

## **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		ТВА

Teaching Assistant(s)		
Name	Email	
ТВА		

Course Information		
Comprehensive Course Description	Introduction to probability and statistics. Topics include probability axioms, conditional probability, the law of total probability, Bayes' theorem, indepen- dence, 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
	A Re able to calculate various moments of common random variables including at least means, variances
	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
	13. Inderstand the law of large numbers and the central limit theorem and how these concents 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 concents 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	

Week     Lectures     Topic       1     Sun 08/26/2018 Tue 09/28/2018     Review of Set Theory and Probability Axioms       2     Sun 09/02/2018 Tue 09/24/2018     Conditional Probability, Total Probability Theorem, and Bayes Rule       3     Sun 09/09/2018 Tue 09/11/2018     Independence and Counting Methods       4     Sun 09/09/2018 Tue 09/18/2018     Discrete Random Variables       5     Sun 09/20/2018 Tue 09/28/2018     Discrete Random Variables       6     Sun 09/20/2018 Tue 09/28/2018     Continuous Random Variables       7     Sun 00/07/2018 Tue 10/02/2018     Continuous Random Variables       8     Sun 10/07/2018 Tue 10/02/2018     Useful Continuous Random Variables       9     Sun 10/27/2018 Tue 10/28/2018     Pairs of Continuous Random Variables       9     Sun 10/27/2018 Tue 10/28/2018     Multivariate Distributions       10     Sun 10/27/2018 Tue 10/28/2018     Sum of Random Variables       11     Sun 11/04/2018 Tue 10/28/2018     Sum of Random Variables       12     Sun 11/04/2018 Tue 11/20/2018     Estimation of a Random Variable 1       13     Sun 11/11/2018 Tue 11/20/2018     Estimation of a Random Variable 1       14     Sun 111/26/20	Tentative Course Schedule (Time, topic/emphasis & resources)		
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## Note

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