NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE PLAN - B.Tech. (CSE) III Semester (A & B) July to November 2018

Course Title	Introduction to Probability Theory		
Course Code	MAIR 37	**No. of Credits**	3
Department	Mathematics	**Faculty**	Dr.D.Deivamoney selvam
Pre-requisites Course Code	MAIR 21 & MAIR 22		
Course Coordinator(s) (if, applicable)			
Other Course Teacher(s)/Tutor(s) E-mail	-	**Telephone No.**	2503667
Course Type	Core course		

COURSE OVERVIEW

Definition of probability-Notion of sample space- event- basic combinatorial analysis-posing probability problems mathematically- examples

Conditional probability –Baye's theorem-random variable- probability mass function- density function- distribution function-Bernoulli trial- Binomial distribution- Poisson approximation-Poisson distribution-normal distribution- moment generating function

Joint probability density function-marginal and conditional densities- function of random variable-covariance- conditional expectation-correlation coefficient

Chebyshev's inequality-law of large numbers-central limit theorem- random processes-Markov dependence- Markov chain- definition- examples- ergodicity

Finite Markov chain- various states-limiting probability-Introduction ot Markov process-M/M/1 queue with finite and infinite waiting space.

COURSE OBJECTIVES

1. To understand the basic concept of randomness, random variable, its categories and behaviour
2. To study various probabilistic tools systematically
3. To formulate problems arising in engineering and technology, using the tool of probaility and random process, solving them and giving interpretation for the results and modifing, if necessary.

COURSE OUTCOMES (CO)	Aligned Programme Outcomes (PO)
1. Understand the axiomatic formulation of modern Probability Theory and think of random variables as an intrinsic need for the analysis of random phenomena 2. Characterize probability models and function of random variables based on single & multiples random variables. 3.To evaluate and apply moments & characteristic functions and understand the concept of inequalities and probabilistic limits. 4. To understand the concept of random processes and determine types like Markov, renewal and stationary processes. 5. To demonstrate the specific applications to Poisson and Makov processes and application of queues in computer technology	1.To identify and use probabilistic tool like random variable, its type for the framing the problems in electronic topics 2. To study the randomness in problem arising computer technology. 3. To study the random behavior of the problems in the computer engineering with reference software and hardware components.

COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	*Week	Topic	Mode of Delivery
1	1	Introduction & definitions Addition theorems- conditional probability Probability problems algebraic – geometric- combinatory	Chalk & Talk
2	2	Total & Baye's Theorems Mutually exclusive & independent events, Probability space & sigma space-problems- Random variables definition & types	Chalk & Talk
3	3	pmf, pdf, PDF. definitions & properties Standard distributions- problems	Chalk & Talk
4	4	pmf, pdf, PDF non-standard distributions Two random variables and joint distribution function-examples	Chalk & Talk
5	5	Joint probability mass function (pmf), Joint probability density function (pdf), properties & problems independent random variables Marginal distributions- problems	Chalk & Talk
6	6	Conditional densities & conditional expectations Covariance function and correlation coefficient Function of one random variable $Y= f(X)$	Chalk & Talk
7	7	$Y=g(X)$ for $g(X) = aX$, X^2, e^{ax}, $\log(X)$, $(X)^{1/2}$ problems	Chalk & Talk

8	8	Function of two random variables Z=g(X,Y) for g(X,Y)= X+Y,X-Y, X/Y, XY, max(X,Y) and min(X,Y) problems	Chalk & Talk
9	9	Generating Function types- MGF,CF,PGF, MGF properties & MGF for standard df, problems MGF for nonstandard df, CF properties and problems	Chalk & Talk
10	10	Chebyshev's inequality, law of large numbers-central limit theorem and problems	Chalk & Talk
11	11	Stochastic process- Markov dependence- Markov chain-definition- examples- ergodicity- problems	Chalk & Talk
12	12	Finite Markov chain- various states-limiting probability - problems- Poisson Process	Chalk & Talk
13	13	Properties of Poisson Process – problems- Introduction to queues- Queue characteristics – Kendall notation	Chalk & Talk
14	14	M/M/1 queue with finite and infinite waiting space - problems	Chalk & Talk

*Each week -3 contact periods

COURSE ASSESSMENT METHODS

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Assignment-1	5^{th} week	3 weeks	5%
2	Test-1	6^{th} week	1 hour	20%
3	Assignment-2	11^{th} week	3 weeks	5%
4	Test-2	12^{th} week	1 hour	20%
5	Semester Examination	17^{th} /18^{th} week	3 hours	50%

ESSENTIAL READINGS : Textbooks, reference books Website addresses, journals, etc

1.Feller.W. An Introduction to Probability Theory and Applications Vol.I, Wiley Eastern, New Delhi
2.Papoulis. A.,Probability, Random variables and Stochastic Processes, McGraw Hill, 2002.
3.E.Wong, Introduction to Random Processes, Springer Verlag,1983.
4.Allen.A.O. Introduction to Probability, and Statistics and Queuing Theory with Computer Science Applications, Academic Press, 2006 Reprint.
5. Ross. S.M. Introduction to Probability Model (9/e) academic press 2007

COURSE EXIT SURVEY

Feedback Questionnaire (end semester)

COURSE POLICY (attendance, evaluation, grading, plagiarism, academic honesty, attendance etc.)

1. All students are expected to attend all classes. To appear for the final semester examination 75% of attendance is essential and students may be permitted to take leave only with prior written permission from the faculty in charge of the subject for a maximum of 25% of the total contact hours including all kinds of absence from class.
2. Absence from attending classes is not permitted above 25% ***including with permission for whatsoever reason.*** However special contact sessions may be permitted to compensate the attendance shortage (up to 10%) to meet the minimum requirement of 75% by attending compensatory sessions as stipulated by the faculty in charge.
3. For students below 50% of attendance, and students with attendance 50% or more and less than 75% are governed by the academic rules.

ADDITIONAL COURSE INFORMATION

Course Co coordinator will be available for any clarification in the above subject matters and for clarifications.

Faculty in charge **CC-Chairperson** **HOD**