OFFICIAL SYLLABUS

OR 586 – THEORY AND TECHNIQUES OF SIMULATION

Adopted – Spring 2014

(Committee: Drs. S. Chew, E. Sewell)

Catalog Description

Theory and techniques of simulation: generation of random variables, output analysis, variance reduction, and experimental design and optimization. Prerequisites: OR442/IE 468 or OR 585 with a grade of C or better.

Textbook

Simulation Modeling and Analysis, Fourth edition, by A. Law. ISBN: 978-0073294414

Course Outline and Topics

Chapter 7. Random-Number Generators
- 7.1. Introduction
- 7.2. Linear Congruential Generators

Chapter 8. Generating Random Variates
- 8.1. Introduction
- 8.2. General Approaches to Generating Random Variates
- 8.3. Generating Continuous Random Variates
- 8.4. Generating Discrete Random Variates

Chapter 9. Output Data Analysis for a Single System
- 9.1. Introduction
- 9.2. Transient and Steady-State Behavior of a Stochastic Process
- 9.3. Types of Simulations with Regard to Output Analysis
- 9.4. Statistical Analysis for Terminating Simulations
- 9.5. Statistical Analysis for Steady-State Parameters
- 9.6. Statistical Analysis for Steady-State Cycle Parameters

Chapter 10. Comparing Alternative System Configurations
- 10.1. Introduction
- 10.2. Confidence Intervals for the Difference between the Expected Responses of Two Systems
- 10.3. Confidence Intervals for Comparing More than Two Systems
- 10.4. Ranking and Selection

Chapter 11. Variance-Reduction Techniques
- 11.1. Introduction
- 11.2. Common Random Numbers
- 11.3. Antithetic Variates
- 11.4. Control Variates

Chapter 12. Experimental Design and Optimization
- 12.1. Introduction
- 12.2. 2k Factorial Designs
- 12.3. 2k-p Fractional Factorial Designs (Optional)
- 12.4. Response Surfaces and Metamodels

Course Objectives

At the conclusion of this course, students should be able to:

(1) Understand random number generation processes and linear congruential generators.
(2) Understand random variate generation processes and approaches for generating discrete and continuous random variates.
(3) Analyze output data for single systems and compare alternative systems using confidence intervals, ranking and selection, etc.
(4) Study various variance reduction techniques such as common random numbers, antithetic variates, control variates, etc.
(5) Design experiments and optimize performance using response surfaces and metamodels.

Any instructor should cover all of the material specified, additional sections are optional.