

Course Title	Probability and Statistics		
Course Code	MS-251		
Credit Hours	3 (3,0)		
Category	Mathematics & Supporting		
Prerequisite	None		
Co-Requisite	None		
Follow-up	None		
Course Learning Outcomes (CLOs)	At the end of the course, the students will be able to:	BT	PLO
	CLO1: Know the concept and applications of probability and statistics.	C1 (Know)	1
	CLO2: Describe expectation and distributions	C2 (Describe)	1
	CLO3: Solve single sample and one- and two- sample estimation.	C3 (Apply)	1,3
	CLO4: Use regression techniques.	C3 (Apply)	1,3
Syllabus	<p>Introduction: Statistics and Data Analysis, Statistical Inference, Samples, Populations, and the Role of Probability. Sampling Procedures, Discrete and Continuous Data, Statistical Modeling, Types of Statistical Studies. Probability: Sample Space, Events, Counting Sample Points, Probability of an Event, Additive Rules, Conditional Probability, Independence, and the Product Rule, Bayes' Rule. Random Variables and Probability Distributions. Mathematical Expectation: Mean of a Random Variable, Variance and Covariance of Random Variables, Means and Variances of Linear Combinations of Random Variables, Chebyshev's Theorem. Probability Distributions: Discrete Probability Distributions, Continuous Probability Distributions. Fundamental Sampling Distributions: Sampling Distributions and Data Descriptions, Random Sampling, Sampling Distributions, Sampling Distribution of Means and the Central Limit Theorem. Sampling Distribution of S^2, t-Distribution, F-Quantile and Probability Plots. Single Sample & One- and Two-Sample Estimation Problems: Single Sample & One- and Two-Sample Tests of Hypotheses. The Use of P-Values for Decision Making in Testing Hypotheses (Single Sample & One- and Two-Sample Tests). Regression: Linear Regression and Correlation, Least Squares and the Fitted Model, Multiple Linear Regression and Certain, Nonlinear Regression Models, Linear Regression Model Using Matrices, Properties of the Least Squares Estimators.</p>		
Suggested Instructional/Reading Material	<ol style="list-style-type: none"> 1. Dimitri P. Bertsekas, John Tsitsiklis, Introduction to probability, Athena Scientific, 2nd Edition, 2008, ISBN: 978-1886529236. 2. Jay L. Devore, Probability and Statistics for Engineering and the Sciences, Cengage Learning, 9th Edition, 2015, ISBN: 978-1305251809. 3. R.E. Walpole, R.H. Myers and S.L Myers, "Probability and Statistics for Engineers and Scientists", 9th Edition. 4. MIT open courseware: https://ocw.mit.edu/courses/mathematics/18-05-introduction-to-probability-and-statistics-spring-2014/ 		