DEPARTMENT OF MATHEMATICS

FACULTY OF ENGINEERING AND TECHNOLOGY

SRM UNIVERSITY

MA0222- PROBABILITY AND RANDOM PROCESSES

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		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	Students will be introduced to the techniques of developing discrete & continuous probability distributions and its applications	17
L2.6	• Applications of Geometric distribution		18
L2.7	• Continuous distribution: Exponential distribution - MGF, Mean, Variance		19
L2.8	• Applications of Exponential distribution		20
L2.9	• Normal distribution – MGF, Mean, Variance		21
L2.10	• Applications of Normal distribution		22
L2.11	• Problems in 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-3 CORRELATION FUNCTION			
L 4.1	Classification of Random processes.	To gain knowledge in the application of family of random variables in real life situations.	37
L 4.2	Stationarity-WSS,SSS processes.		38,39
L 4.3	Problems in WSS and SSS processes.		40,41
L 4.4	Autocorrelation function and its properties.		42

L 4.5 L 4.6	Problems in autocorrelation functions of WSS processes.	Be familiar with application of auto correlation and cross correlation functions	43,44
L 4.7	Crosscorrelation function and its properties.		45
L 4.8	Problems .		46
L 4.9	Linear system with random inputs.		47
L 5.0	Tutorial.		48
UNIT-5 SPCTRAL DENSITIES			
L 5.1	Basic Knowledge about Fourier Transforms and Autocorrelation functions	To familiar with various transformations	49
L 5.2	Power spectral density function	Analyze various type of functions covariance functions, autocorrelation functions , covariance functions with and without spectral properties in the frequency domain	50
L 5.3	Properties		51
L 5.4	System in the form of convolution.		52
L 5.5	Unit impulse response of the system		53
L 5.6	Einstein-Weiner-Khinchine Relationship		54
L 5.7	Cross Power Density Spectrum-properties		55
L 5.8	**Tutorial**		56
MODEL EXAM		**22.04.2013**	**(Duration: 3 Hours)**
LAST WORKING DAY : 03.05.2013			

TEXT BOOKS

- Veerarajan T., Probability, Statistics and Random processes, Tata McGraw Hill, 1st Reprint2004. (Unit I - Chapter 1 pages 1.1-1.20, Chapter 2 Pages 2.1 - 2.3, Chapter 3 Pages 3.1, Chapter 4 pages 4.36 Unit II - Chapter 5 Pages 5.1 - 5.8, 5.38, 5.39, 5.44 - 5.53, Unit IV - Chapter 8 Pages 8.1-8.10,8.15, UnitV- Chapter 6 Pages 6.1-6.3, Chapter 7 Pages 7.45- 7.49)
- S.C. Gupta & V.K Kapoor, Fundamentals of Mathematical Statistics, 9th extensively revised edition, Sultan Chand & Sons, 1999.(Unit III - Chapter 12 Section 12.1, 12.3, 12.4, 12.6-12.42, Chapter 13 Section 13.5, 13.39, 13.49, Chapter 14 Section 14.16-14.24,14.57)

REFERENCE BOOKS

- Trivedi K.S, Probability and Statistics with reliability, Queueing, and Computer Science Applications , Prentice Hall of India, New Delhi,1984

- Gross.D and V.K. Kapoor, Fundamentals of Mathematical Statistics, 9th extensively revised edition, Sultan Chand & Sons, 1999
- Allen.A.O., Probability Statistics and Queuing theory , Academic Press, 1981

Web-based resources

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

http://dir.yahoo.com/Science/Mathematics

http://www.amazon.com

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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