San José State University
Department of Mathematics and Statistics
Math 263 Stochastic Processes, Section 2, Spring 2019

Course and Contact Information

Instructor:	Guangliang Chen
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Office Hours:	1-2:30pm TR, and by appointment (MW 9-2:30pm)
Class Days/Time:	TR 9-10:15am
Classroom:	MH 323
Prerequisites:	Math 129A and Math 163 (each with a grade of B or better)

Faculty Web Page and MYSJSU Messaging

Course materials such as syllabus, handouts, notes, assignment instructions, etc. can be found on Canvas Learning Management System course login website at http://sjsu.instructure.com. You are responsible for regularly checking with the messaging system to learn of any updates.

Course Description

Introductory course in stochastic processes and their applications. The course will cover random walks, discrete time Markov chains, the Poisson process, continuous time Markov processes, renewal theory and queuing theory, and application of stochastic process to clustering.

Course Learning Outcomes (CLO)

Upon successful completion of this course, students will be able to:

1. Become familiar with a number of discrete and continuous stochastic process models.
2. Learn to differentiate between the models and be able to choose the correct model for a given application.
3. Apply stochastic process models in practical applications using software.

Required Texts/Readings

Textbook

Introduction to Probability Models, Academic Press, 10th edition (December 17, 2009), by Sheldon M. Ross (Older editions of the book are fine for reading, but homework will be assigned based on the 10th ed).

Other Readings

1. A Tutorial on Spectral Clustering, Ulrike von Luxburg, Stat Comput (2007) 17: 395-416. ArXiv version of the paper is available at https://arxiv.org/abs/0711.0189
2. Diffusion Maps, Coifman and Lafon, Appl. Comput. Harmon. Anal. 21 (2006) 5–30. Available at https://doi.org/10.1016/j.acha.2006.04.006

Other technology requirements / equipment / material

The instructor may occasionally use Matlab for some class demonstrations; however, you are not required to know the programming language.

Course Requirements and Assignments

Course requirements include weekly homework assignments, a midterm exam, a project, and a final exam.

You are expected to attend all classes and actively participate in classroom discussions which often lead to a deeper understanding of the concepts and are also strongly associated with course grade.

The homework assignments will be mostly theory questions. Detailed instructions about homework will be provided in class.

The students may collaborate on homework but must write independent solutions according to their own understanding. Copying and other forms of cheating will not be tolerated and may result in a failing grade for the course, possibly combined with other disciplinary actions from the university.

Success in this course is based on the expectation that students will spend, for each unit of credit, a minimum of 45 hours over the length of the course (normally three hours per unit per week) for instruction, preparation/ studying, or course related activities, including but not limited to internships, labs, and clinical practica. Other course structures will have equivalent workload expectations as described in the syllabus.

Final Examination or Evaluation

The course will end with a comprehensive final exam as well as a project to be selected between the students and the instructor.

The project will require you to apply a stochastic process model to a real data set (this could be a new application, or a replication of some experiments in a scientific paper). Students are allowed to work either individually or in pairs. They will need to give a short oral presentation in the last class. More details will be given near the end of the semester.

Grading Information

You must submit homework on time to receive full credit. No make-up exam will be given if you miss the midterm exam (unless you have a legitimate excuse such as illness or other personal emergencies and can provide documented evidence).

You must show all your work for both homework and tests. Note that it is your work (in terms of correctness, completeness, and clarity), not just your answer, that is graded. Thus, correct answers with no or poorly written supporting steps may receive very little credit.

The weights in determining the semester average are:

- Homework (weekly): 25%
- Midterm (March 14, Thursday): 25%
- Project (presentation due last class): 10%
- Final exam (Friday, May 17): 40%

I expect to use the following cutoffs for assigning your course grade (I reserve the right to slightly adjust these percentages in order to better reflect the actual distribution of the class in the end):

Grade	*Points*	*Percentage*
A plus	*388 to 400*	*97 to 100%*
A	*372 to 387*	*93 to 96%*
A minus	*360 to 371*	*90 to 92%*
B plus	*348 to 359*	*87 to 89 %*
B	*332 to 347*	*83 to 86%*
B minus	*320 to 331*	*80 to 82%*
C plus	*308 to 319*	*77 to 79%*
C	*292 to 307*	*73 to 76%*
C minus	*280 to 291*	*70 to 72%*
D plus	*268 to 279*	*67 to 69%*
D	*252 to 267*	*63 to 66%*
D minus	*240 to 251*	*60 to 62%*
F	*0 to 239*	

Classroom Protocol

- The class starts on time, so please do not be late.
- If you miss a class, you are responsible for finding out what's said/done in that class (such as new announcement, deadline change, etc.) and responding accordingly.
- Please make sure to turn off or mute your cell phone during class.
- Please do not perform irrelevant or distracting activities in class.
- Academic dishonesty at any level is not tolerated and will be surely reported to the Office of Student Conduct (per SJSU policy).

University Policies

Per University Policy S16-9 *(http://www.sjsu.edu/senate/docs/S16-9.pdf)*, relevant information to all courses, such as academic integrity, accommodations, dropping and adding, consent for recording of class, etc. is available on Office of Graduate and Undergraduate Programs' Syllabus Information web page at http://www.sjsu.edu/gup/syllabusinfo/".

Math 263 Stochastic Processes, Spring 2019, Course Schedule

This schedule is subject to change with fair notice in class and also through Canvas messaging system.

Week	Date	Topics, Readings, Assignments, Deadlines	Textbook sections
1	Jan. 24	Introduction	Introduction and review
2	29	Probability distributions review	
2	31	Conditional probability, expectation and variance	
3	Feb. 5	Discrete Markov Chains	Chapter 4 (4.1 – 4.9)
3	7	Discrete Markov Chains	
4	12	Discrete Markov Chains	
4	14	Discrete Markov Chains	
5	19	Discrete Markov Chains	
5	21	Discrete Markov Chains	
6	26	Poisson process	Chapter 5 (5.1 – 5.4)
6	28	Poisson process	
7	Mar. 5	Poisson process	
7	7	Poisson process	
8	12	Review	
8	14	Midterm	
9	19	Continuous Time Markov Chains	Chapter 6 (6.1 – 6.5)
9	21	Continuous Time Markov Chains	
10	26	Continuous Time Markov Chains	
10	28	Continuous Time Markov Chains	
	April 1-5	Spring break	
11	9	Renewal theory and its applications	Chapter 7 (7.1 – 7.4)
11	11	Renewal theory and its applications	
12	16	Renewal theory and its applications	
12	18	Renewal theory and its applications	
13	23	Brownian motion	Chapter 10 (10.1 – 10.3)
13	25	Brownian motion	
14	30	Brownian motion	
14	May 2	Brownian motion	
15	7	Review	Last week
15	9	Project presentations	
Final Exam	17	Friday, 7:15 - 9:30am	