

San José State University
College of Engineering/Electrical Engineering
EE250, Probability, Random Variables and Stochastic Processes, Section 01,
Fall 2017

Course and Contact Information

Instructor:	Birsen Sirkeci
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Office Hours:	MW 1.45pm - 2:45pm and by appointment
Class Days/Time:	MW 3.00pm - 4.15pm
Classroom:	ENGR 331
Prerequisites:	EE 112 (Linear Systems), EE 102 (Probability and Statistical Analysis)

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 through [MySJSU](#) at <http://my.sjsu.edu> and SJSU Canvas to learn of any updates.

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 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 Understand the concepts: experiment, outcome, event, certain event, null event, outcome, and sample space*
- *LO2 Find the probability of an event*
- *LO3 Understand the concepts equally likely, mutually exclusive and independent*
- *LO4 Understand the definition of a random variable.*

- LO5 Understand and use the probability density functions, mean, and variance.
- LO6 Understand and analyze probabilities associated with a random variable.
- LO7 Understand and analyze probabilities associated with transformations of a random variable.
- LO8 Understand the definition of multiple random variables.
- LO9 Specify multiple random variables in terms of their joint probability density functions and statistics.
- LO10 Understand and analyze probabilities associated with multiple random variables.
- LO11 Understand and analyze probabilities associated with transformations of multiple random variables.
- LO12 Understand the definition of a random process.
- LO13 Analyze and characterize random processes in terms of probability density function
- LO14 Understand the stationarity (both strict-sense and wide-sense)
- LO15 Compute the autocorrelation and the power spectral density of a stationary random process
- LO16 Understand basics of Markov chains
- LO17 Apply the concepts of probability, random variables and random processes to analyze problems

Required Texts/Readings

Textbook

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

Other Readings

1. *Probability, Random Variables, and Stochastic Processes* by A. Papoulis and S.U. Pillai, Mc-Graw Hill, 4th Ed., 2002.
2. *Introduction to Probability* by D.P. Bertsekas and J.N. Tsitsiklis, Athena Scientific, 2nd Ed., 2002.
3. *Intuitive Probability and Random Processes using MATLAB* by S. Kay, Springer, 2006.

Other technology requirements / equipment / material

Materials/Handouts posted on the course webpage.

Course Requirements and Assignments

SJSU classes are designed such that in order to be successful, it is expected that students will spend a minimum of forty-five hours for each unit of credit (normally three hours per unit per week), including preparing for class, participating in course activities, completing assignments, and so on. More details about student workload can be found in [University Policy S12-3](http://www.sjsu.edu/senate/docs/S12-3.pdf) at <http://www.sjsu.edu/senate/docs/S12-3.pdf>.

There will be two midterm exams and a final exam. All exams are CLOSED book and notes. Students can bring a formula sheet. Exams cover the assigned reading materials and class lecture notes. There will be NO make-up exams. Exam solutions will be posted on the web site of the course.

Assignments will be given regularly and will be due one week from the assigned date. Late submissions will not be accepted. MATLAB/Excell/Python/R (or a similar tool) may be used as a programming language for the homework.

NOTE that [University policy F69-24](http://www.sjsu.edu/senate/docs/F69-24.pdf) at <http://www.sjsu.edu/senate/docs/F69-24.pdf> states that “Students should attend all meetings of their classes, not only because they are responsible for material discussed therein, but because active participation is frequently essential to insure maximum benefit for all members of the class. Attendance per se shall not be used as a criterion for grading.”

Final Examination or Evaluation

Final exam will be held on Dec 13th during 12.15pm-2.30pm. It will be comprehensive and will be count as 35% of the total grade.

Grading Information

Grades

<i>Midterm 1 (Oct 11)</i>	<i>30 %</i>
<i>Midterm 2 (Nov 8)</i>	<i>30 %</i>
<i>Final exam (Dec 13)</i>	<i>35 %</i>
<i>Assignments</i>	<i>5 %</i>
<i>Total</i>	<i>100%</i>

Extra credits will be announced during lectures and course website when available.

Grading Percentage Breakdown (tentative):

<i>90% and above</i>	<i>A</i>
<i>89% - 85%</i>	<i>A-</i>
<i>84% - 82%</i>	<i>B+</i>
<i>81% - 79%</i>	<i>B</i>
<i>78% - 75%</i>	<i>B-</i>
<i>74% - 72%</i>	<i>C+</i>
<i>71% - 69%</i>	<i>C</i>
<i>68% - 65%</i>	<i>C-</i>
<i>64% - 62%</i>	<i>D+</i>
<i>61% - 59%</i>	<i>D</i>
<i>58% - 55%</i>	<i>D-</i>
<i>below 55%</i>	<i>F</i>

Classroom Protocol

Students should turn their cell phones off or put them on vibrate mode while in class. Students are expected to participate in class discussions as well as online discussion in the class website. Asking questions during class-time related to the lectures is encouraged.

University Policies

Per University Policy S16-9, university-wide policy information relevant to all courses, such as academic integrity, accommodations, etc. will be 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/>"

EE250 / Probability, Random Variables and Stochastic Processes, Fall 2017

Course Schedule

Course Schedule (Subject to change with fair notice as announced by instructor in class)

Week	Date	Topics, Readings, Assignments, Deadlines
1	Aug 23	Introduction and Probability Models
2	Aug 28	Basic Concepts of Probability
2	Aug 30	Conditional Probability and Independence of Events
3	Sep 4	LABOR DAY – CAMPUS CLOSED
3	Sep 6	Discrete Random Variables – Definition and PMF
4	Sep 11	Discrete Random Variables – Expected Value and Moments
4	Sep 13	Discrete Random Variables – CDF
5	Sep 18	Important Discrete Random Variables
5	Sep 20	Continuous Random Variables - CDF
6	Sep 25	Continuous Random Variables – PDF and Expected Value
6	Sep 27	Important Continuous Random Variables
7	Oct 2	Continuous Random Variables
7	Oct 4	Functions of Continuous Random Variables
8	Oct 9	Multiple Random Variables – Pairs of Discrete RVs
8	Oct 11	MIDTERM 1
9	Oct 16	Multiple random variables – Joint PMF
9	Oct 18	Multiple random variables – Functions of two discrete RVs
10	Oct 23	Multiple random variables - Joint CDF & PDF
10	Oct 25	Multiple random variables - Functions of two continuous RVs
11	Oct 30	Multiple random variables – Independence of RVs
11	Nov 1	Multiple random variables - Jointly Gaussian RVs
12	Nov 6	Introduction to random processes – definition & stationarity
12	Nov 8	MIDTERM 2
13	Nov 13	Random processes – examples
13	Nov 15	Random processes – examples
14	Nov 20	Analysis and processing of random signals
14	Nov 22	Non-Instructional Day – Campus Open
15	Nov 27	Analysis and processing of random signals

Week	Date	Topics, Readings, Assignments, Deadlines
15	Nov 29	Analysis and processing of random signals
16	Dec 4	Markov Chains
16	Dec 6	Markov Chains
17	Dec 11	Review for the FINAL EXAM
Final Exam		Dec 13th during 12.15pm-2.30pm, classroom: TBD

San Jose State University
Electrical Engineering Department

EE Department Honor Code

The Electrical Engineering Department will enforce the following Honor Code that must be read and accepted by all students.

“I have read the Honor Code and agree with its provisions. My continued enrollment in this course constitutes full acceptance of this code. I will NOT:

- *Take an exam in place of someone else, or have someone take an exam in my place*
- *Give information or receive information from another person during an exam*
- *Use more reference material during an exam than is allowed by the instructor*
- *Obtain a copy of an exam prior to the time it is given*
- *Alter an exam after it has been graded and then return it to the instructor for re-grading*
- *Leave the exam room without returning the exam to the instructor.”*

Measures Dealing with Occurrences of Cheating

- *Department policy mandates that the student or students involved in cheating will receive an “F” on that evaluation instrument (paper, exam, project, homework, etc.) and will be reported to the Department and the University.*
- *A student’s second offense in any course will result in a Department recommendation of suspension from the University.*