KING FAHD UNIVERSITY OF PETROLEUM AND MINERALS
DEPARTMENT OF MATHEMATICAL SCIENCES
YEAR 2009-10, 1ST TERM

MATH 595 READING AND RESEARCH I
Topics in Probability Theory and Stochastic Processes

1. BOOKS:

[1] George G. Roussas, An Introduction to Measure-Theoretic Probability. Elsevier Academic Press 2005.

[2] D. Applebaum, Lévy Processes and Stochastic Calculus, Cambridge University Press 2004.

2. Description & Syllabus

Week	Section	Material from Roussas'a Book
1	1	1. Measurable spaces 2. Product measurable spaces 3. Measurable functions and random variables
2	2.1	About measures in general, and probability measure in particular
3	2.3	The caratheodory extension theorem
4	4.3	Probability distributions
5	5	1. Standard convergence theorems and some of their ramifications 2. Sections, Product Measure Theorem, the Fubini Theorem
6	6	Moment and probability inequalities
7	8	1.Basic properties of distribution functions 2.Weak convergence and compactness of a sequence of distribution functions
8	11	1. Definition of the characteristic function of a distribution and basic properties 2. The inversion formula 3. Convergence in distribution and convergence of characteristic functions-the Paul Lévy continuity theorem
		Material from Applebaum's Book
9	1.2	Infinite divisibility
10	1.3	Lévy processes
11	1.4	Convolution semigroups of probability measures
12	1.5	Some further directions in Lévy processes
13	2.3	The jumps of a Lévy processes-Poisson random measures
14	2.4	The Lévy-Itô decomposition
15	6.1	Differential equations and flows
16	6.2	1. Stochastic differential equations- existence and uniqueness 2. Examples of SDEs

2. Grading Policy

Seminar (presentations)	200
Exam I	150
Exam II	150
Total	500