



## Course Syllabus: Probability and Random Processes - AMCS 241

<b>Division</b>	Computer, Electrical and Mathematical Sciences & Engineering
<b>Course Number</b>	AMCS 241
<b>Course Title</b>	Probability and Random Processes
<b>Academic Semester</b>	Spring
<b>Academic Year</b>	2016/2017
<b>Semester Start Date</b>	01/22/2017
<b>Semester End Date</b>	05/18/2017
<b>Class Schedule</b> (Days & Time)	09:00 AM - 10:30 AM   Sun Tue

Instructor(s)				
Name	Email	Phone	Office Location	Office Hours
Ganesh Sundaramoorthi	Ganesh.Sundaramoorthi@kau st.edu.sa	+966128080425		My office is Building 1, room # 2104. My office hour will be on Tuesday 10:30am- 11:30am

Teaching Assistant(s)	
Name	Email

Course Information	
<b>Comprehensive Course Description</b>	This course presents the fundamentals of probability theory and random processes. Contents of this course are relevant but not limited to: communications and information systems, computer engineering, signal processing, machine learning, bioinformatics, econometrics and mathematical finance.
<b>Course Description from Program Guide</b>	Topics include probability axioms, sigma algebras, random vectors, expectation, probability distributions and densities, Poisson and Wiener processes, stationary processes, autocorrelation, spectral density, effects of filtering, linear least-squares estimation and convergence of random sequences.
<b>Goals and Objectives</b>	Students will learn the fundamentals of probability theory and stochastic processes.
<b>Required Knowledge</b>	Multivariable calculus and linear algebra are required, and heavily used in this class. An undergraduate probability course similar in level to the contents of the book found at the following website: <a href="http://athenasc.com/probbook.html">http://athenasc.com/probbook.html</a> . WARNING: This course requires a high level of mathematical competency. The prerequisites are mandatory, and you must know those topics with a high degree of fluency. If you have taken those courses years ago, and forgot them, then this course is not for you! There is a 100 level course that covers prerequisite topics if you are not prepared. This course is not about routine computation nor recipes for accomplishing a task, rather it is about the hows and whys. As such, mathematical proofs are an important part of this class. Problems in the homework will require you to write mathematical proofs.
<b>Reference Texts</b>	[2] Robert G Gallager. Stochastic processes: theory for applications. Cambridge University Press, 2013. [3] H. Kobayashi, B.L. Mark, and W. Turin. Probability, Random Processes, and Statistical Analysis. Cambridge University Press, 2012.
<b>Method of evaluation</b>	5.00% - Active participation 35.00% - Midterm exam 20.00% - Homework /Assignments 45.00% - Final exam

<b>Nature of the assignments</b>	Weekly homeworks
<b>Course Policies</b>	<p>Homework Grading: A typical homework will contain ten problems. Solutions to all problems will be provided after the deadline. Grading will be done by the TAs, and any questions about grading should be addressed to them.</p> <p>Homework Guidelines:</p> <ul style="list-style-type: none"><li>-You may consult other class members on the problems, but you must write up solutions on your own.</li><li>-Homework solutions should be written in such a way that you are explaining your solution in writing to the instructor.</li><li>-Homeworks should be neat, stapled, in the correct order according to problem number, and please use a new sheet of paper for each problem. Include a cover page with your name, id, and homework number.</li><li>-Homeworks will be assigned Sunday and collected the following Sunday and no late homework will be accepted.</li><li>-The lowest two homeworks will not count in the average for your homework score. Therefore, if you have a conference deadline, are sick, or any other issue, don't ask for an extension on homework; the homework can simply be dropped.</li></ul>
<b>Additional Information</b>	

## Tentative Course Schedule

*(Time, topic/emphasis & resources)*

<b>Week</b>	<b>Lectures</b>	<b>Topic</b>
1	Sun 01/22/2017 Tue 01/24/2017	Syllabus / Intro., Review: Axioms of probability
2	Sun 01/29/2017 Tue 01/31/2017	Review: Random variables (discrete & continuous)
3	Sun 02/05/2017 Tue 02/07/2017	Review: Functions of random variables, Distributions derived from the normal
4	Sun 02/12/2017 Tue 02/14/2017	Moment generating function & characteristic function
5	Sun 02/19/2017 Tue 02/21/2017	Generating functions, starting next topic
6	Sun 02/26/2017 Tue 02/28/2017	Inequalities, bounds, large deviation approximation
7	Sun 03/05/2017 Tue 03/07/2017	Convergence of random variables and limit theorems
8	Sun 03/12/2017 Tue 03/14/2017	Review, midterm
9	Sun 03/19/2017 Tue 03/21/2017	Random processes (definitions & overview)
10	Sun 03/26/2017 Tue 03/28/2017	Gaussian Processes
11	Sun 04/02/2017 Tue 04/04/2017	Spring break
12	Sun 04/09/2017 Tue 04/11/2017	Gaussian Processes
13	Sun 04/16/2017 Tue 04/18/2017	Poisson Processes
14	Sun 04/23/2017 Tue 04/25/2017	Poisson / Renewal Processes
15	Sun 04/30/2017 Tue 05/02/2017	Renewal processes
16	Sun 05/07/2017 Tue 05/09/2017	Special topic, buffer and/or review
17	Sun 05/14/2017 Tue 05/16/2017	Final
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### Note

The instructor reserves the right to make changes to this syllabus as necessary.