

CSH612: Simulation and Modeling

Teaching Scheme Lectures: 3 hrs/Week Tutorials: 1 hr/Week Credits: 4	Examination Scheme Class Test -12Marks Teachers Assessment - 6Marks Attendance – 12 Marks End Semester Exam – 70 marks
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Prerequisite: -

1. Basic knowledge of numerical mathematics,
2. probability and statistics, and Programming skills

Course Objectives:

1. The main objective of this subject is to gain the knowledge about system and its behavior so that a person can transform the physical behavior of a system into a mathematical model that can in turn transform into a efficient algorithm for simulation purpose.
2. The area of experimentation and results analysis for simulation models is briefly introduced here. By the end of this module you will learn the verification and validation techniques to compare the defined model with real system's data.

Unit –I (10 Hours)

Introduction of System Models & system simulation: Advantages and disadvantages of simulation, difficulties of simulation when to use simulation? modeling concepts (model classification)

Unit-II (6 Hours)

VERIFICATION AND VALIDATION OF MODEL: Introduction of validation and verification, comparing model data with real system data, validating existing systems, validating first time model

Unit-III(10 Hours)

Discrete system simulation: time graph representation, discrete simulation, the single-server queue queue parameters, the multi-server queue, basic queuing relationships, SINGLE-SERVER QUEUES, MULTISERVER QUEUES, performance measures for queuing systems, the simulation of time sharing systems.

Unit-IV(10 Hours)

Continuous simulation: Introduction of Continuous Simulation, Examples related to continuous simulation, Why do we use Continuous Simulation? The Uses of Simulation.

Unit-V(10 Hours)

Simulation Language: Continuous Simulation Language, Classification of Continuous Simulation Languages, Discrete Simulation Language, Classification of Discrete Simulation Languages, Other Simulation Languages, Introduction of SIMULA.

Unit-VI(10 Hours)

Use of Database A.I. in modeling Simulation: Database in Modeling And Simulation, Definition of Simulation Data Model, Data Representation of Simulation Model, Data Representation For Input Files For a Simulation, Data Representation for Output Files for a Simulation, A.I. in Modeling Simulation

Text and Reference Books

1. Jerry Banks and John Carson, "Discrete Event System Simulation", PHI, 2005
2. Geoffrey Gordon, "System Simulation", Second Edition, PHI, 2006 Frank L. Severance, "System Modeling and Simulation", Wiley, 2001
3. Averill M. Law and W. David Kelton, "Simulation Modeling and Analysis McGraw Hill, 2006.
4. Jerry Banks, "Handbook of Simulation: Principles, Methodology, Advances, Applications and Practice", Wiley, 1998.
5. Sheldon M. Ross: Introduction to Probability Models 7th Edition, Academic Press, 2002
6. Donald E. Knuth: The Art of Computer Programming - Volume 2: Semi Numerical Algorithms, 2nd Edition, WILEY

Course Outcomes:

1. Have a clear understanding of the need for the development process to initiate the real problem.
2. Have a clear understanding of principle and techniques of simulation methods informed by research direction.
3. Cognitive skills (thinking and analysis) –
4. Be able to describe the components of continuous and discrete systems and simulate them.
5. Be able to model any system from different fields
6. Be able to implement numerical algorithm to meet simple requirements, expressed in English
7. Be able to discuss the simulation methods and select the suitable technique on the problems.