

CS 4632 – Modeling and Simulation

The primary task of this course is to introduce students to the fundamental concepts of computer modeling and simulation using discrete-event modeling and programming techniques. This provides the student with the tools necessary to solve large number of real-world situations.

Topics included but not limited are as follow:

Module 1:

Introduction to Modeling and Simulation.

Review of Object-Oriented Modeling and Programming. Using OOSim

Module 2:

Review of Object-Oriented Modeling and Programming.

Techniques for Discrete-Event Simulation: Object orientation.

Module 3:

Single-server Simulation Models, case studies.

Simulation with Multiple-Server Models, case studies.

Module 4:

Models with priorities. Review - Midterm exam.

Models with Standard Resources, case studies.

Module 5:

Models with Detachable Resources, case studies.

Advanced Process Interaction: synchronous cooperation, case studies.

Module 6:

Conditional Waiting, case studies.

Models with Interrupts, case studies.

Module 7:

Overview of Basic Applied Probability Theory.

Simulation Output Analysis: Overview

Module 8:

Emerging Topics

After course completion, successful learners will be able to:

1. Understand and be able to describe the structure and dynamic behavior of various types of systems
2. Design the conceptual models in UML for most of the properties of systems
3. Implement simulation models with an object oriented simulation language
4. Implement simulation models using a commercial integrated software tool such as Arena
5. Carry out general discrete-event simulation runs and provide basic analysis of results
6. Write short reports on various mini-projects (assignments)
7. Develop a project on developing a simulation model for a selected application domain, or a research paper on some aspect of modeling and simulation