CS 472 Simulation and Modelling
Summer 2024

Course Credits: 4
Contact Hours: 56 hours
Instructor: TBA
Email: TBA

COURSE OBJECTIVES

The course gives an introduction to modeling and simulation, which are widely used to analyze complex systems. The contents of the course include the theory and practice of random number generation, queuing theory, direct simulations of discrete-time models, event based simulations and output analysis. Students will learn how to build and analyze models using simulation software.

Upon Completion of this Course, students will be able to:

1. Grasp modeling concepts with emphasis on performance analysis;

2. Understand modeling concepts using mean value analysis with some information technology applications;

3. Understand the basic concepts of discrete-event and next-event simulation;

4. Learn how to generate pseudo-random numbers and analyze the quality of random number generators;

5. Learn how to use simulation software to build models and analyze their output;

6. Develop skills in analyzing simulation results and drawing conclusions.

PREREQUISITES

CS 258 Data Structures and Algorithms

GRADING

Grades will be determined by accumulating points, with 100 points being the maximum, as follows:

ITEM	POINTS
Quizzes	10 Points
Assignments	20 Points
Midterm	20 Points
Project	20 Points
Final Exam	30 Points
Total	100 Points

Late submissions will be graded at the end of the course. Grades will be assigned according to the following rule:

A ≥ 90 > B ≥ 80 > C ≥ 70 > D ≥ 60 > F.

We reserve the right to make adjustments to the overall grading policy.

COURSE MATERIALS

Required Texts:

Banks, J., Carson, J. S., Nelson, B. L., & Nicol, D. M. (2005). *Discrete-Event System Simulation*. Pearson.

Recommended (Optional) Texts or Other Materials:

Law, A. M., & Kelton, W. D. (2000). *Simulation modeling and analysis* (Vol. 2). New York: McGraw-Hill.

COURSE TOPICS

MODULE	TASKS
Module 1	**Topics:** Topic 1: Introduction to Simulation Topic 2: Simulation and modeling Topic 3: Types of simulation models Topic 4: Elements of a simulation study **Assessments:** Quiz#1 Assignment#1

Module 2	**Topics:** Topic 5: General Principles Topic 6: Simulation Software Topic 7: Statistical Models in Simulation Topic 8: Queueing Models **Assessments:** Quiz#2 Assignment#2
Module 3	**Topics:** Topic 9: Random-Number Generation Topic 10: Random-Variate Generation Topic 11: Input Modeling Topic 12: Verification and Calibration of Simulation Models **Assessments:** Midterm Project
Module 4	**Topics:** Topic 13: Validation of Simulation Models Topic 14: Output Analysis Topic 15: Statistical analysis of simulation output Topic 16: Confidence interval estimation **Assessments:** Project due
Module 5	**Topics:** Topic 17: Queuing Theory Topic 18: Basic queuing models Topic 19: Performance measures in queuing systems Topic 20: Simulation of Manufacturing and Material-Handling Systems **Assessments:** Final Exam

ATTENDANCE

1) Class attendance is required. Missing classes without permission will lead to decrease in overall grade.

Missing less than two classes: no penalty.

Missing more than two classes: 7% will be taken off from the overall grade.

If the instructor reports a student's frequent missing of class to the Soochow University Academic Administration Office, the student might get a written warning and might be prohibited from attending final exam.

2) Participants in this course are expected to arrive in class promptly and adequately prepared. The primary objective of this course is to critically engage with the readings and the subject matter. Therefore, course participants are expected to have completed the reading prior to class and prepare thoughtful reflections/commentaries to share with fellow colleagues.

LEARNING REQUIREMENTS

1) Late assignments are not acceptable and are subjected to grade deductions.

2) Assignments submitted in the wrong format will be counted as not submitted.

3) Failure to submit or fulfill any required course component results in failure of the class.

4) Make-up for midterm and final exams only with valid excuses, as defined by the University.

5) In order to earn a Certificate of Completion, participants must thoughtfully complete all assignments by stated deadlines and earn an average quiz score of 50% or greater.

TECHNOLOGY POLICY

The use of electronic devices in class is distracting, both for the user and for the rest of the class. Only non-programmable calculators can be used in the tests and exam. Any attempts to use cell phones and other electronic communication devices will be seemed as cheating. Laptops are discouraged, unless you use them for activities DIRECTLY related to the course (eg., note taking, reading course documents).

ACEDEMIC INTEGRITY POLICY

Soochow University highly values the academic integrity and aims to promote the academic fairness, honesty and responsibility. Any academic dishonesty behaviors and any attempts to cheats and plagiarism will be reported to the university administration office. A written warning and the relevant penalties will be imposed.

The record might be shown on the official university transcript.

<u>DISABILITY ACCOMMODATION</u>

Soochow University is committed to maintaining a barrier-free environment so that students with disabilities can fully access programs, courses, services, and activities at Soochow University. Students with disabilities who require accommodations for access to and/or participation in this course are welcome.

Note:

Please contact the University Administrative Office immediately if you have a learning disability, a medical issue, or any other type of problem that prevents professors from seeing you have learned the course material.