

INDIAN INSTITUTE OF TECHNOLOGY TIRUPATI
PROFORMA FOR NEW COURSE

1.	Title of the Course	Linear Algebra and Probability Theory
2.	Course Number	MA5105
3.	Status of the Course	Core
4.	Structure of Credits	3-1-0-4
5.	Offered To	PG
6.	New Course/Modification to	New
7.	To be Offered by	Department of Mathematics
8.	To take effect from	January 2018
9.	Prerequisite	Nil
10.	Whether approved by the Department	Yes
11.	Course Objective: 1. To introduce the notions of linear dependence, linear independence, rank of matrices, Gram-Schmidt orthogonalization. Using these notions, to study the system of linear equations, and the necessary and sufficient conditions for a matrix to be similar to a diagonal matrix. 2. The main objective of the module Probability theory is to impart the knowledge in probability theory and its relevant theoretical features. Students will be facilitated to explore the aspects of the probability theory most used in various analytical models in the different field.	
12.	Course Content: System of linear equations, row-reduced echelon matrices, invertible matrices, vector spaces, subspaces, bases and dimension, linear transformations, linear functionals, inner product spaces, Gram-Schmidt orthogonalization, eigenvalues, eigenvectors, diagonalization of symmetric and Hermitian matrices. The Axioms of Probability, Conditional Probability, Independence, Bayes' rule, Random variables, Distribution Functions, Expectation and Variance, Properties of Expectation, Covariance and Correlation, Multivariate Normal Distributions, Transformations of Random variables, Sum of Random Variables, Moment Generating Functions, Characteristic Functions, Chebychev's Inequality, Notions of Convergence, Law of Large Numbers, Central Limit Theorem, The Concept of Statistical Inference, The Method of Maximum Likelihood Estimation.	
13.	Text book(s): 1. K. Hoffman , R. Kunze, <i>Linear Algebra</i> , Prentice-Hall Inc., (2005). 2. R. Sheldon , <i>A first course in Probability</i> , Pearson Education India, (2002).	
14.	Reference(s): 1. 1. H. Strang, <i>Linear Algebra and Its Applications</i> , Brooks / Cole, (2006). 2. P. Billingsley, <i>Probability and Measure</i> , John Wiley & Sons Pvt. Ltd., (2012). 3. G. Casella, R. Berger , <i>Statistical Inference</i> , Thomson Learning, (2001). 4. P.G. Hoel , S.C. Port and C.J. Stone, <i>Introduction to Probability</i> , Universal Book Stall, (1998). 5. R. Durrett, <i>Elementary probability for applications</i> , Cambridge University Press, (2009).	