

COURSE DESCRIPTION

Department and Course Number	CS 482	Course Coordinator	Reilly
Course Title	Simulation Methodology and Applications	Total Credits	3

Current Catalog Description

Foundations for computer modeling and simulation, with accent on discrete systems: random number and process generation; statistical bases with probability and frequency distribution orientation; Monte Carlo experiments and general purpose modeling, e.g., in SLX. Topics where simulation and AI meet, e.g., simulation environment matters, e.g., expert systems, formal logic, etc.

Textbook

None. There's an unpublished introduction to SLX and much material on a CD the students will have.

References *The GPSS book used in CS 481 is recommended as reference: Getting Started with GPSS-H, 2nd ed., by J. Banks, J. S. Carson, and J. N. Sy, Wolverine Software, 2003.*

For mathematical foundations we utilize some general material on queuing systems, renewal systems, and inventory systems along with readings from books on computer system and computer network modeling.

Course Goals

The main idea behind the course is to gain competence in a portion of modeling & simulation (aka model building and exercising) with respect to applications.

Prerequisites by Topic

Algorithms and Data Structures, Calculus (preferably I and II at a minimum), probability and statistics exposure.

Major Topics Covered in the Course

The course stresses modeling in SLX, a relatively new simulation language that embeds several features from GPSS, and more general model conceptualizations. SLX basic object concepts play a role in modeling and also offer opportunity to build co-processing systems models such as those in some forms of AI, e.g., neural networks, fuzzy systems, genetic algorithms and "intelligent" components rooted in expert system shells.

Laboratory projects (specify number of weeks on each)

Lab work consists primarily in project work, with formal write-ups and oral presentations. Sometimes smaller homework problems are introduced to make specific points.

Estimate CSAB Category Content

	CORE	ADVANCED		CORE	ADVANCED
		6			4
Data Structures		15	Computer Organization and Architecture		15
Algorithms			Concepts of Programming Languages		
Software Design					

Oral and Written Communications

Every student is required to submit at least 2 written reports (not including exams, tests, quizzes, or commented programs) of typically 5-10 pages and to make an oral presentation of typically 10-20 minutes duration. Material is graded primarily for technical content and relationship to course material, clarity of presentation (mainly a matter of organization), completeness, and accuracy.

Social and Ethical Issues

Honesty in handling input and output data. Following rules in team project work.

Theoretical Content

Probability and statistics make up to 40% of the course. AI concepts constitute about 25%. "Insights" into and from other areas of computer science, basic theory, programming language theory and practice, computer system and network organization.

Problem Analysis

Some problems ask for student initiative and require analysis beyond prescribed analysis to do the basics.

Solution Design

Almost all homework goes through a complete life cycle of analysis, design, implementation and testing.