

San José State University
School/Department
EE250, Probability, Random Variables and Stochastic
Processes, 2, Spring 2009

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| Instructor: | Birsen Sirkeci |
| Office Location: | ENGR 359 |
| Telephone: | (408) (924-3913) |
| Email: | bsirkeci@email.sjsu.edu |
| Office Hours: | Tues 10:30am-12:30pm, Tues 3:30pm-6:30pm |
| Class Days/Time: | Mon Wed 6:00pm-7:15pm |
| Classroom: | ENGR 345 |
| Prerequisites: | EE112 (Linear Systems), EE102 (Probability and Statistical Analysis) |

Faculty Web Page and MYSJSU Messaging (Optional)

Copies of the course materials such as the syllabus, assignment handouts, etc. may be found on my course web page accessible through the WebCT. You are responsible for regularly checking with the messaging system through MySJSU or WebCT.

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 Goals and Student Learning Objectives

1. Ability to understand the concepts: experiment, outcome, event, certain event, null event, outcome, and sample space
2. Ability to find the probability of an event
3. Ability to understand the concepts equally likely, mutually exclusive and independent

4. Ability to understand the definition of a random variable.
5. Ability to understand and use the probability density functions, mean, and variance.
6. Ability to understand and analyze probabilities associated with a random variable.
7. Ability to understand and analyze probabilities associated with transformations of a random variable.
8. Ability to understand the definition of multiple random variables.
9. Ability to specify multiple random variables in terms of their joint probability density functions and statistics.
10. Ability to understand and analyze probabilities associated with multiple random variables.
11. Ability to understand and analyze probabilities associated with transformations of multiple random variables.
12. Ability to understand the definition of a random process.
13. Ability to analyze and characterize random processes in terms of probability density function
14. Ability to understand the stationarity (both strict-sense and wide-sense)
15. Ability to compute the autocorrelation and the power spectral density of a stationary random process
16. Ability to understand basics of Markov chains
17. Ability to 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 or 2nd Ed).

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 equipment / material requirements (optional)

Handouts posted on the webpage.

Classroom Protocol

Students will turn their cell phones off or put them on vibrate mode while in class. They will not answer their phones in class. Students whose phones disrupt the course and do not stop when requested by the instructor will be referred to the Judicial Affairs Officer of the University.

Dropping and Adding

Students are responsible for understanding the policies and procedures about add/drops, academic renewal, etc. [Information on add/drops are available at http://info.sjsu.edu/web-dbgen/narr/soc-fall/rec-298.html](http://info.sjsu.edu/web-dbgen/narr/soc-fall/rec-298.html). [Information about late drop is available at http://www.sjsu.edu/sac/advising/latedrops/policy/](http://www.sjsu.edu/sac/advising/latedrops/policy/). Students should be aware of the current deadlines and penalties for adding and dropping classes.

Assignments and Grading Policy

| | |
|------------------------------------|-------------|
| Assignments | % 10 |
| Midterm-1 (MARCH 4 th) | % 25 |
| Midterm-2 (APRIL 8 th) | % 30 |
| Final Exam | % 35 |
| Total | 100% |

a. Exams: There will be two midterm exams and a final exam. All exams are CLOSED book and notes. Students can bring a formula sheet (one page – both sides).

b. Homework: Homework assignments will be given regularly and will be due one week from the assigned date. Late homework will not be accepted.

University Policies

Academic integrity

Students should know that the University's [Academic Integrity Policy is available at http://www.sa.sjsu.edu/download/judicial_affairs/Academic_Integrity_Policy_S07-2.pdf](http://www.sa.sjsu.edu/download/judicial_affairs/Academic_Integrity_Policy_S07-2.pdf).

Your own commitment to learning, as evidenced by your enrollment at San Jose State University and the University's integrity policy, require you to be honest in all your academic course work. Faculty members are required to report all infractions to the office of Student Conduct and Ethical Development. The website for [Student Conduct and Ethical Development is available at http://www.sa.sjsu.edu/judicial_affairs/index.html](http://www.sa.sjsu.edu/judicial_affairs/index.html).

Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade and sanctions by the University. For this class, all assignments are to be completed by the individual student unless otherwise specified. If you would like to include in your assignment any material you have submitted, or plan to submit for another class, please note that SJSU's Academic Policy F06-1 requires approval of instructors.

Campus Policy in Compliance with the American Disabilities Act

If you need course adaptations or accommodations because of a disability, or if you need to make special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible, or see me during office hours. Presidential Directive 97-03 requires that students with disabilities requesting accommodations must register with the DRC (Disability Resource Center) to establish a record of their disability.

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.

Course Number / Title, Semester, Course Schedule

Table 1 Course Schedule

| Week | Date | Topics, Readings, Assignments, Deadlines |
|-------------|-------------------|---|
| 1 | Jan 26, 28 | Introduction and Probability Models |
| 2 | Feb 2,4 | Basics Concepts of Probability |
| 3 | Feb 9,11 | Discrete Random Variables |
| 4 | Feb 16,18 | Continuous Random Variables |
| 5 | Feb 23,25 | Continuous/Mixed Random Variable |
| 6 | March 2,4 | Review of single random variables and MIDTERM-1 examination |
| 7 | March 9,11 | Multiple random variables |
| 8 | March 16,18 | Multiple random variables |
| 9 | March 23, 25 | Spring Recess |
| 10 | March 30, April 1 | Multiple random variables Introduction to random processes |
| 11 | April 6,8 | Review of topics and MIDTERM-2 examination |
| 12 | April 13,15 | Stationarity |
| 13 | April 20,22 | Analysis and Processing of Random Signals |
| 14 | April 27,29 | Analysis and Processing of Random Signals |
| 15 | May 4,6 | Markov Chains |
| 16 | May 11,13 | Markov Chains |
| Final Exam | May 18 | Time: 1715-1930 |

