

COURSE TEMPLATE

1.	Department /Centre proposing the course	Mathematics
2.	Course Title (<i>< 45 characters</i>)	INTRODUCTION TO PROBABILITY THEORY AND STOCHASTIC PROCESS
3.	L-T-P structure	3 - 1 - 0
4.	Credits	4
5.	Course number	MAL 106
6.	Status (<i>category for program</i>)	DC for Maths and PLC for Others

7.	Pre-requisites (course no./title)	NIL
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8.	Status vis-à-vis other courses (<i>give course number/title</i>)	
8.1	Overlap with any UG/PG course of the Dept./Centre	MAL 140 , MAL 509 , MAL 725
8.2	Overlap with any UG/PG course of other Dept./Centre	EEL 433
8.3	Supercedes any existing course	MAL 250

9.	Not allowed for (indicate program names)	NIL
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10.	Frequency of offering	☐ Every sem ☐ 1 st sem ☐ 2 nd sem ☒ Either sem
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11.	Faculty who will teach the course S DHARMARAJA, NILADRI CHATTERJEE, APARNA MEHRA	
12.	Will the course require any visiting faculty?	No

13.	Course objective (<i>about 50 words</i>): The aim of the course is to provide the students with explanations and expositions of probability, stochastic processes concepts and theoretical concepts pertaining to handling various stochastic modeling	
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14.	Course contents (<i>about 100 words</i>) (<i>Include laboratory/design activities</i>): Axioms of probability, Probability space, Conditional probability, Independence, Bayes' rule, Random variable, Some common discrete and continuous distributions, Distribution of Functions of Random Variable, Moments, Generating functions, Two and higher dimensional distributions, Functions of random variables, Order statistics, Conditional distributions, Covariance, correlation coefficient, conditional expectation, Modes of convergences, Laws of large numbers, Central limit theorem, Definition of Stochastic process, Classification and properties of stochastic processes, Simple Markovian stochastic processes, Gaussian processes, Stationary	
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	processes, Discrete and continuous time Markov chains, Classification of states, Limiting distribution, Birth and death process, Poisson process, Steady state and transient distributions, Simple Markovian queuing models (M/M/1, M/M/1/N, M/M/c/N, M/M/N/N, M/M/∞).
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15. Lecture Outline *(with topics and number of lectures)*

Module no.	Topic	No. of hours
1	Axioms of probability, Probability space, Conditional probability, Independence, Bayes' rule	4
2	Random Variable, Some common discrete and continuous distributions, Distribution of Functions of Random Variable	6
3	Moments, Generating functions	4
4	Two and higher dimensional distributions, Functions of random variables, Order statistics, Conditional distributions	6
5	Covariance, correlation coefficient, conditional expectation	4
6	Modes of convergences, Laws of large numbers, Central limit theorem	4
7	Definition, Classification, properties, Simple Markovian stochastic processes, Gaussian processes, Stationary processes	3
8	Definition, Classification of states, Limiting distribution	3
9	Definition, Birth and death process, Poisson process, Steady state and transient distributions	4
10	M/M/1, M/M/1/N, M/M/c/N, M/M/N/N, M/M/ ∞	4
11		
12		
COURSE TOTAL (14 times 'L')		42

16. Brief description of tutorial activities

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17. Brief description of laboratory activities

Module no.	Experiment description	No. of hours
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
COURSE TOTAL (14 times 'P')		####

18. Suggested texts and reference materials

STYLE: Author name and initials, Title, Edition, Publisher, Year.

1. P L Mayer, Introductory Probability and Statistical Applications, Addison-Wesley, 1966.
2. K S Trivedi, Probability and Statistics with Reliability, Queueing and Computer Science Applications, Wiley, second edition, 2001.
3. S M Ross, Introduction to Probability Models, Academic Press, ninth edition, 2000.

19. Resources required for the course *(itemized & student access requirements, if any)*

19.1	Software	Nil
19.2	Hardware	Nil
19.3	Teaching aides (videos, etc.)	Nil
19.4	Laboratory	Nil
19.5	Equipment	Nil
19.6	Classroom infrastructure	Microphone, Blackboard and Projector.
19.7	Site visits	Nil

20. Design content of the course *(Percent of student time with examples, if possible)*

20.1	Design-type problems	Nil
20.2	Open-ended problems	Nil
20.3	Project-type activity	Nil
20.4	Open-ended laboratory work	Nil
20.5	Others (please specify)	70-80% theory and 20-30% theory based analytic examples/problems.

Date: 3-1-2014

(Signature of the Head of the Department)