**San José State University**

# Engineering School/Electrical Engineering Department EE250, Probability, Random Variables, and Stochastic Processes Section 2, Fall 2019

## Course and Contact Information

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| Instructor: | Jalil Kamali |
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| Office Hours: | MW 19:00-19:30 |
| Class Days/Time: | MW 19:30-20:45 |
| Classroom: | ENG 345 |
| Prerequisites: | EE102, EE112 |

## Course Description

This course is a graduate-level course on probability theory, random processes and their applications in electrical engineering. Topics covered include review of probability, random variables, transform techniques, random processes, filtering of random signals and Markov chains. The course covers random processes in detail: discusses autocorrelation, power spectral density, stationarity, effect of filtering and estimation of random signals. We will also discuss applications of random processes in signal processing, communications and queueing theory.

### Course Learning Outcomes (CLO)

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

* **LO1** Define a random experiment, outcome, event, certain event, null event, and
* sample space
* **LO2** Find the probability of an event
* **LO3** Determine whether events are equally likely, mutually exclusive or independent
* **LO4** Define a random variable; classify random variables as discrete or continuous, compute probabilities from probability mass (density) functions and cumulative distribution functions
* **LO5** Calculate mean, variance, moments, probabilities associated with a random variance and its transformations
* **LO6** Compute probabilities (joint and conditional) of two random variables. Test independence of two random variables
* **LO7** Analyze probabilities associated with multiple random variables and with its transformations
* **LO8** Compute covariance and correlation for two random variables
* **LO9** Define a random process and classify random processes
* **LO10** Analyze and characterize random processes in terms of probability density function
* **LO11** Identify if a process is stationary (both strict-sense and wide-sense)
* **LO12** Compute the autocorrelation and the power spectral density of a stationary random process
* **LO13** Define basic properties of a Markov chain and identify if a process is Markov chain
* **LO14** Apply the concepts of probability, random variables and random processes to analyze problems

## Required Texts/Readings

### Textbook

Probability, Statistics, and Random Processes for Electrical Engineering by A. Leon-Garcia, Prentice Hall, (3rd Ed).

The textbook is closely followed in the class and the covered sections of each chapter are announced. Students are responsible to read those sections.

### Other Readings

Probability, Random Variables, and Stochastic Processes by A. Papoulis and S.U.

Pillai, Mc-Graw Hill, 4th Ed., 2002.

## Course Requirements and Assignments

Homework assignments will be given regularly. While the students are not asked to hand in the solution and it will not be part of the grading, it is an essential part of learning. Thus, students are urged to try to solve these problems on their own. Solutions to these problem sets will also be distributed.

### Evaluation

There will be two midterms and one final examination. Exams cover the assigned reading materials and class lecture notes.

Midterm 1: Wednesday October 2nd, class time

Midterm 2: Wednesday November 6th, class time

Final Exam: Wednesday December 11th, 19:45 – 22:00

## Grading Information

Midterm 1: 30%

Midterm 2: 30%

Final Exam: 40%

### Determination of Grades

The grade determination is slightly subjective. The following is the general guideline which may be adjusted to help students. Use of plus/minus in grading will be considered.

| *Grade* | *Percentage* |
| --- | --- |
| *A* | *above 85%* |
| *B* | *70% to 84%* |
| *C* | *60% to 69%* |
| *D* | *50% to 59%* |

## Classroom Protocol

Attendance is not required in this course. However, students who choose to miss the class are responsible to find out what is covered in the classroom (course material as well as the announcements). Students must arrive on time (before the teacher) and use of cell phone and laptop in the classroom is strictly prohibited.

## University Policies

Per [University Policy S16-9](http://www.sjsu.edu/senate/docs/S16-9.pdf) *(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](http://www.sjsu.edu/gup/syllabusinfo/) at http://www.sjsu.edu/gup/syllabusinfo/”. Make sure to visit this page, review and be familiar with these university policies and resources.