

DISCIPLINE SPECIFIC CORE COURSE– 10: STATISTICAL SIMULATION

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		
Statistical Simulation	4	3	0	1	Class XII pass with Mathematics	knowledge of basic statistics

Learning Objectives

The learning objectives include:

- Concept of simulation and simulation modelling.
- Generation of Pseudo random number generators as well as from standard statistical distributions. Monte-Carlo simulation technique.
- Application of simulation techniques.

Learning Outcomes

After completing this course, students will possess skills concerning:

- How simulation may be used to understand the behavior of real world systems by utilizing mathematical models with an emphasis on simulation.
- How to generate random numbers by the different methods.
- Hands-on experience in using simulation software packages/structured programming languages.

SYLLABUS OF DSC- 10

Theory

UNIT I

(12 Hours)

Introduction to simulation:

Introduction, Definitions of simulation, Need for simulation, general principles, types of simulation, Simulation models, Phases in simulation models, Event type simulation, Monte Carlo simulation technique.

UNIT II

(18 Hours)

Random numbers generation:

Methods for the generation of Random numbers, Pseudo random number generators, Mid square method for the generation of random number and its limitations, the inverse transform method; Generating the Discrete and Continuous random variables.

UNIT III

(15 Hours)

Applications of simulation:

Applications of simulation in different fields of study, simulation of Inventory problems and simulation of Queueing problems. Advantages and disadvantages of simulation, Simulation languages, Scope of simulation techniques.

Practical/Lab Work – (30 hours)

List of Practical:

1. Pseudo random number generators;
2. Generation of $U(0,1)$.
3. Generation using the inverse transform method applied to:
 - (a) Discrete distribution and
 - (b) Continuous distribution.
4. Monte Carlo simulation method and applications.
5. Problems based on Queueing systems.
6. Problems based on Inventory Controls, etc.

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

ESSENTIAL READING:

- Sheldon M. Ross (2022) Simulation, Sixth Edition, Elsevier Academic press publication.
- Taha, H. A. (2010). Operations Research. An Introduction, 9th Ed, Pearson.
- Swarup, K. Gupta, P.K. and Mohan, M. (2019). Operations Research, 15th Ed, Sultan Chand & Sons.

SUGGESTED READINGS:

- Voss, J. (2013). An introduction to statistical computing: A simulation-based approach, 1st Ed., Wiley series in computational statistics.
- Sharma, J. K. (2017). Operations Research: Theory and applications, 6th Edition, Trinity Press.
- Payer T.A. (1982). Introduction to simulation, McGraw Hill.

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