جامعة الملك عبدالله
للعلوم والتقنية
King Abdullah University of
Science and Technology

Course Syllabus: Introduction to Probability & Statistics - AMCS 143

Division	Computer, Electrical and Mathematical Sciences & Engineering
Course Number	AMCS 143
Course Title	Introduction to Probability & Statistics
Academic Semester	Fall
Academic Year	2018/2019
Semester Start Date	08/26/2018
Semester End Date	12/11/2018
Class Schedule (Days & Time)	10:30 AM - 12:00 PM | Sun Tue

Instructor(s)

Name	Email	Phone	Office Location	Office Hours
Ahmed Sultan Salem	Ahmed.Salem@kaust.edu.sa	+966128080416		TBA

Teaching Assistant(s)

Name	Email
TBA	

Course Information

Comprehensive Course Description	Introduction to probability and statistics. Topics include probability axioms, conditional probability, the law of total probability, Bayes' theorem, independence, discrete and continuous random variables, multiple random variables, sum of random variables, the sample mean, and introduction to statistical inference, linear regression and, hypothesis testing.
Course Description from Program Guide	This course provides an elementary introduction to probability and statistics with applications. Topics include: basic probability models; combinatorics; random variables; discrete and continuous probability distributions; statistical estimation and testing; confidence intervals; and an introduction to linear regression.

Goals and Objectives	At the end of this course, students should: 1. Understand concepts of discrete probability, conditional probability, independence, and be able to apply these concepts to engineering applications (selected by instructor). 2. Understand mathematical descriptions of random variables including probability mass functions (PMFs), cumulative distribution functions (CDFs), probability distribution functions (PDFs), conditional mass, conditional distribution and conditional density functions. 3. Be familiar with some of the more commonly encountered random variables, in particular the Gaussian random variable. 4. Be able to calculate various moments of common random variables including at least means, variances and standard deviations. 5. Be able to calculate the distribution of a function of a random variable. 6. Be able to apply the concepts of random variables to engineering applications (selected by instructor). 7. Be able to mathematically characterize multiple random variables using joint PMFs, joint CDFs and joint PDFs. 8. Understand how to formulate the joint PDF of multiple Gaussian random variables. 9. Understand correlation, covariance, correlation coefficient and how these quantities relate to the independence of random variables 10. Be able to apply the concepts of multiple random variables to engineering applications (selected by instructor). 11. Be able to compute the sample mean and sample standard deviation of a series of independent observations of a random variable. 12. Be able to estimate the CDF and PDF of a random variable from a series of independent observations. 13. Understand the law of large numbers and the central limit theorem and how these concepts are used to model various random phenomena (selected by instructor). 14. Be able to compute confidence intervals associated with sample means 15. Be able to use statistical concepts to analyze and interpret engineering data with particular emphasis on linear regression and hypothesis testing.
Required Knowledge	Calculus
Reference Texts	-Required Textbook: Introduction to Probability, by Dimitri P. Bertsekas and John N. Tsitsiklis, 2nd Edition
Method of evaluation	**25.00**% - Final exam **25.00**% - Midterm exam **25.00**% - Exam 2 **25.00**% - Exam 1
Nature of the assignments	Four Exams, each worth 25% of the grade. All exams are closed book and closed notes. Problem sets will be given as ungraded homework. The grading is given in a Satisfactory(S)/Unsatisfactory(U) system. To pass the course the final grade should be at least 70%.
Course Policies	Students who do not show up for an exam should expect a grade of zero on that exam.
Additional Information	

Tentative Course Schedule *(Time, topic/emphasis & resources)*		
Week	**Lectures**	**Topic**
1	Sun 08/26/2018 Tue 08/28/2018	Review of Set Theory and Probability Axioms
2	Sun 09/02/2018 Tue 09/04/2018	Conditional Probability, Total Probability Theorem, and Bayes Rule
3	Sun 09/09/2018 Tue 09/11/2018	Independence and Counting Methods
4	Sun 09/16/2018 Tue 09/18/2018	Discrete Random Variables
5	Sun 09/23/2018 Tue 09/25/2018	Pairs of Random Variables
6	Sun 09/30/2018 Tue 10/02/2018	Continuous Random Variables
7	Sun 10/07/2018 Tue 10/09/2018	Useful Continious Random Variables and Transformation of Random Variables
8	Sun 10/14/2018 Tue 10/16/2018	Pairs of Continous Random Variables
9	Sun 10/21/2018 Tue 10/23/2018	Multivariate Distributions
10	Sun 10/28/2018 Tue 10/30/2018	Sum of Random Variables
11	Sun 11/04/2018 Tue 11/06/2018	Parameter Estimation
12	Sun 11/11/2018 Tue 11/13/2018	Estimation of a Random Variable I
13	Sun 11/18/2018 Tue 11/20/2018	Estimation of a Random Variable II
14	Sun 11/25/2018 Tue 11/27/2018	Hypothesis Testing
15	Sun 12/02/2018 Tue 12/04/2018	Final Exam
16	Sun 12/09/2018 Tue 12/11/2018	
17		
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Note

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