

13. Analysis of Covariance of a one-way classified data.
14. Residual Analysis.
15. Orthogonal Polynomials.

Practical work to be conducted using electronic spreadsheet / EXCEL/ Statistical Software Package/ SPSS/ calculators.

ESSENTIAL READINGS

- Montgomery, D. C., Peck, E. A. and Vining, G. G. (2012): Introduction to Linear Regression Analysis, 5th Ed., John Wiley and Sons.
- Rencher, A. C. and Schaalje, G. B. (2008): Linear Models in Statistics, 2nd Ed., John Wiley and Sons.
- Draper, N. R. and Smith, H. (1998): Applied Regression Analysis, 3rd Ed., John Wiley and Sons.

SUGGESTIVE READINGS:

- Weisberg, S. (2005): Applied Linear Regression, 3rd Ed., John Wiley and Sons.
- Rawlings, John O. Pantula Sastry G. Dickey, David A. (1998) Applied Regression Analysis: A Research Tool, Second Edition
- Bapat, R.B.(1993): Linear Algebra and Linear Models, Hindustan Book Agency.

Note: Examination scheme and mode shall be as prescribed by the Examination Branch University of Delhi, from time to time.

DISCIPLINE SPECIFIC CORE COURSE 15 –: STOCHASTIC PROCESSES

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Stochastic Processes	4	3	0	1	Class XII pass with Mathematics.	knowledge of probability, probability distributions and sampling distributions

Learning Objectives:

- To define, design and model
- To analyze transitions through Markov chains
- To identify the real life applications of stochastic processes

Learning Outcomes:

After completing this course, students should have developed a clear understanding of:

- The fundamental concepts of stochastic processes.
- Tools needed to analyze stochastic processes.
- Markov processes and Markov chains.
- Markov chain applications.
- Poisson process and its variations.
- Random walk and ruin theory

SYLLABUS OF DSC-15

Theory

UNIT I

(13 hours)

Introduction of Stochastic Process

Probability Distributions: Generating functions, Bivariate probability generating functions, and their application.

Stochastic Process: Introduction, Covariance stationary, and Stationary Process.

UNIT II

(15 hours)

Markov Chains

Markov Chains: Definition of Markov Chain, transition probability matrix, order of Markov chain, Markov chain as graphs, higher transition probabilities.

Classification of states and chains, stationary process, and stability of Markov system. Generalization of independent Bernoulli trials,

UNIT III

(12 hours)

Poisson Process

Poisson Process: postulates of Poisson process, and properties of Poisson process and applications.

Gambler's Ruin Problem: Classical ruin problem, expected duration of the game.

PRACTICAL/LAB WORK – (30 hours)

List of Practical:

1. Applications of Partial Fraction Theorem.
2. Problems based on (covariance) stationary processes.
3. Simulation of Markov chains.
4. Calculation of transition probability matrices.
5. To check whether the given chain is irreducible or not.
6. Classification of states.
7. Computation of probabilities in case of generalizations of independent Bernoulli trials.
8. Simulation and applications of Poisson processes.
9. Transition Markov chain in case of gambler's ruin problem .
10. Calculation of probabilities for ruin problems.

Practical work to be conducted using electronic spreadsheet / EXCEL/ Statistical Software Package/ SPSS/ calculators.

ESSENTIAL READINGS

- Feller, W. (1968). Introduction to probability Theory and Its Applications, Vol I, 3rd Ed., Wiley International.
- Medhi, J. (2019). Stochastic Processes, 4th Ed., Reprint, New Age International Publishers.

SUGGESTIVE READINGS:

- Sheldon M. Ross (2007) : Introduction to Probability Models, 9th edition, Academic Press publications
- Karlin & Taylor (1975) : A first course in stochastic processes, 2nd edition, Academic Press publications
- Basu, A.K. (2005). Introduction to Stochastic Processes, Narosa Publishing.
- P. G. Hoel, S. C. Port and C. J. Stone: Introduction to Stochastic Processes.
- J. G. Kemeny, J. L. Snell and A. W. Knapp: Finite Markov Chains.
- Geoffrey R, Grimmett & David R. Stirzaker : Probability and Random Processes
- Bhat, B.R. (2000). Stochastic Models: Analysis and Applications, New Age International Publishers.

Note: Examination scheme and mode shall be as prescribed by the Examination Branch University of Delhi, from time to time.

Discipline Specific Elective for B. Sc. (H) Statistics

DISCIPLINE SPECIFIC ELECTIVE COURSE – 3A: ACTUARIAL STATISTICS

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Actuarial Statistics	4	3	0	1	Class XII pass with Mathematics	----

Learning Objectives

The learning objectives include:

- To learn basics of Actuarial Science.
- To learn advanced techniques in Actuarial Science with practical applications in daily life.

Learning Outcomes:

After completing this course, students should have developed a clear understanding of:

- Basics of Actuarial Science.