Carleton University

Department of Systems and Computer Engineering

SYSC4005/5001 Simulation and Modeling

Winter 2012

Instructor: Professor Ioannis Lambadaris, office ME 4442, 520-2600 ext. 1974, email: ioannis@sce.carleton.ca

Course web site: The course page will be found in the departmental web site www.sce.carleton.ca→ Course Materials → SYSC4005 or SYSC5001
login:sysc4005-5001, password:iel2012

Course Textbook: J. Banks, J. C. Carson, II, B. L. Nelson, and D. M. Nicol, "Discrete-Event System Simulation," 5th Edition, Pearson - Prentice Hall, 2010, ISBN 0-13-606212-1.

Additional text (strongly recommended):
Lawrence M. Leemis and Stephen Park, Discrete-Event Simulation: A First Course, Prentice Hall (2005)
A. M. Law and W. D. Kelton, Simulation Modeling & Analysis, New York: McGraw-Hill, 1991 (QA76.9.C65L38 1991).

Course Objective: The goal of the course is to provide the basic background for modeling and computer simulation of systems. Emphasis is placed on the design of simulation experiments and the correct interpretation of the associated statistical results. The course includes a brief overview of simulation languages. If time permits, special topics such as design of experiments and variance reduction techniques will be discussed.

Prerequisites: Knowledge of basic probability and statistics is required (such as STAT 2605 or STAT 3502) and fourth year status in Engineering. Students who have not satisfied the prerequisites for this course must either a) withdraw from the course or b) obtain a prerequisite waiver from from our department, or c) will be deregistered from the course after the last day to register for courses in the term. A short introduction to probability and statistics will be given in class. This will be a refresher. A quiz on basic probability, statistics as they apply on simulations will follow.

Lectures: Tuesday and Thursday in Mackenzie Engineering (ME) 3269 from 6:00 pm – 7:30pm

Office Hours: Tuesday and Thursday from 5:00pm to 5:45pm and 7:30pm to 8:00pm (i.e. just before and after classes), or by appointment.

Teaching Assistant/office hours/contact info: The TA will be Kevin Luo (wenluo@sce.carleton.ca)

Exams

Quiz: The quiz will last 20-30minutes. It will be closed book and one page of handwritten notes will be allowed along with calculators. It will take place on Thursday **January 26.**

First In-Class Exam: Closed book. Calculators and one page of hadwriten notes are allowed. It will take place on **March 1.**

Second In-Class Exam: Closed book. Calculators and one page of hadwriten notes are allowed. It will take place on **April 5** (**last day of classes**).

Project: I plan to give a simulation project. The simulation language/package can be C or C++, or Java or OPNET or any other package/language the students are familiar with. Tutorials and lab schedule/space will be decided shortly and it will be announced on the course web site.

Grading Method:

4-5 Sets of Assignments	5%
(Note: Assignments can be done in groups of no more than two students/group)	
SimulationProject	10%
(Note: Project can be done in groups of no more than three students/group)	
Preliminary Quiz	10%
1st Exam	35%
2nd Exam	40%

Note: No late assignments will be accepted.

Students with Disabilities:

Students with disabilities requiring academic accommodations in this course are encouraged to contact a coordinator at the Paul Menton Centre for Students with Disabilities to complete the necessary letters of accommodation. After registering with the PMC, make an appointment to meet and discuss your needs with me at least two weeks prior to the final exam. This is necessary in order to ensure sufficient time to make the necessary arrangements. Please note the following deadlines for submitting completed forms to the Paul Menton Centre: ***March 7, 2012*** for the Winter Term.

Plagiarism:

Plagiarism (copying and handing in for credit someone else's work) is a serious instructional offense that will not be tolerated. Please refer to the section on instructional offenses in the Undergraduate Calendar for additional information.

References: (Most of the books will be on reserve at the library)

P. A. Fishwick, Simulation Model Design and Execution, Englewood Cliffs, New Jersey: Prentice-Hall, 1995 (QA76.9.C65F57).

W. H. Press, B. P. Flannery, S. A. Teukolsky, and W. T. Vetterling, Numerical Recipes in C, Second Edition, New York: Cambridge University Press, 1992 (QA76.73.C15N865 1992).

M. C. Jeruchim, P. Balaban, and K. S. Shanmugan, Simulation of Communication Systems, Plenum Press, 1992(TK5102.5.J47).

P. Bratley, B. L. Fox, and L. Schrage, A Guide to Simulation, New York: Springer-Verlag, 1987 (QA76.9.C65B73 1987).

G. Gordon, System Simulation, Prentice Hall, 2nd edition, 1977 (QA76.5.G63 1978).

I. Stahl., Introduction to Simulation with GPSS on the PC, Macintosh and VAX, Prentice Hall, 1990 (HF5548.2.S7724).

Course Outline:

- Introduction to simulation and examples
- Mathematical review: probability distributions, basic statistics, and mathematical modelling terminology; Brief introduction to queueing models
- Principles of model design and execution with emphasis on discrete-event simulation
- Overview of simulation languages
- Random number generation
- Random variate generation
- Input data analysis
- Verification and validation of simulation models
- Output analysis for a single model
- Special Topics (time permitting): Evaluation of alternative system designs, design of experiments and variance reduction techniques