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	**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 S2, 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.		
Suggested Instructional/ Reading Material	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/		