

Course Code MAT3003	Probability, Statistics and Reliability	Course Type	LT
		Credits	4
Prerequisites	Basic knowledge of statistics		
Course Objectives: <ul style="list-style-type: none"> To provide the mathematical support by way of probabilistic models and statistical methodology to tackle problems encountered in Science and Engineering applications. 			
Course Outcomes: <ul style="list-style-type: none"> Understand basic notions of probability arising in a variety of uncertain situations which are nontraditional in areas of science and engineering. Knowing the basic tools of statistical methods Emphasize the study of data analysis leading to probabilistic models 			
Student Outcomes (SO) : a,b,e,i,k			
Module No.	Module Description	No. of hours	SO
1	Probability Theory: Introduction to probability concepts, Random experiments, Events, Conditional probability, Independent events, Theorem of Total Probability, Baye's theorem Sample space, Exercise.	9	a,b,e,i,k
2	Random variables (RV): Introduction to Random variables, - One dimensional Random Variables, Discrete and Continuous RV- Density and Distribution function of RV, Expectation, Variance, and its properties, Covariance, and Moments. Moment Generating function Special Distributions Binomial and Poisson distributions – Normal distribution, Exponential distributions, Weibull distribution	14	a,b,e,i,k
3	Correlation and regression Two dimensional random variables, Joint distribution and Joint density functions - Marginal, Conditional Distribution and Density functions. Regression and Correlation. – Partial and Multiple Correlation- Multiple Regression.	11	a,b,e,i,k
4	Test of Significance Testing of hypothesis – Introduction - Types of errors, critical region, procedure of testing hypothesis. Large sample tests - Z test for Single Proportion, Difference of Proportion, Single mean and difference of means.	14	a,b,e,i,k

	Small sample tests - Student's t-test, F-test - Chi-square test - Goodness of fit - Independence of Attributes		
5	Design of Experiments and Reliability Analysis of variance – One and Two way classifications – Completely Randomized Design (CRD), Randomized Block Design (RBD), Latin Square Design (LSD) Basic concepts - Hazard function - Reliabilities of series and parallel systems - System Reliability – Maintainability - Preventive and repair maintenance – Availability	10	a,b,e,i,j,k
6	Guest Lectures by experts on contemporary topics	2	
	Total Lecture:	60	
Mode of Teaching and Learning: # Class room teaching # Use of mathematical/Statistical softwares (such as R,MATLAB, MATHEMATICA, SAGE, ETC.) as teaching aid # Minimum of 2 lecture periods by experts on contemporary topics			
Mode of Evaluation and assessment: Digital Assignments, Continuous Assessment Tests, Final Assessment Test and unannounced open book examinations, quizzes, student's portfolio generation and assessment, innovative assessment practices			
Text Book(s): 1. Probability and Statistics for engineers and scientists by R.E.Walpole, R.H.Mayers, S.L.Mayers and K.Ye, 9th Edition, Pearson Education (2012). 2. Probability, Statistics and Reliability for Engineers and Scientists by Bilal M. Ayub and Richard H. McCuen, 3rd edition, CRC press (2011). 3. Mathematical Statistics by M. Ray, H S Sharma, and S Chaudhary, RP & Sons Education. 4. Fundamental of Mathematical Statistics by T Veerarajan, Yes Dee Publishing Pvt Ltd.			
Reference Book(s): 1. Reliability Engineering by E.Balagurusamy, Tata McGraw Hill, Tenth reprint 2010. 2. Probability and Statistics for Engineers by R.A.Johnson, Miller & Freund's, 8th edition, Prentice Hall India (2010) 3. Probability and Statistics by J.L.Devore, 8th Edition, Brooks/Cole, Cengage Learning (2012)			
Recommendation by the Board of Studies on		22/04/2017, 19/6/2019	
Approval by Academic council on		07/09/17	
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