NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

TO ECE THAVASI RAJA

DEPARTMENT OF MATHEMATICS

COURSE PLAN – PART I			
Name of the programme and specialization	B.TECH ELECTRONICS AND COMMUNICATION ENGINEERING		
Course Title	PROBABILITY THEORY AND RANDOM PROCESS		
Course Code	MAIR45	No. of Credits	3
Course Code of Pre-requisite subject(s)	MAIR11, MAIR21		
Session	January 2019	Section (if, applicable)	B
Name of Faculty	Dr.R.SATHYA	Department	MATHEMATICS
Official Email	sathyar@nitt.edu	Telephone No.	-
Name of Course Coordinator(s) (if, applicable)			
Official E-mail		Telephone No.	
Course Type (please tick appropriately)	☑ Core course	☐ Elective course	

Syllabus (approved in BoS)

Axioms of probability theory - Probability spaces - Joint and conditional probabilities- Bayes' Theorem- Independent events.

Random Variable and random vectors - Distributions and densities. Independent random variables – Functions of one and two random variables.

Moments and characteristic functions - Inequalities of Chebyshev and Schwartz. Convergence concepts.

Random processes - Stationarity and ergodicity - Strict sense and wide sense stationary processes - Covariance functions and their properties - Spectral representation - Wiener-Khinchine theorem.

Gaussian processes - Processes with independent increments - Poisson processes - Lowpass and Bandpass noise representations.

Reference Books:

1. Davenport, Probability and Random Processes for Scientist and Engineers, McGraw-Hill.
2. Papoulis,A, Probability, Random variables and Stochastic Processes, McGraw Hill, 2006.
3. E. Wong: Introduction to Random Processes, Springer Science & Business Media, 2013
4. W.A.Gardner: Introduction to Random Processes, (2/e), McGraw Hill,1990.
5. H.Stark & J.W. Woods: Probability, Random Processes and Estimations Theory For Engineers, (2/e), Prentice Hall,1994.

COURSE OBJECTIVES

- To understand the basic concepts of probability theory and random variables.
- To provide the students with knowledge about random process and how to model the random processes in the communication system such as receivers, interference etc..

MAPPING OF COs with POs

Course Outcomes	Programme Outcomes (PO) (Enter Numbers only)
1. To understand the axiomatic formulation of modern Probability Theory and think of random variables as an intrinsic need for the analysis of random phenomena.	
2. To 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 covariance and spectral density of stationary random processes.	
5. To demonstrate the specific applications to Poisson and Gaussian processes and representation of low pass and band pass noise models.	

COURSE PLAN – PART II

COURSE OVERVIEW

- To provide a firm foundation in the basic theory of probability and random variables and random processes for communication Engineers.
- To teach the theoretical concepts and techniques for solving problems that arise in practise.
- To understand the mathematical techniques relating to random processes in the areas of signal processing, detection, estimation and communication.

COURSE TEACHING AND LEARNING ACTIVITIES (Add more rows)

S.No.	Week/Contact Hours	Topic	Mode of Delivery
1	Week 1,2 and 3	Axioms of probability theory - Probability spaces – Joint and conditional probabilities- Bayes' Theorem- Independent events.	Chalk and Talk

2	Week 3,4 Week 5,6,7 Week 7,8	Random Variable and random vectors Distributions and densities. Independent random variables - Functions of one and two random variables.	Chalk and Talk
3	Week 9,10,11	Moments and characteristic functions - Inequalities of Chebyshev and Schwartz-Convergence concepts.	Chalk and Talk
4	Week 11,12,13	Random processes - Stationarity and ergodicity - Strict sense and wide sense stationary processes- Covariance functions and their properties -Spectral representation-Wiener-Khinchine theorem.	Chalk and Talk
5	Week 13,14,15	Gaussian processes - Processes with independent increments -Poisson processes - Lowpass and Bandpass noise representations.	Chalk and Talk

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Assessment - I	8th week	1 hr	20
2	Assessment -II	13th week	1 hr	20
3	Assignments*	-		10
CPA	Compensation Assessment*	15th week	1 hr	20
4	Final Assessment		3 hrs	50

***mandatory; refer to guidelines on page 4**

COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)

1. Feedback from students during class committee meeting.
2. Online feedbacks collected by academic section through (MIS). The feedback is to be filled honestly by the students.

COURSE POLICY (including compensation assessment to be specified)

1. ***COMPENSATORY ASSESSMENT POLICY:**
   - ✓ Students who have missed the **Assessment I and II** or both (genuine reasons with proof) can register for **Compensatory Assessment** examination which shall be conducted soon after the completion of the second Assessment and before the regular semester examination.
   - ✓ Compensatory Assessment shall be conducted for 20 marks comprising the syllabus of both first and second Assessment.
2. ***ASSIGNMENTS:**
   - ✓ Students should submit assignments before last date of submission. In case students fails to submit their assignments, he/she will get zero mark for that particular assignment.

ATTENDANCE POLICY (A uniform attendance policy as specified below shall be followed)

- At least 75% attendance in each course is mandatory.
- A maximum of 10% shall be allowed under On Duty (OD) category.
- Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' grade.

ACADEMIC DISHONESTY & PLAGIARISM

- Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
- Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.
- The departmental disciplinary committee including the course faculty member, PAC chairperson and the HoD, as members shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the Academic office.
- The above policy against academic dishonesty shall be applicable for all the programmes.

ADDITIONAL INFORMATION, IF ANY

Faculty is available for discussion after the class hours at the Department of Mathematics Lyceum Block Room No. 214.

FOR APPROVAL

Course Faculty (Dr. R. SATHYA) CC- Chairperson _____ HOD _____