Department of Mathematics & Statistics
Concordia University

> ## STAT 461 (MAST 729B)
> Operations Research II
> *Summer 2015*

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Office Hours: Wednesdays, 16:00-17:30.

Text: *Simulation, 5*th Edition, by Sheldon M. Ross (Academic Press).

Objectives: This course is an introduction to the methods of *simulation* and the *Monte Carlo* techniques. Simulation consists of formulating a suitable statistical model for a given system (in economy, industry, insurance etc.) in terms of appropriate random variables and their (joint) distributions, and generating values of those variables on a computer to see how the system works. Monte Carlo techniques are statistical methods for estimating various quantities of interest for the system, based on repeated simulations, which are difficult to compute theoretically based on the model. In Part I of the course we shall review basic probability theory and study methods for generating (pseudo) random variables. In Part-II we shall study simulation of a few complex systems and their estimation using Monte Carlo methods.

Assignments: There will be 3 or 4 assignments. Most of the assignments will involve use of the software –R that will be demonstrated during one class. R is installed on the PCs in the Department's Computer Lab, and a freely downloadable student version can be found at http://www.r-project.org. There will be a few separate questions for undergraduate and graduate students in the assignments and exams.

Final Grade: a) Assignments (15%)
                   b) Mid-term test (30%)
                   c) Final examination (55%)

IMPORTANT: <u>**PLEASE NOTE THAT THERE IS NO "100% FINAL EXAM" OPTION IN THIS COURSE.**</u>

Note: 1) Assignments are compulsory. Late assignments will not be accepted.
2) A mid-term exam will be held on **Wednesday, July 22, 2015**. This exam, as well as the final, will be closed book exams.
3) The final examination will cover everything taught in the course.

Content: <u>Part I:</u> Elements of Probability Theory (Ch.2), Random Numbers (Ch. 3), Generating Discrete Random Variables (Ch. 4), and Generating Continuous Random Variables (Ch. 5).

<u>Part II:</u> The Discrete Event Simulation Approach (Ch. 7), Statistical Analysis of Simulated Data (CH. 8), Variance Reduction Techniques (Ch. 9).