



Course Syllabus: Stochastic Processes - AMCS 241

Division	Computer, Electrical and Mathematical Sciences & Engineering
Course Number	AMCS 241
Course Title	Stochastic Processes
Academic Semester	Fall
Academic Year	2019/2020
Semester Start Date	08/25/2019
Semester End Date	12/10/2019
Class Schedule (Days & Time)	09:00 AM - 10:30 AM Sun Wed

Instructor(s)				
Name	Email	Phone	Office Location	Office Hours
Mohamed-Slim Alouini	slim.alouini@kaust.edu.sa	+966128080283		Sunday and Wed at 10:30 AM

Teaching Assistant(s)	
Name	Email
Lama Niyazi and Housseem Sifaou	lama.niyazi@kaust.edu.sa and houssem.sifaou@kaust.edu.sa

Course Information	
Comprehensive Course Description	Introduction to probability and random processes. Topics include probability axioms, random vectors, expectation, probability distributions and densities, Poisson and Wiener processes, stationary processes, autocorrelation, and spectral density.
Course Description from Program Guide	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.
Goals and Objectives	Students should acquire at the end of the course a good understanding of probability theory, random variables and stochastic processes.
Required Knowledge	Elementary probability (undergraduate level).

Reference Texts	<p>S. Kay, Intuitive Probability and Random Processes using Matlab, Springer, 2006. Available as E-BOOK: https://link.springer.com/book/10.1007%2Fb104645</p> <p>H. Kobayashi, B. L. Mark, and W. Turin, Probability, Random Processes, and Statistical Analysis, Cambridge, 2012. Available as E-BOOK: https://www.cambridge.org/core/books/probability-random-processes-and-statistical-analysis/1909C657E4758038B54C4235B3AD0FDF</p> <p>Leon-Garcia, Probability, Statistics, and Random Processes for Electrical Engineering, Third Edition, Prentice-Hall, 2008.</p> <p>P. Z. Peebles, Probability, Random Variable and Random Signal Processing, Fourth Edition, McGraw-Hill, 2001.</p> <p>S. Ross, First Course in Probability, Sixth Edition, Prentice-Hall, 2002.</p> <p>R. D. Yates and D. J. Goodman, Probability and Stochastic Processes, Wiley, 1999.</p> <p>R. E. Ziemer, Elements of Engineering Probability and Statistics, Prentice Hall, 1997.</p> <p>M. B. Pursley, Random Processes in Linear Systems, Prentice-Hall, 2002.</p> <p>H. Stark and J W. Woods, Probability and Random Processes with Applications to Signal Processing, Third Edition, Prentice-Hall, 2002.</p> <p>A. Papoulis, Probability, Random Variables, and Stochastic Processes, Mc-Graw Hill, 2005.</p>
Method of evaluation	<p>30.00% - Final exam 20.00% - Quiz(zes) 25.00% - Exam 2 25.00% - Exam 1</p>
Nature of the assignments	<p>Weekly quizzes + two exams + one final exam are scheduled in class. The exams are closed books and closed notes. However, you are allowed to bring one sheet of notes, formulas, or any other information you would like to put on the page (no photocopy is allowed). This note sheet should be limited to one sheet of paper (8.5 x 11 inches: A4 format) for the 1st exam. You can bring 2 such sheets for the second exam, and 3 such sheets for the third and final exam.</p> <p>The weekly quizzes have a duration of 20 minutes and will be held at the beginning of the Sunday lectures. The quizzes will be based on the homework problems and the examples covered during the lectures.</p>
Course Policies	<p>1- Grades will be posted on the course website.</p> <p>2- All exams are required. Students who do not show up for an exam should expect a grade of zero on that exam.</p> <p>3- If you dispute your grade on any homework, or exam, you may request a re-grade (from the TA for the homework or from the instructor for the exams) only within 48 hours of receiving the graded exam. Incomplete (I) grade for the course will only be given under extraordinary circumstances such as sickness, and these extraordinary circumstances must be verifiable. The assignment of an (I) requires first an approval of the dean and then a written agreement between the instructor and student specifying the time and manner in which the student will complete the course requirements.</p> <p>4- Engineers are required to practice “continuous” or “life-long” learning. This course will cover a lot of material which will require the students to do a lot of self-study, reading of the textbooks and handouts, learning how to use equipment and software, etc...Although the instructor and the TAs are committed to help the students in this course, the students are also expected to take initiatives and to get used to this notion of self-study that will be anyway (i) expected from them in their future careers and (ii) imperative to their success and survival in the real engineering and academic worlds.</p>
Additional Information	

Tentative Course Schedule

(Time, topic/emphasis & resources)

Week	Lectures	Topic
1	Sun 08/25/2019 Wed 08/28/2019	Review Linear Algebra+ Calculus + Basic Concepts 1 (Set Theory)
2	Sun 09/01/2019 Wed 09/04/2019	Basic Concepts 2 + Combinatorics
3	Sun 09/08/2019 Wed 09/11/2019	Discrete RVs
4	Sun 09/15/2019 Wed 09/18/2019	Continuous RVs + Mixed RVs
5	Sun 09/22/2019 Wed 09/25/2019	Simulation/Generation of RVs + Inequalities
6	Sun 09/29/2019 Wed 10/02/2019	Exam 1 + Two RVs
7	Sun 10/06/2019 Wed 10/09/2019	Multiple RVs - Multivariate Gaussians
8	Sun 10/13/2019 Wed 10/16/2019	Sum of RVs
9	Sun 10/20/2019 Wed 10/23/2019	Sum of RVs (Continued)
10	Sun 10/27/2019 Wed 10/30/2019	Mid-semester break + Exam 2
11	Sun 11/03/2019 Wed 11/06/2019	Introduction to random processes
12	Sun 11/10/2019 Wed 11/13/2019	Some important random processes
13	Sun 11/17/2019 Wed 11/20/2019	Some important random processes (continued)
14	Sun 11/24/2019 Wed 11/27/2019	Birth-Death processes
15	Sun 12/01/2019 Wed 12/04/2019	Final exam reviews
16	Sun 12/08/2019	Exams

Note

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