DEPARTMENT OF MATHEMATICS

FACULTY OF ENGINEERING AND TECHNOLOGY

SRM UNIVERSITY

MA0212- Probability and Queuing Theory

SEMESTER IV **ACADEMIC YEAR: 2012-2013**

LECTURE SCHEME / PLAN

The objective is to impart students of Engineering and Technology, the concepts of statistical techniques on probability to apply them for solving real world problems.

The list of instructions (provided below) may be followed by a faculty relating to his/her own schedule includes warm-up period, controlled/free practice, and the respective feedback of the classes who handle. The lesson plan has been formulated based on high quality learning outcomes and the expected outcomes are as follows

Each subject must have a minimum of 56 hours, which in turn, 45 hours for lecture and rest of the hours for tutorials. The faculty has to pay more attention in insisting the students to have 95 % class attendance.

Lect. No	Lesson schedule	Learning outcomes	Cumulative hour(s)
UNIT-I: Probability & Random Variables			
L 1.1	• Introduction to probability concepts, axioms, theorems	▪ Students will demonstrate knowledge & be able to examine and understand & use basic probability ▪ Students will be able characterize probability models using probability mass (density) functions & cumulative distribution functions	1
L1.2	• Conditional probability, Multiplication theorem		2
L1.3	• Theorem of total probability, Baye's theorem		3
L1.4	• Characteristics of random variables – Discrete case		4
L1.5	• Characteristics of random variables – Continuous case		5
L1.6	• Moments		6
L1.7	• Expectation, variance, covariance		7
L1.8	• Moment generating functions		8
L1.9	• Function of random variable		9
L.1.10	• Chebychev's inequality - proof		10
L.1.11	• Applications of Chebychev's inequality		11
L.1.12	• Tutorial		12
CYCLE TEST – I :			Date: 04.02.2013
UNIT-II Theoretical Distributions			
L2.1	• Discrete distribution: Binomial distribution – MGF, Mean, Variance	Students will be introduced to the techniques of developing discrete & continuous probability distributions and its applications	13
L2.2	• Applications of Binomial distribution		14
L2.3	• Poisson distribution – MGF, Mean, Variance		15
L2.4	• Applications of Poisson distribution		16
L2.5	• Geometric distribution – MGF, Mean, Variance		17

L2.6	• Applications of Geometric distribution		18
L2.7	• Negative Binomial distribution – MGF, Mean, Variance & applications		19
L2.8	• Continuous distribution: Exponential distribution - MGF, Mean, Variance		20
L2.9	• Applications of Exponential distribution		21
L2.10	• Normal distribution – MGF, Mean, Variance		22
L2.11	• Applications of Normal distribution		23
L.2.12	• Tutorial		24
CYCLE TEST – II :		Date: 04.03.2013	
UNIT-III **Testing of Hypothesis**			
L3.1	• Introduction to sampling distributions	▪ Students will be able to formulate null & alternate hypothesis, identify type I & type II errors ▪ Students know how to use the test statistic, critical value ▪ Students know to draw inferences by correctly formulating a decision rule for testing a hypothesis	25
L3.2	• Large sample tests – Test for a specified mean		26
L3.3	• Test for the difference of means		27
L3.4	• Small sample tests – 't' test for a specified mean		28
L3.5 L3.6	• 't' test for the difference of means		29, 30
L3.7	• 't' test for the paired observations		31
L3.8 L3.9	• F test – Test of significance of the difference between population variances		32, 33
L3.10	• Chi square test for goodness of fit		34
L3.11	• Chi square test for independence of attributes		35
L.3.12	• Tutorial		36
SURPRISE TEST			
UNIT-IV : Properties of Queueing Theory			
L4.1	• Introduction to Markovian queueing models	Students should be able to ▪ Understand the terminology & nomenclature appropriate to queueing theory ▪ Demonstrate knowledge and understanding of various queueing models ▪ Describe applications of queueing theory to practical problems	37
L4.2	• Steady state distribution		38
L4.3	• Single server model with infinite system capacity		39
L4.4 L4.5	• Characteristics of the model (M/M/1) : (∞/FIFO)		40, 41
L4.6	• Single server model with finite system capacity		42

L4.7 L4.8	• Characteristics of the model (M/M/1) : (k/FIFO)		43, 44
L4.9	• Applications of queueing theory to Computer Science & Engineering		45
L.4.10	• Tutorial		46
UNIT-V **Markov Chains**			
L5.1	• Introduction to Markov process	Students should be able to analyse the behavior of various Markov chains	47
L5.2	• Markov chain one step & n-step transition probability, tpm		48
L5.3	• Chapman Kolmogorov theorem		49
L5.4	• Applications on Chapman Kolmogorov theorem		50
L5.5	• Transition probability - Applications		51
L5.6 L5.7	• Limiting distributions - Applications		52, 53
L5.8 L5.9	• Classification of states of a Markov chain - Applications		54, 55
L.5.10	• Tutorial		56
MODEL EXAM		**22.04.2013**	**(Duration: 3 Hours)**
LAST WORKING DAY : 03.05.2013			

References:

- Veerarajan T., Probability, Statistics and Random Processes, Tata McGraw Hill,1st Reprint 2004.
- S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 9th extensively revised edition, Sultan Chand & Sons, 1999.
- Trivedi K S, " Probability and Statistics with reliability, Queueing and Computer Science Applications",Prentice Hall of India,New Delhi, 1984
- Gross.D and Harris.C.M. "Fundementals of Queuing theory", John Wiley and Sons, 1985.
- Allen.A.O., "Probability Statistics and Queuing theory",Academic Press, 1981.

Web-based resources

http://en.wikipedia.org/wiki/probabilityandstatistics

http://en.wikipedia.org/wiki/queueing-theory

http://en.wikipedia.org/wiki/markov-process

Internal marks Total: 50

Internal marks split up: Cycle Test 1: 10 Marks Model Exam: 20 Marks

Cycle Test 2: 10 Marks Surprise Test: 5 marks

Attendance: 5 marks

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