

Syllabus – ISE 599: Modeling and Simulation for Systems Architecting and Engineering

Fall 2007, Wednesday, 6:30pm – 9:10pm

Instructor Dr. Raymond Madachy Phone 213.740.7275
Office SAL 318 E-mail madachy@usc.edu
Office Hours Wednesday, 4:30-6:30 pm

Course Description

This course covers modeling and simulation principles with applications to systems architecting and engineering. Students will use simulation tools and conduct studies to address current research issues for complex systems. It covers modeling approaches with a focus on continuous and discrete simulation, and surveys applications for complex systems across a variety of engineering domains.

The objectives of the course are to:

- Review basic simulation methods and principles applied to the architecting and engineering of complex systems. Describe the art and science of the modeling process, especially as applied to complex systems, and provide access to tools and executable models.
- Cover continuous, discrete-event and other simulation methods. Students will learn to develop and execute their own simulation models.
- Be exposed to a variety of simulation applications for system architecting and engineering disciplines by domain experts. Overview current and future research in the disciplines, and the future directions of modeling and simulation in general.
- Develop simulation term projects that address critical research issues and/or industrial applications in systems architecting and engineering.

Some of the lectures will be supplemented with demonstrations. Overall the course will equip the student to better understand how modeling and simulation can support the architecting process across a variety of domains, and be able to apply the techniques.

Materials

Course text:

Law M, Kelton W, *Simulation Modeling and Analysis*. McGraw-Hill, New York, NY, 2000

Reference materials:

Khoshnevis B, *Systems Simulation - Implementations in EZSIM*. McGraw-Hill, New York, NY, 1992

Madachy R. *Software Process Dynamics*, Wiley/IEEE Press, 2007

U.S. Defense and Modeling Office, <http://www.dmsomil.com>, 2007

Website

Students access the assignments, lecture notes, and other class materials from <http://den.usc.edu>.

Course Project

The semester project is to develop an extensive simulation study related to systems architecting and engineering. Each student will define his/her research topic to be addressed by systems modeling and simulation. The variety of topics is flexible and in approved cases students can team up in groups of two.

Grading

The following breakdown of semester activities determines the student's grade: midterm-15%; homework-20%; final examination-15%; course project-50%. Homework assignments are announced in class. Off-campus students must submit their assignments in time to be received by DEN on the day they are due. Off campus assignments must be submitted as specified in the DEN guidelines. Assignments may be turned in late for partial credit. Credit decrements will increase 20% with each class period after the due date. All assignments must be prepared using a word processor, spreadsheet, presentation graphics, and simulation software as required.

Final Exam

The university schedules the final exam date and time. This semester the final exam is on December TBD, 2007.

Academic Integrity

The Department of Industrial and Systems Engineering adheres to the University's policies and procedures governing academic integrity as described in SCampus. Students are expected to be aware of and to observe these academic integrity standards as they will be strictly enforced throughout the semester.

Disability Services and Programs

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me as early in the semester as possible. DSP is located in STU 301 and is open 8:30am – 5:00pm Monday through Friday. The phone number for DSP is 213.740.0776.

Note: This syllabus is subject to change as announced in class.

Course Schedule:

Week	Date	Milestones	Topic
1	8/29/07	Student Background Forms Due	Introduction to System Modeling and Simulation
2	9/5/07		Simulation Software Tools, Project Overview
3	9/12/07	Homework #1 Due	Continuous, Discrete Event, Combined, and Other Modeling Techniques
4	9/19/07	Course Project Proposal Due	The Modeling Process
5	9/26/07	Homework #2 Due	Statistics of Simulation and Monte-Carlo Analysis
6	10/3/07	Project Report #1 Due	Model Analysis, Validation and Verification, Student Status Presentations
7	10/10/07	Homework #3 Due	Software Intensive Systems Applications
8	10/17/07	Midterm	Midterm Exam
9	10/24/07		Sustainable Cities and Environment Applications – Dr. Hilary Bradbury-Huang
10	10/31/07	Homework #4 due	Urban Planning and Transportation Applications – Dr. James Moore
11	11/7/07	Project Report #2 Due Special Topic Presentation #7	Human- System Integration and Training Applications – Dr. Azad Madni
12	11/14/07		Current and Future Directions of Simulation for Complex Systems
13	11/21/07	Homework #5 due	Student Presentations
14	11/28/07		Student Presentations
15	12/5/07	Final Project Report Due	Student Presentations

Final Examination: TBD