	National Institute of Technology Meghalaya An Institute of National Importance	**CURRICULUM**

Programme	**Bachelor of Technology in Electronics and Communication Engineering**	Year of Regulation	**2018-19**
Department	**Electronics and Communication Engineering**	Semester	**IV**

Course Code	Course Name	Credit Structure				Marks Distribution			
		L	T	P	C	INT	MID	END	Total
EC 212	**Probability Theory and Stochastic Processes**	**3**	**0**	**0**	**3**	**50**	**50**	**100**	**200**

Course Objectives		Course Outcomes		
	To provide the fundamentals and advanced concepts of probability theory and random process to support graduate coursework		CO1	Able to apply the specialized knowledge in probability theory and random processes to solve practical engineering problems.
	To be familiar with some of the commonly encountered random variables, in particular the Gaussian random variable		CO2	Able to distinguish interrelationship between discrete and continuous random variables and between deterministic and stochastic processes.
	To understand the classifications of random processes concepts such as strict stationarity, wide-sense stationarity and ergodicity		CO3	Able to develop mathematical models for practical design with joint distribution problems and determine theoretical solutions to the developed models.
	Analysis of random process and application to the signal processing in the communication system		CO4	Able to apply central limit theorem and random process including stationary process for definite solutions.

No.	COs	Mapping with Program Outcomes (POs)												Mapping with PSOs			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
1	CO1	**3**	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**3**	**2**	**3**	**-**
2	CO2	**2**	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**3**	**-**	**2**	**-**
3	CO3	**1**	**2**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**3**	**3**	**-**
4	CO4	**-**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**2**	**3**	**2**	**-**

SYLLABUS

No.	Content	Hours	COs
I	**The Axioms of Probability:** Sets and set operations; Probability space; Conditional probability and Bayes theorem; Combinatorial probability and sampling models.	**06**	**CO1**
II	**The Concept of a Random Variable and its Functions:** Discrete random variables, probability mass function, probability distribution function, example random variables and distributions; Continuous random variables, probability density function, probability distribution function, example distributions;	**07**	**CO1, CO2**
III	**Moments and Conditional Statistics:** Joint distributions, functions of one and two random variables, moments of random variables; Conditional distribution, densities and moments; Characteristic functions of a random variable; Markov, Chebyshev and Chernoff bounds;	**08**	**CO1, CO3**
IV	**Random Sequences:** Random sequences and modes of convergence (everywhere, almost everywhere, probability, distribution and mean square); Limit theorems; Strong and weak laws of large numbers, central limit theorem.	**07**	**CO3**
V	**Random Processes:** Random process, Stationary processes, mean and covariance functions, ergodicity, transmission of random process through LTI, power spectral density.	**08**	**CO2, CO4**
	Total Hours	**36**	

Essential Readings

1. H. Stark and J. Woods, ``Probability and Random Processes with Applications to Signal Processing," Third Edition, Pearson Education, 2001.
2. *A.Papoulis and S. Unnikrishnan Pillai, ``Probability, Random Variables and Stochastic Processes," Fourth Edition, McGraw Hill, 2017.*

Supplementary Readings

1. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to ProbabilityThoery, Houghtion Mifflin; 1st Edition, 1972
2. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Stochastic Processes, Waveland PrInc Publishers, 1986
3. S. M. Ross, Introduction to Probability Models, Harcourt Asia, Academic Press, 10th Edition, 2010.