2102401 Random Processes for Electrical Engineering

Semester 1, 2015

Schedule: Mon, Wed 11 AM - 12:30 PM, ENG3 #320

Instructors:

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Prerequisite: 2102203 Probability & Statistics for Electrical Engineering

Course web: http://jitkomut.lecturer.eng.chula.ac.th/ee507.html (for lecture notes download). Students can check scores from CU blackboard.

Course Description: Basic concepts of probability theory; random variables; (joint) distribution functions; mean, variance, covariance, and correlation; sum of random variables and law of large number; stochastic process; stationary random processes, analysis of random signals, power spectral density, response of linear systems to random signals, amplitude modulation by random signals, optimal linear estimator.

Grading policy: Pre-quiz 5%, 2 quizes 20%, Homework 15%, Midterm 30%, Final 30%

Textbooks:

- Alberto Leon-Garcia, *Probability, Statistics, and Random Processes for Electrical Engineering*, 3rd edition, Pearson Prentice Hall, 2009.
- Roy D. Yates and David J. Goodman, *Probability and Stochastic Processes: A Friendly Introduction for Electrical and Computer Engineers*, 2nd Edition, John Wiley & Sons, 2005.

Course Objectives:

1. To explain the basic concepts of probability theory, random variables, and stochastic processes.
2. To calculate the mean, variance, covariance, and correlation of one or more random variables.
3. To analyze probability models from their distribution functions.
4. To identify and classify different stochastic processes.
5. To analyze random signals using probability models.
6. To compute the power spectral density of random signals.
7. To analyze the response of linear systems with random signal inputs
8. To design an optimal linear filter

Exam Rules: Unless it is stated otherwise, for examinations, students are allowed to bring 1 sheet (two pages) of A4-sized paper with handwritten formulas. No photocopies are allowed. A scientific calculator per student is permitted.

Course outline

Week	Date	Outline	Homework
1	Aug 10	Review of Probability	
	Aug 12	No class (holiday)	
2	Aug 17	Random Variables	Pre-quiz
	Aug 19	Random Variables	HW 1
3	Aug 24	Function of Random Variables	
	Aug 26	Functions of Random Variables	
4	Aug 31	Pairs of Random Variables	Quiz 1
	Sep 2	Pairs of Random Variables	HW 2
5	Sep 7	Multiple Random Variables	
	Sep 9	Multiple Random Variables	HW 3
6	Sep 14	Multiple Random Variables	
	Sep 16	Multiple Random Variables	HW 4
7	Sep 21	Sums of Random Variables	
	Sep 23	Sums of Random Variables	
8	Oct 2	Midterm exam 1-4 PM	
9	Oct 5	Random Processes	
	Oct 7	Random Processes	HW 5
10	Oct 12	Specifying RPs	
	Oct 14	Specifying RPs	
11	Oct 19	Stationary RPs	
	Oct 21	Stationary RPs	HW 6
12	Oct 26	Continuity, Derivatives, and Integrals of RPs	
	Oct 28	Continuity, Derivatives, and Integrals of RPs	Quiz 2
13	Nov 2	Power Spectral Density	
	Nov 4	Power Spectral Density	HW 7
14	Nov 9	Response of Linear Systems to Random Signals	
	Nov 11	Response of Linear Systems to Random Signals	
15	Nov 16	Optimal Linear Systems	
	Nov 18	Optimal Linear Systems	HW 8
16	Nov 22	Reviews	
	Nov 25	Reviews	
17	Dec 4	Final exam 1-4 PM	

Class policies:

1. The lectures will be given mainly in *English*. Students should attempt to write the homework in English as well.
2. Any student who is late more than 15 minutes will NOT be permitted to the classroom and will be considered absent from the class unless he/she can provide a reasonable explanation. Remember that when any student comes to class late, it can interupt the flow of the lecture or distract other students.
3. Please refrain from using cellphones (include texting) and talking in class. These activities obviously are distractions to the classroom. Cellphones should be switched to the vibration mode.
4. Students must hand in homework at the begining of the class (11:00-11:15 AM) on the due date, unless it is stated otherwise. Late homework is NOT accepted in any case. You can always submit the HW **before** the deadline in Instructor's email or to his/her offices.
5. By default homework is an individual activity. Certainly you can form a study group and share ideas with classmates but you MUST write up the solution

yourself *independently*. If a set of copied homework is detected, all involved parties must withdraw from the class; otherwise you will receive an **F**. You can declare a collaboration with classmates by writing all the collaborator names on the work sheet.

6. There is NO make-up quizzes unless students have an acceptable reasons. Medical certificate is required if you miss the exam due to severe sickness. Having a cold, nausea, or digestive problem is NOT considered as severe symptoms.
7. Students will receive an **F** if showing any *intention of cheating* during quiz, midterm, or final exams.
8. Students must keep all graded homework and exam papers until the letter grades are announced.
9. As a general rule, your grade is NOT negotiable, especially once the final exam is over. Do NOT attempt to negotiate with the instructors because you will definitely get NO for answer. Instead, if you feel you are behind the class, you should come to office hours during the entire semester.