Carleton University

Department of Systems and Computer Engineering

SYSC 5001 Discrete Simulation and Modeling Winter 2022

Course Outline

Instructor:
Professor C. Huang
Room 4486ME
Tel: 520-2600 ext. 5730
Email: huang@sce.carleton.ca
http://www.sce.carleton.ca/faculty/huang.html

Office Hours
TBD

Calendar Description
Simulation as a problem solving tool. Random variable generation, general discrete simulation procedure: event table and statistical gathering. Analyses of simulation data: point and interval estimation. Confidence intervals. Overview of modeling, simulation, and problem solving using SIMSCRIPT, MODSIM, and other languages.

Prerequisites
Upon entry into this course, students are expected to have knowledge of: Basic probability theory; A high-level programming language such as C++, Java, or Python

Course Objectives
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 and probability theory. If time permits, special topics such as design of experiments and variance reduction techniques will be discussed.

Text: J. Banks, J. C. Carson II, B. L. Nelson, and D. M. Nicol, Discrete-Event System Simulation, 5/E, ISBN-10:0136062121, ISBN-13: 9780136062127, Pearson, 2010

References:

Lawrence M. Leemis and S. K. Park, *Discrete-Event Simulation: A First Course*, Pearson Education, 2006

H. Perros, *Computer Simulation Techniques: The definitive introduction!*
https://people.engr.ncsu.edu/hp/files/simulation.pdf

Sheldon Ross, *Simulation*, Academic Press; 5th edition (November 5, 2012)

M. Law and W. D. Kelton, *Simulation Modeling & Analysis,* New York: McGraw-Hill, 1991

P. A. Fishwick, *Simulation Model Design and Execution*, Englewood Cliffs, New Jersey: Prentice-Hall

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

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M. C. Jeruchim, P. Balaban, and K. S. Shanmugan, *Simulation of Communication Systems*, Plenum Press, 1992

P. Bratley, B. L. Fox, and L. Schrage, *A Guide to Simulation*, New York: Springer-Verlag, 1987

G. Gordon, *System Simulation*, Prentice Hall, 2nd edition, 1977

I. Stahl., *Introduction to Simulation with GPSS on the PC, Macintosh and VAX*, Prentice Hall, 1990

e-Proctoring
Please note that tests and examinations in this course will use a remote proctoring service provided by Scheduling and Examination Services. You can find more information at https://carleton.ca/ses/e-proctoring/

Marking Scheme

Attendance	10%
Participation	10%
Midterm	20%
Project	20%
Final Exam	40%

Breakdown of Course Requirements

1. Students have to do the project individually.
2. Project will include four deliverables.
3. No late assignments will be accepted.
4. Final exam will cover the whole course with more weight on the contents after Midterm.
5. The final examination is for evaluation purposes only and will not be returned to students. You will be able to make arrangements with the instructor or with the department office to see your marked final examination after the final grades have been made available.

Deadline Policy
A minimum of one week, but normally ten days, will be allowed for completion of all assignments. Late assignments will not be accepted. All assignments shall be submitted online.

Class Schedule
2:35pm-3:55pm, Tuesday and Thursday, Online.

TA Info
TBD

TA Office Hours:
TBD

Checking Marks:

Lists of term marks will be posted on dates to be announced. It is each student's responsibility to check that marks are correct or report any errors by the specified deadline.

Course Schedule:

1. Introduction to Simulation
2. General Principles
3. Simulation Software
4. Statistical Models
5. Input Modeling
6. Random-Number Generation
7. Random-Variate Generation
8. Verification and Validation
9. Performance Estimation
10. Queueing Models
11. Variance Reduction Techniques
12. Special topics if time permit

General Regulations

Student Responsibility: It is the student's responsibility to remain informed of all rules, regulations and procedures required by their program and by the Faculty of Graduate and Postdoctoral Affairs. Ignorance of regulations will not be accepted as a justification for waiving such regulations and procedures.

Academic Integrity: Students should be aware of their obligations with regards to academic integrity. Please review the information about academic integrity at: https://carleton.ca/registrar/academic-integrity/. This site also contains a link to the complete Academic Integrity Policy that was approved by the University's Senate.

Plagiarism: Plagiarism (copying and handing in for credit someone else's work) is a serious instructional offense that will not be tolerated.

Deferred Term Work : Students who claim illness, injury or other extraordinary circumstances beyond their control as a reason for missed term work are held responsible for immediately informing the instructor concerned and for making alternate arrangements with the instructor and in all cases this must occur no later than three (3.0) working days after the term work was due. The alternate arrangement must be made before the last day of classes in the term as published in the academic schedule. For more information, see the current *Graduate Calendar, Academic Regulations of the University, Section 9.3.*

Academic Accommodation: You may need special arrangements to meet your academic obligations during the term. You can visit the Equity Services website to view the policies and to obtain more detailed information on academic accommodation at

http://www.carleton.ca/equity/ For an accommodation request, the processes are as follows:

- **Pregnancy or Religious obligation**: Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details see https://carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf
- **Academic Accommodations for Students with Disabilities**: The Paul Menton Centre for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations in this course, please contact PMC at 613-520-6608 or pmc@carleton.ca for a formal evaluation. If you are already registered with the PMC, contact your PMC coordinator to send me your ***Letter of Accommodation*** at the beginning of the term, and no later than two weeks before the first in-class scheduled test or exam requiring accommodation (*if applicable*). **Requests made within two weeks will be reviewed on a case-by-case basis.** After requesting accommodation from PMC, meet with me to ensure accommodation arrangements are made. Please consult the PMC website (www.carleton.ca/pmc) for the deadline to request accommodations for the formally-scheduled exam (*if applicable*).
- **Survivors of Sexual Violence:** As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and where survivors are supported through academic accommodations as per Carleton's Sexual Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, visit: https://carleton.ca/sexual-violence-support/.
- **Accommodation for Student Activities:** Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation must be provided to students who compete or perform at the national or international level. Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, see https://carleton.ca/senate/wp-content/uploads/Accommodation-for-Student-Activities-1.pdf

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Health and Safety: Every student should have a copy of our Health and Safety Manual. A PDF copy of this manual is available online: http://sce.carleton.ca/courses/health-and-safety.pdf

Students from the University of Ottawa: You can request to have access to cuLearn: please see http://gradstudents.carleton.ca/forms-policies/