

West Virginia University
EE 513: Stochastic Systems Theory
(Probability and Stochastic Processes for Engineers)

General Information
Fall 2008

Instructor: Natalia A. Schmid
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Office hours: TBA
Class Room: G84
Meeting Time: Tu., Th. 11am. - 12:15 pm.
URL: <http://www.csee.wvu.edu/~natalias/ee513/ee513.html>
(This web-page will contain important announcements and materials handed out in class.)

1. Homework:

Homework will be assigned biweekly. Solutions will be posted on the day homework is due. The solutions will be distributed in class or posted on the following web site <http://www.csee.wvu.edu/~natalias/ee513/ee513.html>. Two problems will be selected at random from each homework set to be graded carefully. The overall homework grade will be determined by the average of all homework scores. Homework is an important part of the course, so doing it thoughtfully and carefully is recommended.

2. Grade:

The final grade in this course will be determined as follows:

The composition of the final grade	Grading Policy
Homework, 30%	A is guaranteed: 90-100 points
Midterm examination, 35%	B is guaranteed: 80-90 points
Final examination, 35%	C is guaranteed: 65-80 points

3. Prerequisites:

- STAT 215
- While there is no other specific prerequisite for this course besides graduate standing, some exposure and understanding of the following undergraduate subjects is assumed: signal and linear systems; the “usual” undergraduate engineering mathematics (including Calculus); and introduction to probability.

4. Computer usage:

Some homework problems will require using a computer. No specific computer or computer language will be required. Please, establish a computer account.

5. Expected Outcomes:

By the end of the term students are expected:

- To be able to specify the probability space; give a definition of random variable.
- Given a description of a random variable and a transformation, to evaluate the probability mass / probability density function for the transformed random variable;

- To evaluate various functions of a single random variable;
- To write expressions for joint and marginal probabilities;
- Given a transformation and a vector of random variables, to derive the probability mass / density function for the transformed joint random variables;
- To write expressions for conditional probabilities and conditional expectations;
- To state and prove laws of large numbers and the central limit theorem;
- To give definition of random process.
- Characterize random processes in linear systems;
- To understand the concept of linear filtering. To characterize discrete time Kalman filter.

6. Textbook:

There are many textbooks about the subject of this course.

The one listed as required for the course is *Probability and Random Processes for Electrical Engineering* written by A. Leon-Garcia and published by Addison-Wesley in 2008. Therefore, this text book will be followed relatively closely.

Some useful material and advanced topics are covered in the book *Probability, Random Variables, and Stochastic Processes* written by A. Papoulis. Other books and references should be consulted as necessary for grasping the material.

7. Missed Test Policy:

You are expected to attend the midterm and the final exams at the scheduled times and dates. If you have an unavoidable conflict, please let me know as soon as possible, but no later than one week before the exam. If you miss an exam without first having your absence approved, then you will be given the opportunity to make it up only if you have received approval from the Associate Dean of Academic Affairs.

8. Regrading:

If you believe that I made a mistake or was unfair in my grading, you may request a regrade. However, the request must be made in writing and within one week that the assignment or exam was returned. The decision to change the grade is entirely at my discretion.

9. Attendance:

Attendance will not be taken. However, you will be responsible for all material covered in class, even if it is not in the textbook. It is your responsibility to make sure that you are present for all tests, that all assignments are turned in on time, and that you are aware of all announcements made in class. Please arrive to class on time.

Social Justice Statement:

West Virginia University is committed to social justice. I concur with that commitment and expect to foster a nurturing learning environment, based upon open communication, mutual respect, and non-discrimination. Our University does not discriminate on the basis of race, sex, age, disability, veteran status, religion, sexual orientation, color or national origin. Any suggestions as to how to further such a positive and open environment in this class will be appreciated and given serious consideration. If you are a person with a disability and anticipate needing any type of accommodation in order to participate in this class, please advise me and make appropriate arrangements with Disability Services (293-6700). If you feel that you are being treated inappropriately or unfairly in any way, please feel free to bring your concerns to my attention. Please be assured that doing so will not prejudice the grading process. In return, I expect you to behave professionally and ethically.

Tentative Schedule Fall 2008

Topic	Schedule
Course Policies; Schedule;	1 lecture
Introduction: probability spaces; Random variables: definition and characterization	2 lectures
Probability distribution & densities, mapping of a single random variable	3 lectures
Expectation, moments, characteristic functions, and other functions of random variables; Probability bounds	3 lectures
Joint random variables; Conditional probabilities; Transformations of joint random variables; Functions of joint random variables	4 lectures
Law of large numbers; Central limit theorem	2 lectures
Examination #1	1 lecture
Random processes: definition and characterization	3 lectures
Covariance and power spectra	2 lectures
Random processes in linear systems	2 lectures
Gaussian processes	3 lectures
Kalman Filter	2 lectures
Final examination (Exam #2)	

- No classes will be scheduled on **Sept. 30, 2008**.
- Examination #1: **TBA**
- Final examination (Exam #2): **TBA**