

# GUJARAT TECHNOLOGICAL UNIVERSITY

## Mathematical Foundation of Computer Science SUBJECT CODE: 3710214

**Type of course:** Core

**Prerequisite:** Discrete Mathematics

**Rationale:**

**Teaching and Examination Scheme:**

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
			ESE(E)	PA (M)	PA (V)	PA (I)		
3	0	2	4	70	30	30	20	150

**Content:**

Sr. No	Content	Total Hrs	% Weightage
1	Probability mass, density, and cumulative distribution functions, Parametric families of distributions, Expected value, variance, conditional expectation, Applications of the univariate and multivariate Central Limit Theorem, Probabilistic inequalities, Markov chains	7	15
2	Random samples, sampling distributions of estimators, Methods of Moments and Maximum Likelihood	7	15
3	Statistical inference, Introduction to multivariate statistical models: regression and classification problems, principal components analysis, The problem of overfitting model assessment	8	16
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	11	23
5	<b>Computer science and engineering applications:</b> Data mining, Network protocols, analysis of Web traffic, Computer security, Software engineering, Computer architecture, operating systems, distributed systems, Bioinformatics, Machine learning	10	21
6	Recent Trends in various distribution functions in mathematical field of computer science for varying fields like bioinformatic, soft computing, and computer vision	5	10

**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

**Course Outcome:**

After learning the course the students should be able to:

- Understand the difference between traditional client server architecture and distributed architecture
- Understand the importance and issues of distributed system
- Implement socket programming, RMI and CORBA