Faculty of Engineering & Technology
Master of Technology (M. Tech)
(W. E. F.: 2023-24)

Document ID: SUTEFETM-01

Name of Faculty	:	Faculty of Engineering & Technology
Name of Program	:	Master of Technology (M.Tech.) – Artificial Intelligence & Data Science
Course Code	:	1MAI01
Course Title	:	Applied Mathematics
Type of Course	:	Professional Core
Year of Introduction	:	2023-24

Prerequisite	:	Applied Mathematics
Course Objective	:	Establish a solid mathematical foundation applicable to various IT domains, alongside the logical basis for modern techniques, encompassing diverse fields and addressing sampling and classification problems.
Course Outcomes	:	At the end of this course, students will be able to:
	CO1	To understand the mathematical fundamentals that is prerequisites for a variety of courses like Data mining, Network protocols, analysis of Web traffic, Computer security, Software engineering, Computer architecture, operating systems, distributed systems, Bioinformatics, Machine learning
	CO2	To develop the understanding of the mathematical and logical basis to many modern techniques in information technology like machine learning, programming language design, and concurrency
	CO3	To study various sampling and classification problems.

Teaching and Examination Scheme

Teaching Scheme (Contact Hours)			Credits	Examination Marks				
				Theory Marks		Practical Marks		Total Marks
L	**T**	**P**	**C**	**SEE**	**CIA**	**SEE**	**CIA**	
3	2	0	4	70	30	30	20	150

Legends: ***L****-Lecture;* ***T****–Tutorial/Teacher Guided Theory Practice;* ***P*** *– Practical,* ***C*** *– Credit,* ***SEE*** *– Semester End Examination,* ***CIA*** *- Continuous Internal Assessment (It consists ofAssignments/Seminars/Presentations/MCQ Tests, etc.))*

Course Content

Unit No.	Topics	Teaching Hours	Weightage	Mapping with CO
1	Probability mass, density, and cumulative distribution functions, Parametric families of distributions, Expected value, variance, conditional expectation, Applications of the	10	15%	CO1

	univariate and multivariate Central Limit Theorem, Probabilistic inequalities, Markov chains			
2	Random samples, sampling distributions of estimators, Methods of Moments and Maximum Likelihood	10	15%	CO1
3	Statistical inference, Introduction to multivariate statistical models: regression and classification problems, principal components analysis, The problem of overfitting model assessment	10	15%	CO2
4	Graph Theory: Isomorphism, Planar graphs, graph colouring, hamilton circuits and euler cycles. Permutations and Combinations with and without repetition. Specialized techniques to solve combinatorial enumeration problems	15	20%	CO2
5	Computer science and engineering applications: Data mining, Network protocols, analysis of Web traffic, Computer security, Software engineering, Computer architecture, operating systems, distributed systems, Bioinformatics, Machine learning	10	25%	CO2
6	Recent Trands in various distribution functions in mathematical field of computer science for varying fields like bioinformatic, soft computing, and computer vision	05	10%	CO3

Suggested Distribution of Theory Marks Using Bloom's Taxonomy						
Level	Remembrance	Understanding	Application	Analyse	Evaluate	Create
Weightage	**20**	**30**	**30**	**20**	**0**	**0**

NOTE: This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Sr. No.	**Name of Experiment/Tutorial**	**Teaching Hours**
1	Analyze the concept of randomization. Implement a program in a language that supports graphics to Push the balls from left and right allowing random movement and then let them fall in rectangle bins. Show graphically how they form curve	06
2	Consider that there are two parties party1 and party2 contesting for elections. Consider candidate from either party1 or party2. Considervoting population and ask them about their likelihood to vote for the candidate from party1. Now Ask the population again to show their	06

	likelihood for candidate after candidate gives speech. Now again rate the candidate through voting population. Implement a program to do this. Use WEKA tool to simulate this..	
3	Write a program that takes two inputs- size of the house (no of rooms) and location of the house and accordingly give price of the house. Classify the house as very costly, costly, affordable, cheap.	06
4	Consider website of your institute. Represent the link structure by directed graph. Apply and implement algorithm to traverse the graph and to reach a faculty's web page in your department	06
5	Graph theory problem – there are k aircrafts and have to be assignedn flights. The time interval of ith flight is (ti1,ti2). If the time interval overlaps for the flights the same aircraft cannot be assigned to both the flights. Vertices of the graph are flights. Two vertices are connected if the corresponding time intervals overlap. Simulate the problem by applying graph theory. Use simulation tool to simulate or programming language to implement graph	06

Major Equipment/ Instruments and Software Required

Sr. No.	Name of Major Equipment/ Instruments and Software
1	Python - Jupyter
2	Weka

Suggested Learning Websites

Sr. No.	Name of Website
1	https://www.quora.com/What-are-the-core-subjects-of-applied-mathematics
2	https://www.toprankers.com/what-is-cbse-applied-mathematics

Reference Books

Sr. No.	Name of Reference Books
1	John Vince, Foundation Mathematics for Computer Science, Springer
2	K. Trivedi.Probability and Statistics with Reliability, Queuing, and Computer Science Applications. Wiley
3	M. Mitzenmacher and E. Upfal.Probability and Computing: Randomized Algorithms and Probabilistic Analysis
4	Alan Tucker, Applied Combinatorics, Wiley