

## MICRO LESSON PLAN

Hours	LECTURE TOPICS	READING
<b>UNIT- I RANDOM VARIABLES</b>		
1	Discrete and continuous random variables	R1
2	Moments - Moment generating functions	R1
3	Moment generating functions, properties	R1
4	Binomial, Poisson	R1
5	Geometric	R1
6	Negative binomial	R1
7	Uniform, Exponential	R1
8	Gamma	R1
9	Weibull distributions	R1
10,11,i2	Tutorial	R1
<b>UNIT- II TWO DIMENSIONAL RANDOM VARIABLES</b>		
13	Joint distributions	R1
14	Marginal distributions	R1
15	conditional distributions	R1
16	Covariance	R1
17	Correlation and regression	R1
18	Transformation of random variables	R1
19-21	Central limit theorem	R1
22,23,24	Tutorial	
<b>UNIT -III MARKOV PROCESSES AND MARKOV CHAINS</b>		
25-26	Classification - Stationary process	R1
27-29	Markov process - Markov chains	R1
30-31	Transition probabilities	R1
32-33	Limiting distributions-Poisson process	R1
34,35,36	Tutorial	
<b>UNIT- IV QUEUEING THEORY</b>		
37	Markovian models	R1
38	Birth and Death Queuing models	R1
39	Birth and Death Queuing models	R1
40	Steady state results	R1
41	Single and multiple server queuing models	R1
42	Single and multiple server queuing models	R1
43	queues with finite waiting rooms	R1
44	Finite source models	R1
45	Little Formula	R1
46,47,48	Tutorial	
<b>UNIT -V NON-MARKOVIAN QUEUES AND QUEUE NETWORKS</b>		
49-50	M/G/1 queue	R1
51-54	Pollaczek- Khintchine formula	R1
55-57	series queues	R1
58,59,60	Open and closed network	R1

## **SUBJECT OBJECTIVES AND DISCRIBTION**

### **DISCRIBTION**

The probabilistic models are employed in countless applications in all areas of science and engineering. Queuing theory provides models for a number of situations that arise in real life. The course aims at providing necessary mathematical support and confidence to tackle real life problems.

### **OBJECTIVES**

At the end of the course, the students would

- Have a well – founded knowledge of standard distributions which can describe real life phenomena.
- Acquire skills in handling situations involving more than one random variable and functions of random variables.
- Understand and characterize phenomena which evolve with respect to time in a probabilistic manner.
- Be exposed to basic characteristic features of a queuing system and acquire skills in analyzing queuing models.

**L T P C**

**MA 2262 PROBABILITY AND QUEUEING THEORY**

**3 1 0 4**

**UNIT I RANDOM VARIABLES**

**9 + 3**

Discrete and continuous random variables - Moments - Moment generating functions and their properties. Binomial, Poisson, Geometric, Negative binomial, Uniform, Exponential, Gamma, and Weibull distributions.

**UNIT II TWO DIMENSIONAL RANDOM VARIABLES**

**9 + 3**

Joint distributions - Marginal and conditional distributions - Covariance - Correlation and regression - Transformation of random variables - Central limit theorem.

**UNIT III MARKOV PROCESSES AND MARKOV CHAINS**

**9 + 3**

Classification - Stationary process - Markov process - Markov chains - Transition probabilities - Limiting distributions - Poisson process

**UNIT IV QUEUEING THEORY**

**9 + 3**

Markovian models - Birth and Death Queuing models - Steady state results: Single and multiple server queuing models - queues with finite waiting rooms - Finite source models - Little's Formula

**UNIT V NON-MARKOVIAN QUEUES AND QUEUE NETWORKS**

**9 + 3**

M/G/1 queue - Pollaczek - Khintchine formula, series queues - open and closed networks

**LECTURES : 45 TUTORIAL 15 TOTAL : 60**

**TEXT BOOKS:**

1. O.C. Ibe, "Fundamentals of Applied Probability and Random Processes", Elsevier, 1<sup>st</sup> Indian Reprint, 2007 (For units 1, 2 and 3).
2. D. Gross and C.M. Harris, "Fundamentals of Queueing Theory", Wiley Student edition, 2004 (For units 4 and 5).

**REFERENCES:**

1. A.O. Allen, "Probability, Statistics and Queueing Theory with Computer Applications", Elsevier, 2<sup>nd</sup> edition, 2005.
2. H.A. Taha, "Operations Research", Pearson Education, Asia, 8<sup>th</sup> edition, 2007.
3. K.S. Trivedi, "Probability and Statistics with Reliability, Queueing and Computer Science Applications", John Wiley and Sons, 2<sup>nd</sup> edition, 200