignments in this class. To copy text or ideas from another source (including your own previously, or concurrently, submitted course work) without appropriate reference is plagiarism and will result in a failing grade for your assignment and usually further disciplinary action. For additional information on plagiarism, self-plagiarism, and how to avoid it, see, for example:
`http://www.lib.berkeley.edu/instruct/guides/citations.html#Plagiarism`
`http://gsi.berkeley.edu/teachingguide/misconduct/prevent-plag.html`

Accomodations for students with disabilities: Please see me (during office hours) or email me as soon as possible if you need particular accommodations, and we will work out the necessary arrangements.

Scheduling conflicts: Please email me by the second week of the term about any known or potential extracurricular conflicts (such as religious observances, graduate or medical school interviews, or team activities). I will try my best to help you with making accommodations, but cannot promise them in all cases. If there is no mutually workable solution, you may be dropped from the class.