EE 315 - Probabilistic Methods in Electrical Engineering **COURSE OUTLINE** **(041)**

Instructor: Dr. Salam A. Zummo, **Office:** Bldg. 14/284, **Phone:** 1634, **E-mail:** zummo@kfupm.edu.sa
O.H.: S, M (11:00am-12:00pm), **Web Site:** http://faculty.kfupm.edu.sa/ee/zummo/courses.htm

PREREQUISITE: EE 207

TEXT BOOK:

Peebles, P. Z. "*Probability, Random Variables, and Random Signal Principles*", McGraw-Hill, 4th Edition, 2001.

REFERENCES:

Leon-Garcia, A. "*Probability and Random Processes for EE*", Addison Wesley, 2nd Edition, 1994.
Ross, S "A First Course in *Probability*", Prentice Hall, Fifth Edition, 1998.
Helstrom, C.W. "*Probability and Stochastic Processes for Engineers*", Addison-Wesley, 2nd Edition, 1992.

Week	Topics	Sections	Homework
	Probability	1.1	
1	Set definitions and set operations, Axioms of probability	1.2-1.3	
	Joint and conditional probability	1.4	
2	Independent events	1.5	
	Combined experiments	1.6	
	Bernoulli trials	1.7	
3	**Random Variables**		
	The random variable (r.v.) concept, CDF and PDF	2.1-2.3	
	Some Important r.v.'s	2.4-2.5	
4	Conditional distribution and density functions	2.6	
5	Expectation, Moments	3.1, 3.2	
	Characteristic function	3.3	
6	Transformations of a r.v.	3.4	
	Multiple random variables		
7	Pairs of r.v.'s	4.1	
	Properties of joint distribution and joint density	4.2-4.3	
	Conditional distribution and density	4.4	
8	Statistical Independence	4.5	
	Distribution and density of a sum of r.v.'s	4.6	
	Central Limit Theorem	4.7	
	Expected value of a function of r.v.'s	5.1	
9	Joint characteristic functions	5.2	
	Jointly Gaussian r.v.'s	5.3 (Only 2 r.v.'s)	
	Transformations of multiple r.v.'s	5.4	
	Sampling and some limit theorems	5.7	
10	**Random Processes –Temporal Characteristics**		
	Concept of a random process	6.1	
	Stationarity and independence	6.2	
	Correlation functions and their properties	6.3-6.4	
11	Gaussian random process	6.5	
	Poisson random process	6.6 (Up to 6.6-4)	
	Random Processes – Spectral Characteristic		
12	Power Spectral Density and its properties	7.1 (Up to 7.1-2)	
	Relationship between PSD and autocorrelation function	7.2	
13	**Linear systems with random inputs**		
	Random signal response of linear systems	8.2	
14	Spectral characteristics of system response	8.4	
15	**REVIEW**		

GRADING POLICY:

- (HW + Quizzes, Attendance) (10% + 15%)
- Major Exam I (October 18, 9-11pm) 20%
- Major Exam II (December 11, 7-9 pm) 20%
- Final Exam (Comprehensive) 35%

- **Official excuses** have to be verified from the Students' Affairs Dept. Personal excuses will not be accepted.
- **Homework**s will be assigned weekly. Each student has to submit an independent solution. Solutions will be posted online.
- **Quizzes**: 6-7 Quizzes, scheduled bi-weekly and based on HWs. The worst quiz will be canceled.