Stats 217: Introduction to Stochastic Processes I

Stanford University

Summer, 2022 (SCPD)

1 Course summary

This course is the first of a two-quarter sequence (along with STATS 218) exploring the rich theory of stochastic processes. The main topics covered this quarter are: discrete and continuous time Markov chains, Poisson processes, Random walks, branching processes, first passage times, recurrence and transience, stationary distributions. The prerequisites for this course are STATS 116 or equivalent.

2 SCPD

Video cameras located in the back of the room will capture the instructor presentations in this course. For your convenience, you can access these recordings by logging into the course Canvas site. These recordings might be reused in other Stanford courses, viewed by other Stanford students, faculty, or staff, or used for other education and research purposes. Note that while the cameras are positioned with the intention of recording only the instructor, occasionally a part of your image or voice might be incidentally captured. If you have questions, please contact a member of the teaching team, or preferably, any one in the following list:

- Pax Hehmeyer. pax@stanford.edu.
- Lina Piezas. linat@stanford.edu.
- Cecilia Canales. bcanales@stanford.edu.
- Jeffery Wang. jeffws20@stanford.edu.
- Susie Ementon. susiele@stanford.edu.

3 Location and hours

- Location: Thornton 102.
- Hours: Tu and Th 1:30 pm - 3 pm Pacific Time.
4 Course staff

1. **Instructor:** Apratim Dey.
   (a) **Email:** apd1995@stanford.edu
   (b) **Office hours:** Th 5-6 pm Pacific Time.
   (c) **Location:** OH location Sequioa Library (First Floor), Zoom link to be added on Canvas.

2. **Teaching Assistant:** Rahul Kanekar.
   (a) **Email:** rkanekar@stanford.edu
   (b) **Office hours:** Tu and Fri 5-6 pm Pacific Time.
   (c) **Location:** OH location Sequioa Room 207 (Bowker), Zoom link to be added on Canvas.

5 Course materials

All course materials including syllabus, lecture notes, recordings, office hour links, etc. will be posted on Canvas.

6 Ed

We will use Ed as the discussion platform for the course. You should be able to access it from the navigation bar on Canvas.

7 Grading

1. **Homeworks (50%)**

   - There will be a total of 7 weekly homeworks.
   - Homeworks will be released every week on Wednesday and will be due on the Wednesday of the following week.
   - Each homework will contain 2 problems.
   - Late days will NOT be allowed. We feel this is reasonable because there are only two problems per week and we wish to release the solutions as soon as possible.
   - The best 6 homeworks will count (equally) towards the final grade. So, if for any reason you cannot submit a homework, don’t worry and try to do well on the other homeworks.
   - Homeworks can be either handwritten or typeset, but if you are asked to provide codes or plots, please submit them in the natural format.
2. Midterm (20%)
   • There will be a take-home midterm.
   • The midterm will be released on July 15, 2022 (Friday) at 10 am Pacific Time.
   • You will be allowed 24 hours to work on the midterm. So the midterm will be due on July 16, 2022 (Saturday) at 10 am Pacific Time.
   • The midterm should be uploaded on Gradescope (see next section).

3. Final exam (30%)
   • There will be a take-home final exam.
   • The final will be released on August 12, 2022 (Friday) at 10 am Pacific Time.
   • You will be allowed 24 hours to work on the final. So the final will be due on August 13, 2022 (Saturday) at 10 am Pacific Time.
   • The final should be uploaded on Gradescope (see next section).

8 Gradescope

All homeworks, midterm and final should be submitted to Gradescope. Please take care to tag each page to the correct question while submitting. You can access Gradescope through the navigation bar on Canvas. Entry code: DJ54VP.

9 Programming

There may be some (hopefully not too heavy) programming component in homeworks and exams with the aim to clarify or exemplify some concept covered in lecture or to perform some exploration into something not touched upon. You are allowed to use any programming language of your choice, although the course staff will probably only be able to help you with R or Python if you run into issues.

10 Textbook

Some useful references for this course are:

- *Introduction to Stochastic Processes* by Hoel, Port, and Stone.
- *An Introduction to Stochastic Modeling* by Pinsky and Karlin.
11 Students with Documented Disabilities

Students who may need an academic accommodation based on the impact of a disability must initiate the request with the Office of Accessible Education (OAE). Professional staff will evaluate the request, review appropriate medical documentation, recommend reasonable accommodations, and prepare an Accommodation Letter for faculty. The letter will indicate how long it is to be in effect. Students should contact the OAE as soon as possible since timely notice is needed to coordinate accommodations. Students should also send your accommodation letter to instructors as soon as possible. The OAE is located at 563 Salvatierra Walk (phone: 723-1066, URL: http://oae.stanford.edu).