Semester: III						
MATHEMATICS FOR ARTIFICIAL INTELLIGENCE & MACHINE LEARNING (Theory) (For AI and ML)						
Course Code	**:**	MAT231ET		**CIE**	**:**	**100 Marks**
Credits: L: T: P	**:**	3:1:0		**SEE**	**:**	**100 Marks**
Total Hours	**:**	45L+30T		**SEE Duration**	**:**	**3.00 Hours**

Unit-I	**08 Hrs**
Probability and Random Variable: Random experiment, Sample space, Events – equally likely events, mutually disjoint events, exhaustive events, Axioms of probability, Conditional probability, Partitions and law of total probability, Bayes theorem, Independence, Random variables - Discrete and continuous – Probability mass function (PMF), Probability density function (PDF), Cumulative distribution function (CDF), Expected value and variance of random variable, Markov and Chebyshev Inequality. Implementation using MATLAB.	
Unit – II	**08 Hrs**
Probability Distributions: Discrete distributions - Bernoulli, Binomial, Geometric, Equally Likely and Poisson. Continuous distributions – Exponential, Uniform, Normal. Implementation using MATLAB.	
Unit –III	**09 Hrs**
Joint Distribution of Random Variables - Joint Probability mass function, Joint probability density function, Joint Cumulative distribution function, Marginals, Joint moments, Independence, Conditional PDF, Conditional PMF and Conditional mean and Conditional variance. Implementation using MATLAB.	
Unit –IV	**10 Hrs**
Linear Algebra - I: Vector spaces, subspaces, linear dependence and independence, basis, dimension, four fundamental subspaces of a matrix, Linear transformations - matrix representation, dilation, reflection, projection and rotation matrices. Implementation using MATLAB	
Unit –V	**10 Hrs**
Linear Algebra - II: Inner Products, Orthogonality - Orthogonal complement subspace, orthogonal matrices, orthogonal and orthonormal bases, Gram-Schmidt process, QR-factorization. Eigenvalues and Eigenvectors, matrix diagonalization, Real symmetric matrices, singular value decomposition. Implementation using MATLAB.	

Course Outcomes: After completing the course, the students will be able to	
CO1	Illustrate the fundamental concepts of probability, random variables, probability distributions, linear algebra.
CO2	Apply the acquired knowledge of probability, discrete and continuous random variables, probability distributions, linear algebra to solve the problems of engineering applications.
CO3	Analyze the solution of the problems obtained from appropriate techniques of probability, random variables, probability distributions, linear algebra to the real-world problem.
CO4	Interpret the overall knowledge of probability, random variables, probability distributions, linear algebra gained to demonstrate the problems arising in many practical situations.

Reference Books	
1	Introduction to Probability and Statistics for Engineers and Scientists, Sheldon Ross, 5th Edition, 2014, Academic Press, ISBN: 13-978-0123948113.
2	Michael Baron, "Probability and Statistics for Computer Scientists", CRC Press, 2nd Edition, 2014, ISBN- 13: 978-1-4822-1410-9.
3	Linear Algebra and its Applications, David C. Lay, 3rd Edition, 2002, Pearson Education India, ISBN:13: 978-81-7758-333-5.
4	Practical Linear Algebra: A Geometry Toolbox, Gerald Farin and Dianne Hansford, 3rd Edition, 2014, CRC Press, ISBN: 13: 978-1-4665-7958-3.

RUBRIC FOR THE CONTINUOUS INTERNAL EVALUATION (THEORY)		
#	**COMPONENTS**	**MARKS**
1.	**QUIZZES:** Quizzes will be conducted in online/offline mode. TWO QUIZZES will be conducted & Each Quiz will be evaluated for 10 Marks. **THE SUM OF TWO QUIZZES WILL BE THE FINAL QUIZ MARKS.**	**20**
2.	**TESTS:** Students will be evaluated in test, descriptive questions with different complexity levels (Revised Bloom's Taxonomy Levels: Remembering, Understanding, Applying, Analyzing, Evaluating, and Creating). THREE tests will be conducted. Each test will be evaluated for 50 Marks, adding upto 150 Marks. **FINAL TEST MARKS WILL BE REDUCED TO 40 MARKS.**	**40**
3.	**EXPERIENTIAL LEARNING:** Students will be evaluated for their creativity and practical implementation of the problem. Case study-based teaching learning (05), Program specific requirements (05), Video based seminar/presentation/demonstration (10), MATLAB (20). **ADDING UPTO 40 MARKS**.	**40**
	MAXIMUM MARKS FOR THE CIE THEORY	**100**
RUBRIC FOR SEMESTER END EXAMINATION (THEORY)		
Q. NO.	**CONTENTS**	**MARKS**
	PART A	
1	Objective type questions covering entire syllabus	20
	PART B (Maximum of TWO Sub-divisions only)	
2	Unit 1: (Compulsory)	16
3 & 4	Unit 2: Question 3 or 4	16
5 & 6	Unit 3: Question 5 or 6	16
7 & 8	Unit 4: Question 7 or 8	16
9 & 10	Unit 5: Question 9 or 10	16
	TOTAL	**100**