



National Institute of Technology Meghalaya
An Institute of National Importance

CURRICULUM

Programme	MSc	Year of Regulation	2018-19
Department	Mathematics	Semester	IV

Course Code	Course Name	Pre-Requisite	Credit Structure				Marks Distribution			
			L	T	P	C	INT	MID	END	Total
MA 540	Stochastic Processes	MA 407	3	0	0	3	50	50	100	200

Course Objectives	Course Outcomes	CO1	Able to identify different types of stochastic processes.
		CO2	Able to determine transition probability matrices, stability and reducibility of a Markov chain.
CO3	Able to apply properties of Poisson process to determine the mean occurrence of an event in a specified duration or interval of time.		
CO4	Able to derive and prove important theorems and formulas for Renewal theory.		
CO5	Able to apply and analyse birth and death processes in Markovian queueing models.		

SYLLABUS

No.	Content	Hours	COs
I	Introduction to stochastic process Definition and examples of stochastic process, classification of stochastic process.	4	CO1
II	Markov Chains Definition and examples, transition probability matrices, classification of states of a Markov chain, determination of higher order transition probabilities, stability of a Markov chain, Markov chain with denumerable number of states, reducible Markov chains, Poisson process and its extensions, birth and death process.	14	CO2 CO3
III	Renewal Processes Renewal processes in continuous time, renewal equation; Stopping time, Wald's equation, renewal theorems, residual and excess lifetime, renewal reward processes, regenerative renewal processes, generalization of the classical renewal theory.	12	CO4
IV	Stochastic processes in queueing models Queueing processes, steady state distribution, Little's formula, birth and death processes in queueing theory, Markovian models.	6	CO5
Total Hours		36	

Essential Readings

1. J. Medhi; "Stochastic Processes", 3rd edition, New Age International, New Delhi, 2009.
2. S. Karlin & H M Taylor; "A First Course in Stochastic Processes", 2nd edition, Academic Press, New York, 1975.

Supplementary Readings

1. S. M. Ross; "Stochastic Processes", 2nd edition, John Wiley and Sons, New York, 1996.