Course Code	ECE 501
Course Name	Probability and Random Process
Credits	4
Course Offered to	UG/PG
Course Description	The course will provide students with an in depth introduction to stochastic processes with applications in electrical engineering. A review of axioms of probability, single and multivariate distributions, and functions of random variables will be followed by study of fundamental theorems like Markov's inequality, Chebyshev's inequality, Chernoff's Bound, weak and strong law of large numbers (convergence in probability and almost sure convergence), mean-squared convergence, convergence in distribution, the central limit theorem, random waveforms, stationarity, ergodicity, linear systems with stochastic inputs, autocorrelation and the power spectrum. Along the course we will also look at examples like the Weiner process, Poisson process and Markov Chains.

Pre-requisites		
Pre-requisite (Mandatory)	**Pre-requisite (Desirable)**	**Pre-requisite(other)**
ECE240 Principles of Communication Systems		
*Please insert more rows if required		

Post Conditions*(For suggestions on verbs please refer the second sheet)			
CO1	**CO2**	**CO3**	**CO4**
Students are able to define sets, outcomes, event spaces. Solve problems on basic counting, and use the axioms of probability to prove basic theorems.	Students are able to calculate the pdf, cdf, and expectations of functions of continuous, discrete, and mixed random variables. Ability to solve word problems that involve a mix of the above.	Students are able to able to analyze the performance, demodulate and decode the signals in presence of additive white Gaussian noise channel	Students are able to define a stochastic process and its moments and test for properties like stationarity. They are able to derive properties of a Poisson process, Weiner process, and Normal process, and apply the same to solving word problems.

Weekly Lecture Plan			
Week Number	**Lecture Topic**	**COs Met**	**Assignment/Labs/Tutorial**
Week 1,2,3	Review of the axioms of probability and the single random variabl	CO1	Assignment at the end of every week
Week 4,5,6	Functions of two random variables, joint moments, joint characteristic functions, conditional distributions, conditional expectations	CO2	Assignment at the end of every week
Week 7,8,9	Multiple random variables, Sums (random and deterministic) of random variables, different kinds of convergence, laws of large numbers	CO2 + CO3	Assignment at the end of every week

Week 10,11,12,13	Introduction to stochastic processes, examples, stationarity, cyclo-stationarity, time averaging and ergodicity. Auto correlation, power spectrum, linear systems with stochastic inputs. Markov Chains	CO4	Assignment at the end of every week
*Please insert more rows if required			

Weekly Lab Plan

Week Number	Laboratory Exercise	COs Met	Platform (Hardware/Software)
Course does not have a lab component			
*Please insert more rows if required			

Assessment Plan

Type of Evaluation	% Contribution in Grade
Assignment	0
Mid-sem	25
Quiz	40 (Five quizzes, best of four)
Project	0
End-sem	35
*Please insert more row for other type of Evaluation	

Resource Material

Type	Title
Textbook	An introduction to Probability by Feller
Reference	A first course in Probability by Ross
Reference	Probability and Stochastic Processes: A Friendly Introduction for Electrical and Computer Engineers by Roy D. Yates (2nd Edition)